Village of Scarsdale

Office of the Village Manager
Scarsdale, New York 10583
914-722-1110
Fax: 914-722-1119
www.scarsdale.com

Jonathan I. Mark, Mayor

Matthew J. Callaghan
Carl L. Finger
Deborah Pekarek
Marc Samwick
William Stern
Jane Veron

Stephen M. Pappalardo,
Village Manager

Village Board Agenda

September 13, 2016
Agenda Committee Meeting - 7:30 PM – Trustees Room
Village Board Meeting - 8:00 PM - Rutherford Hall

Roll Call _____

Pledge of Allegiance _____

Minutes

- Village Board Meeting of August 23, 2016 _____

Bills & Payroll

- Trustee Stern _____

Mayor's Comments _____

Manager's Comments _____

Public Comments _____

Committee Items

Finance Committee – Trustee Samwick

- Resolution re: Fiscal Year 2015-2016 Closeout Balancing Budget Transfers _____
- Resolution re: Acceptance of a Gift for the Scarsdale Public Library Addition and Renovation Project _____

Law Committee - Trustee Finger

- Resolution re: Proposal to retain legal services for Cayuga Pond Stormwater and Sediment Reduction Water Quality Improvement Project (WQIP #57157) _____
- Resolution re: Authorization to Execute a Professional Services Agreement with Antonucci & Associates, Architects & Engineers LLP _____

Municipal Services Committee – Trustee Pekarek

- Resolution re: Awarding VM Contract #1207 Proposal "A" Resurfacing of Various Roads and Various Restoration Work FY 2016/2017 and FY 2017/2018 _____
- Resolution re: Awarding VM Contract #1207 Proposal "B" Installation and Resetting of Granite Curbing and Related Work FY 2016/2017 and FY 2017/2018 _____
- Resolution re: Awarding VM Contract #1207 Proposal "C" Roadway Patches and Restoration Work FY 2016/2017 and FY 2017/2018 _____
- Resolution re: Awarding VM Contract #1207 Proposal "E" Sewer Cleaning and Televising Work FY 2016/2017 and FY 2017/2018 _____
- Resolution re: Authorization to execute an extension of the New York State Department of Transportation State Roads FY 2016/17 Municipal Snow and Ice Removal Agreement _____
- Resolution re: Calling for a Public Hearing on the Number of Taxicabs to be Licensed in 2017 _____

Police Commissioner – Trustee Stern

- Resolution re: Authorization to Execute an Intermunicipal Agreement with Westchester County for the 2016 Stop-DWI Patrol/Datamaster Project _____

Recreation Committee – Trustee Callaghan _____

- Resolution re: VM Contract #1143 – Athletic Field Maintenance Change Order #5

Other Committee Reports

Liaison Reports

Written Communications (55)

- Revaluation (51)
- Friends of the Scarsdale Parks – Library Renovations
- Lika L. Levi – Demolitions – 21 Lockwood Rd
- Tama Seife – Property Maintenance – 21 Circle Rd
- Timothy King – Curbing Installation Thank You Note – 17 Paddington Rd

Town Board Agenda

Town Board Meeting
September 13, 2016
Rutherford Hall, Village Hall

Roll Call

Minutes

- Town Board Meeting of August 9, 2016

Reports

- Report of the Custodian of Taxes as of August 31, 2016

Resolutions

- Resolution re: Real Property Tax Law (RPTL 556), Application for Refund and Credit of Certain Real Property Taxes for the Property at 14 Gorham Road, Scarsdale NY

Future Meeting Schedule

Tuesday, September 13, 2016

- 6:30PM – Finance Committee
    - Review of FY 2015/2016 Financial Statements with Independent Auditors

Friday, September 16, 2016

- 5:00PM – Personnel Committee Meeting
    - Personnel Matter – Evaluation of Employee Performance

      (It is anticipated that a motion will be offered to move into Executive Session to discuss a personnel matter.)

Tuesday, September 27, 2016

- 7:30PM – Agenda Committee Meeting
- 8:00PM – Village Board Meeting

Tuesday, October 25, 2016

- 6:00PM – Municipal Services Committee Meeting
    - Village Center/West Quaker Ridge Traffic Study – Presentation by Village Consultant, TRC Engineers, Inc.

THREE THOUSAND TWO HUNDRED SIXTY-FIRST

LIMITED AGENDA MEETING

Trustees' Room
Village Hall
August 23, 2016

A Limited Agenda Meeting of the Board of Trustees of the Village of Scarsdale was held in the Trustees' Room in Village Hall on Tuesday, August 23, 2016 at 8:30 A.M.

Present were Mayor Mark, Trustees Callaghan, Pekarek (via teleconference), Samwick, and Veron. Also present were Village Manager Pappalardo, Deputy Village Manager Cole, Village Attorney Esannason, Deputy Village Attorney Garrison, Village Clerk Conkling and Assistant to the Village Manager Ringel.

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The minutes of the Board of Trustees Regular Meeting of Tuesday, August 9, 2016 were approved on a motion entered by Trustee Callaghan, seconded by Trustee Veron, and carried unanimously.

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Bills & Payroll

Trustee Samwick reported that he had audited the Abstract of Claims dated August 23, 2016 in the amount of $881,120.50 which includes $55,560.64 in Library Claims previously audited by a Trustee of the Library Board which were found to be in order and he moved that such payment be ratified.

Upon motion duly made by Trustee Samwick and seconded by Trustee Veron, the following resolution was adopted unanimously:

RESOLVED, that the Abstract of Claims dated August 23, 2016 in the amount of $881,120.50 is hereby approved.

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Fire Commissioner

Upon motion entered by Trustee Callaghan, and seconded by Trustee Samwick, the following resolution regarding the Uniformed Firefighters Association Fundraiser for the Muscular Dystrophy Association was approved by a unanimous vote:

WHEREAS, Through a combination of volunteerism and philanthropy, both directly and through the organizations to which they belong, Village employees demonstrate support for Scarsdale community values, including participating in a variety of local and non-local activities and fundraisers benefitting worthwhile causes near and far; and

WHEREAS, the Scarsdale Uniformed Firefighters Association (UFFA) has requested that the Village of Scarsdale authorize a "Fill the Boot" fundraising effort in support of the Muscular Dystrophy Association, to be held in the public areas near the East Parkway and Depot Place entrances to the Scarsdale Train Station; now, therefore, be it

RESOLVED, that the Village Board herein approves and supports the UFFA's efforts for a "Fill the Boot" fundraiser in the public areas near the East Parkway and Depot Place entrances to the Scarsdale Train Station on September 09, 2016, from 6:00 am – 9:00 am, for the benefit of the Muscular Dystrophy Association.

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Future Meetings

Mr. Mark announced the following future meeting schedule:

- *Tuesday, September 13, 2016* – Finance Committee Meeting – 6:30 P.M. – Trustees' Room
- *Tuesday, September 13, 2016* - Agenda Meeting – 7:30 P.M. – Trustees' Room
- *Tuesday, September 13, 2016* - Village Board Meeting– 8:00 P.M. – Trustees' Room
- *Wednesday, September 14, 2016* – Personnel Committee Meeting – 6:30 P.M. – Trustees' Room
- *Tuesday, October 25, 2016* – Municipal Services Committee Meeting – 6:00 P.M. – Trustees' Room

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Village Hall Schedule

- *Monday, September 5, 2016* - Labor Day – Village Hall Closed

There being no further business to come before the Board, Trustee Veron moved to adjourn the meeting at 8:35 A.M., seconded by Trustee Callaghan and carried by a unanimous vote.

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Donna M. Conkling
Village Clerk

RESOLUTION RE: **FISCAL YEAR 2015-2016 CLOSEOUT BALANCING BUDGET TRANSFERS**

WHEREAS, Pursuant to the provisions of Section 5-520 of the New York State Village Law, the Board of Trustees, by resolution, may transfer funds from existing and unexpended balances; from a contingent account; from available cash surplus or unanticipated revenues within a fund; or by borrowing; and

WHEREAS, at the end of the Village Fiscal Year 2015-2016, it is necessary to make balancing modifications to and from various accounts of already existing appropriations in the budget based on actual results of operations; and

WHEREAS, the final 2015-2016 audit has been completed and in all cases, there are sufficient unexpended balances in various accounts, excess revenues or fund balances available to cover the transfers; now therefore be it

RESOLVED, that pursuant to Village Law Section 5-520, the Board of Trustees hereby authorizes and directs the proper Village officers to modify the 2015-2016 Budget by making the following transfers identified on the attached spreadsheet; and be it further

RESOLVED, that a sum of up to $1,212,500 from the audited 2015-2016 General Fund Balance, if prudent and needed, be appropriated to the 2016-2017 Capital Fund accounts as specified below, in accordance with the FY 16/17 Budget Adoption Resolution of April 26, 2016, regarding road resurfacing and highway equipment, and the September 9, 2016 memorandum regarding the Sewer Rent Fee funding correction, attached hereto and made a part hereof:

FROM:		
	A-9999-9999-9999 Use of Fund Balance	$1,212,500
TO:	A-9990-TRNFR-TRNFR-950-9550-.0 General Fund Transfer to Capital:	$1,212,500
TO:		
	H-1000-030-5031-01 Transfer from General Fund	$1,212,500
TO:		
	H-5197-963-2017-055 Road Resurfacing, Curbing	$500,000
	H-5197-963-2017-052 Highway Equipment	$100,000
	H-9999-9999-9999 Fund Balance for previously appropriated Sanitary Sewer Projects	$571,500
	H-5197-963-2017-061B Heathcote Rd Brdg – Design & Construction	$41,000

Submitted by: Village Manager
Date: September 13, 2016
For: September 13, 2016

RESOLUTION RE: **ACCEPTANCE OF A GIFT FOR THE SCARSDALE PUBLIC LIBRARY ADDITION AND RENOVATION PROJECT**

WHEREAS, the Scarsdale Library Board completed a Master Plan dated June 10, 2013 which identifies a number of building renovations and additions that will increase the capacity of the Library to provide a broader range of rapidly evolving library services while maintaining popular traditional collections and programs by offering a more balanced utilization of the building space within a safe, attractive and inviting comfortable environment, said master plan supported by the Scarsdale Village Board of Trustees via resolution dated April 8, 2014 (attached); and

WHEREAS, the improvements identified in the Master Plan will transform the Library into a multi-purpose community asset for future generations, maintain its preeminent status among free public libraries in the County and State, enhance its technological capacity to further library services and create a physical environment that will be a welcoming and versatile learning center; and

WHEREAS, the Scarsdale Public Library Board, at their October 21, 2013 meeting, authorized the retention of the fund raising consulting firm of Plan A Advisors, P.O. Box 165, Thornwood, NY 10594, to design and conduct a capital campaign to implement such a project, subsequently identified in the July 20, 2015, Schematic Design Report prepared by Dattner Architects, at an estimated construction cost of $16,500,000 and total project cost of approximately $19,500,000; and

WHEREAS, in accordance with a Village Board request at a March 07, 2016, Committee of the Whole meeting, the Library Board and Architect value engineered the schematic design plans, reducing the total project cost to $17,900,000, as identified in Option A-1 (attached), which the Architect presented at the July 19, 2016, Committee of the Whole meeting; and

WHEREAS, two separate gifters wish to donate towards the Scarsdale Public Library Addition and Renovation Capital Improvement Project: The Friends of the Scarsdale Library has offered to donate a gift of $34,203.70, and Mary Beth Evans and Dan Moretti have offered to donate a gift of $500; and

WHEREAS, pursuant to Policy #106: "*Gifts to the Village of Scarsdale*" of the Village of Scarsdale Administrative Policies & Procedures Manual, acceptance of all gifts valued at $500 or greater must be approved by the Village Board of Trustees; now, therefore, be it

RESOLVED, that the Village Board hereby accepts the gifts of $34,203.70 from the Friends of the Scarsdale Library and $500 from Mary Beth Evans and Dan Moretti toward the Scarsdale Public Library Master Plan Improvement Project; and be it further

RESOLVED, that the Village Treasurer take the necessary steps to complete the transaction and deposit these financial gifts of $34,203.70 and $500 in the Library Capital Campaign Account; and be it further

RESOLVED, that the Board of Trustees hereby extends their heartfelt thanks and great appreciation to both the Friends of the Scarsdale Library and to Mary Beth Evans and Dan Moretti for their generosity and commitment to the Scarsdale Public Library and Community.

Submitted by: Village Manager
Date: September 7, 2016
For: September 13, 2016

RESOLUTION RE: PROPOSAL TO RETAIN LEGAL SERVICES FOR CAYUGA POND STORMWATER AND SEDIMENT REDUCTION WATER QUALITY IMPROVEMENT PROJECT (WQIP #57157)

WHEREAS, the 2009 Village Wide Comprehensive Stormwater Management Plan (SWMP) found that the Sheldrake River Drainage Basin includes one of the most complicated flood prone sub-drainage basin areas in the Village, including the sub drainage basin area identified as SR3, located within the FEMA designated 100-year flood plain; and

WHEREAS, previous Village work within the SR3 sub drainage basin area, supporting both water quality and flood mitigation, included a 2015 project targeting accumulated silt removal from the open water course between Seneca and Cayuga Roads and infrastructure improvements to enhance both capacity and flow rates; and

WHEREAS, based on the Village's desire to continue its efforts to improve the Sheldrake River Drainage Basin within critical sub-drainage basin SR3, and building upon the effectiveness of the 2015 work, staff applied for a NYSDEC Water Quality Improvement (WQIP) Grant to construct a sediment forebay and spillway detention at Cayuga Pond ("Pond") to reduce sediment deposition downstream, thereby improving water quality and providing flood mitigation benefits; and

WHEREAS, In December, 2015 the Village was awarded a $1.4 million WQIP grant requiring a 25% ($350,000) local match, a portion of which can be met through in-kind services; and

WHEREAS, in order to take advantage of the awarded funds and construct the project, the Village must obtain several temporary construction access easements as well as a permanent easement for storage and ongoing maintenance of a pump station by property owners who surround and own Cayuga Pond; and

WHEREAS, the Montana based environmental consulting firm of Trout Headwaters, Inc. and the California based environmental law firm of Nossaman LLP, have been retained to represent the Cayuga Pond property owners to assist them in understanding the intended hydrological and water quality benefits of the proposed Cayuga Pond project, and

WHEREAS, Trout Headwaters submitted a letter dated August 10, 2016 (attached) requesting extensive documentation from the Village requiring much time and effort to compile at the risk of project delays in accordance with the NYS approved project schedule, and

WHEREAS, based on the extensive information requested and the potential operational and legal current and future ramifications, Village staff believes it prudent to retain the environmental law firm of Sive Paget & Riesel, P.C. to advise the Village on environmental and legal matters as it relates to the Cayuga Pond Project; now therefore, be it

RESOLVED, that the Village Manager is, herein, authorized to execute the proposal to retain legal services dated August 22, 2016, in substantially the same form as attached hereto, between the Village of Scarsdale and Sive Paget & Riesel P.C., for legal services associated with the Cayuga Pond Stormwater and Sediment Reduction Water Quality Improvement Project, WQIP Project #57157; and be it further

RESOLVED, that the Village Manager shall take all appropriate administrative acts required for the successful completion of the terms of the proposal.

Submitted by: Village Manager
Date: September 09, 2016
For: September 13, 2016

RESOLUTION RE: AUTHORIZATION TO EXECUTE A PROFESSIONAL SERVICES AGREEMENT WITH ANTONUCCI & ASSOCIATES, ARCHITECTS & ENGINEERS LLP

WHEREAS, following the New York State Department of Transportation biennial inspection in June 2014, the Heathcote Road Bridge received a red flag rating and report indicating that the abutment located on the southern portion of the bridge needed immediate attention; and

WHEREAS, in order to properly address the red flag, the Village of Scarsdale hired Antonucci & Associates, Architects & Engineers LLP (AAAE) to design a temporary support structure, as well as assess the entire structure for stability; and

WHEREAS, while the temporary support has addressed the immediate issue, AAAE determined that a large scale rehabilitation project is necessary to improve the overall long term stability of the bridge; and

WHEREAS, professional engineering consultant support is necessary for the design of the Heathcote Bridge Rehabilitation Project, and the engineering consulting firm of AAAE has provided excellent engineering support thus far for the Village in its effort to maintain the Heathcote Road Bridge; and

WHEREAS, in recognition of AAAE's knowledge of the Heathcote Road Bridge and their previous satisfactory performance on both this bridge and Public Works Department salt shed currently under construction, a professional service agreement for a fee not to exceed $41,000 has been negotiated with AAAE, to provide professional engineering services related to the Heathcote Road Bridge Rehabilitation project, as further described in the Agreement; now therefore be it

RESOLVED, that the Village Manager is hereby authorized to execute a professional service agreement with Antonucci & Associates, Architects & Engineers LLP, 50 Fifth Avenue, Pelham, NY, for engineering services associated with the Heathcote Road Bridge Rehabilitation project for a fee not to exceed; $41,000; and be it further

RESOLVED, that the cost of said services be charged to Capital Budget Account # H-5197-963 201-061B-Hwy-Heathcote Rd Brdg-Dsn&Constr.; and be it further

RESOLVED, that the Village Manager is hereby authorized to undertake all administrative acts pursuant to the agreement.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: **AWARDING, VM CONTRACT #1207 PROPOSAL "A" RESURFACING VARIOUS ROADS AND VARIOUS RESTORATION WORK FY 2016/2017 AND FY 2017/2018**

WHEREAS, the Village Manager reports that he publicly advertised for the receipt of bids on August 5, 2016 and notified eleven vendors of a contract for road resurfacing and various restoration work, pursuant to VM Contract #1207; and

WHEREAS, on the bid opening date, August 23, 2016, four bids were received for Proposal "A": Resurfacing of Various Roads and Various Restoration Work; and

WHEREAS, the lowest responsible bid, meeting all specifications for Proposal "A", was from PCI Industries, 550 Franklin Avenue, Mount Vernon NY 10550, based on the unit bid prices identified for Items 1-10; and

WHEREAS, PCI Industries, has successfully performed roadway resurfacing for the Village in the past and has proven the ability to supply the required quantities of material; now therefore be it

RESOLVED, that VM Contract #1207 Proposal "A": Resurfacing of Various Roads and Various Restoration Work, be awarded to PCI Industries, 550 Franklin Avenue, Mount Vernon NY 10550, for a two year term expiring August 31, 2018; and be it further

RESOLVED, that VM Contract #1207 Proposal "A" unit bid prices are itemized as follows: Bid Item 1 Asphaltic Concrete Wedge Course – $ 200.00 per ton; Bid Item 2 Asphaltic Concrete Wearing Course (402.1279) – $ 104.70 per ton; Bid Item 3 Asphaltic Concrete Wearing Course (402.097202) – Not included in contract; Bid Item 4 Asphaltic Concrete Wearing Course (402.068101) – Not included in contract, Bid Item 5 Base Course (402.3779) - $ 250.00 per ton Bid Item 6 Cold Milling - $ 4.50 per square yard; Bid Item 7 Resetting of Manhole Castings – $ 500.00; Bid Item 8 Resetting of Storm Catch Basin Castings - $ 600.00; Bid Item 9 Resetting of Water Valve Boxes - $ 375.00, Bid Item 10 Installing new manhole frame and castings - $ 750.00, based on estimated work quantities not to exceed budgeted appropriations; and be it further

RESOLVED, that the contract work be charged to FY 2016/2017 Capital Account #H-5197-963 2017-055 ($516,000: Anticipated ConEd Reimbursement [$104,000], Pave NY Grant [$37,000], and FY 2015/16 closeout transfer

[$375,000]), with the FY 2017/18 work subject to adequate budget appropriation; and be it further

RESOLVED, that the Village Manager is hereby authorized to execute VM Contract #1207 Proposal "A" with PCI Industries, 550 Franklin Avenue, Mount Vernon NY 10550, and to undertake administrative acts as may be required under said agreement.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: AWARDING, VM CONTRACT #1207 PROPOSAL "B" INSTALLATION AND RESETTING OF GRANITE CURBING AND RELATED WORK FY 2016/2017 AND FY 2017/2018

WHEREAS, the Village Manager reports that he publicly advertised for the receipt of bids on August 5, 2016 and notified eleven vendors of a contract for road resurfacing, furnishing and installation of granite curbs, and various restoration work, pursuant to VM Contract #1207; and

WHEREAS, on the bid opening date, August 23, 2016, three bids were received for Proposal "B": Installation and Resetting of Granite Curbing and Related Work; and

WHEREAS, the lowest responsible bid, meeting the specifications for Proposal "B, was from Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583, based on the unit bid prices identified for Items 1 and 2; and

WHEREAS, Acocella Contracting Inc., has successfully performed granite curbing work for the Village in the past and has proven the ability to supply the required quantities of material; now therefore be it

RESOLVED, that VM Contract #1207 Proposal "B": Installation and Resetting of Granite Curbing and Related Work, be awarded Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583, for a two year term expiring August 31, 2018; and be it further

RESOLVED, that VM Contract #1207 Proposal "B" unit bid prices are itemized as follows: Bid Item 1 New Granite Curbing - $ 24.75 per linear foot; Bid Item 2 Resetting Existing Curbing - $17.25 per linear foot, based on estimated work quantities not to exceed budgeted appropriations; and be it further

RESOLVED, that the contract work be charged to FY 2016/2017 Capital Account H-5197-963 2017-055 ($125,000 FY 2015/16 closeout transfer) and H-5197-963 2017-057 ($20,000), with the FY 2017/18 work subject to adequate budget appropriation; and be it further

RESOLVED, that the Village Manager is hereby authorized to execute VM Contract #1207 Proposal "B" with said Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583, and to undertake administrative acts as may be required under said agreement.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: **AWARDING VM CONTRACT #1207 PROPOSAL "C" ROADWAY PATCHES AND RESTORATION WORK FY 2016/2017 AND FY 2017/2018**

WHEREAS, the Village Manager reports that he publicly advertised for the receipt of bids on August 5, 2016 and notified eleven vendors of a contract for road resurfacing, furnishing and installation of granite curbs, and various restoration work, pursuant to VM Contract #1207; and

WHEREAS, on the bid opening date, August 23, 2016, one bid was received for Proposal "C": Roadway Patches and Restoration Work; and

WHEREAS, the lowest responsible bid, meeting the specifications for Proposal "C":, was from Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583, at the unit bid prices identified for Items 1-9; and

WHEREAS, Acocella Contracting Inc., has successfully performed roadway patch work for the Village in the past and has proven the ability to supply the required quantities of material; now, therefore, be it

RESOLVED, that VM Contract #1207 Proposal "C": Roadway Patches and Restoration Work be awarded to Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583, for a two year term expiring August 31, 2018; and be it further

RESOLVED, that VM Contract #1207 Proposal "C" unit bid prices are itemized as follows: Item 1 Remove temporary pavement - $ 58.00 per square yard; Item 2 Asphalt Roadway Patch Delamination Repair - $ 36.00 per square yard; Item 3 Provide all labor, equipment and material to place 6" high machine asphalt curbing – $ 12.00 per linear foot; Item 4 reset granite curbing – $ 12.00 per linear foot; Item 5 Supply and install granite curbing - $20.00 per linear foot; Item 6 Adjusting manholes to grade - $ 100.00 each; Item 7 Adjusting catch basins to grade - $ 150.00 each; Item 8 Adjust water valve boxes to grade - $ 50.00 each; Item 9 Furnish & setting water valve box adapters - $ 25.00 each, based on estimated work quantities not to exceed budgeted appropriations; and be it further

RESOLVED, that the cost of the contract work be charged to FY 2016/17 Water Fund Operating Budget: EWS–8310–DSTRB–EXCAV–400 416 ($40,000), with the FY 2017/18 work subject to adequate budget appropriation; and be it further

RESOLVED, that the Village Manager is hereby authorized to execute VM Contract #1207 Proposal "C" with said Acocella Contracting Inc., 68 Gaylor Road, Scarsdale, NY 10583 and to undertake administrative acts as may be required under said agreement.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: **AWARDING VM CONTRACT #1207 PROPOSAL "E" SEWER CLEANING AND TELEVISING WORK – FY 2016/2017 AND FY 2017/2018**

WHEREAS, the Village Manager reports that he publicly advertised for the receipt of bids on August 5, 2016 and notified eleven contractors of the contract for Sewer Cleaning and Televising Work, pursuant to VM Contract #1207; and

WHEREAS, on the bid opening date, August 23, 2016, one bid was received for Proposal "E": Sewer Cleaning and Televising Work; and

WHEREAS, the lowest responsible bid, meeting the specifications for Proposal "E", was from Fred A. Cook, Jr. Inc., based on unit bid prices identified for Items 1 – 4; and

WHEREAS, staff has reviewed the bid response, and spoken with references provided in the bid material, and has determined that Fred A. Cook Jr. Inc. is capable of performing the work as described in the contract; now therefore be it

RESOLVED, that VM Contract #1207 Proposal "E": Sewer Cleaning and Televising Work, be awarded to Fred A. Cook Jr. Inc., P.O. Box 70, Mount Vernon NY 10548, for a two year term expiring August 31, 2018; and be it further

RESOLVED, that VM Contract #1207 Proposal "E" unit bid prices are itemized as follows: Item 1 Cleaning of 6" – 8" pipes - $3.00 per linear foot; Item 2 Cleaning of 10" – 12" pipes - $3.00 per linear foot; Item 3 Cleaning of 15" – 18" pipes - $3.00 per linear foot; Item 4 Cleaning of 24" – 36" pipes - $3.00 per linear foot, Item 5 Daytime Emergency 6" - 36" pipe – $495.00 per hour, Item #6 Evening Emergency 6" - 36" pipe – $600.00 per hour, Item 7 Weekend and Holiday Emergency 6" – 36" pipe – $600.00 per hour, based on estimated work quantities not to exceed budgeted appropriations; and be it further

RESOLVED, that the contract work be charged to FY 2016/2017 Capital Account #H-8120-965 2017-093 ($60,000); and be it further

RESOLVED, that the Village Manager is hereby authorized to execute VM Contract #1207 Proposal "E" on behalf of the Village of Scarsdale with said Fred A. Cook Jr. Inc., P.O. Box 70, Mount Vernon NY 10548, and to undertake administrative acts as may be required under said agreement.

Submitted by: Village Manager
Date: September 8, 2016
For: September 13, 2016

RESOLUTION RE: **AUTHORIZATION TO EXECUTE AN EXTENSION OF THE NEW YORK STATE DEPARTMENT OF TRANSPORATION STATE ROADS FY 2016/17 MUNICIPAL SNOW AND ICE REMOVAL AGREEMENT**

WHEREAS, pursuant to Section 12 of the New York State Highway Law, the maintenance of State highways includes control over snow and ice removal, as authorized by the New York State Department of Transportation (NYSDOT); and

WHEREAS, snow and ice control on State highways, 15.7 miles of which are located within the Village of Scarsdale, may be performed by the host municipality pursuant to an agreement entered into by the municipality and the NYSDOT; and

WHEREAS, in the interest of public safety and plowing expediency, the Village of Scarsdale has historically provided such service to NYSDOT since 1999 through successive amendments to the Indexed Lump Sum Municipal Snow and Ice Agreement, the latest of which was executed in January 14, 2014 (attached), thereby extending the original agreement through June 30, 2015, with said agreement continuing in force until a successor agreement is proffered by the NYSDOT; and

WHEREAS, the NYSDOT recently delivered a one-year extension Agreement for the 2016/17 season (attached), retroactive to July 1, 2016, and terminating June 30, 2017; and

WHEREAS, the new estimated index lump sum expenditure is $1,578.00 per lane mile for a total of $24,774.60; now, therefore, be it

RESOLVED, that the Village Board of Trustees hereby authorizes the Village Manager to execute the New York State Index Lump Sum Municipal Snow and Ice Extension Agreements for the 2016/17 winter season between the Village of Scarsdale and the New York State Department of Transportation for snow and ice removal services, in substantially the same form as attached hereto; and be it further

RESOLVED, that the Village Manager is, herein, authorized to undertake all administrative acts required pursuant to the terms of the Agreements including the execution of any amendments to the above cited extension.

Submitted by: Village Manager
Prepared: September 8, 2016
For: September 13, 2016

RESOLUTION RE: CALLING FOR A PUBLIC HEARING ON THE NUMBER OF TAXICABS TO BE LICENSED IN 2017

RESOLVED, that a Public Hearing is hereby called by the Board of Trustees of the Village of Scarsdale to be held in Rutherford Hall in Village Hall on Tuesday, September 27, 2016, at 8:00 pm in Rutherford Hall in the Village of Scarsdale to determine the number of taxicabs to be licensed in Scarsdale in 2017, pursuant to Section 272-3 of the Village Code; and be it further

RESOLVED, that the Village Clerk is directed to advertise said Public Hearing.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: **AUTHORIZATION TO EXECUTE AN INTERMUNICIPAL AGREEMENT WITH WESTCHESTER COUNTY FOR THE 2016 STOP-DWI PATROL/DATAMASTER PROJECT**

WHEREAS, the County of Westchester and its municipalities have participated in the Westchester County STOP-DWI Patrol/Datamaster Project for many years through an intermunicipal agreement which provides overtime reimbursement for added patrol efforts to enforce New York State Vehicle & Traffic Laws against intoxicated and impaired driving; and

WHEREAS, in 2011, the Westchester County Board of Legislators granted authority for the Westchester County STOP DWI Program to enter into an agreement with the Village of Scarsdale for a five (5) year term commencing January 1, 2011 and ending December 31, 2015; and

WHEREAS, Westchester County now desires to continue the program and to extend it for another five years from January 1, 2016 through December 31, 2020 and wishes to establish a grant, not to exceed $8,400, in each of those years; and

WHEREAS, the Chief of Police of the Village of Scarsdale recommends continuing the program and has indicated its success in past years as an educational and enforcement tool for promoting safe driving throughout the Village; now, therefore, be it

RESOLVED, that the Village Manager is herein authorized to execute the inter-municipal agreement between the Village of Scarsdale and Westchester County, in substantially the same form as attached hereto, for an annual grant award not to exceed $8,400; and be it further

RESOLVED, that the Village Manager is herein authorized to undertake any administrative acts required under the terms of the agreement.

Submitted by: Village Manager
Date: September 9, 2016
For: September 13, 2016

RESOLUTION RE: VM CONTRACT #1143 – ATHLETIC FIELD MAINTENANCE – CHANGE ORDER #5

WHEREAS, the Village Board of Trustees approved a resolution at its February 26, 2013 meeting (attached) awarding VM Contract #1143 – Athletic Field Maintenance to Greenway Property Services, 3 Rye Ridge Plaza #181, Rye Brook, NY 10573, for a two year period from March 2013 to March 2015, at a total cost of $53,466; and

WHEREAS, the lump sum base bid contract work includes mowing, fall cleanup and spring cleanup for six Village athletic field properties, with unit bid prices also provided for certain additional maintenance services as needed and determined by the Superintendent of Parks and Recreation, such services including purchase, removal and installation of sod, additional field mowing and a labor rate for additional labor; and

WHEREAS, the Village Manager approved Change Order #1 dated March 22, 2013 (attached) for additional field maintenance improvement work on athletic ball fields at Crossway Fields #1 and #2, Winston Field, and Supply Fields #1 and #2 in the amount of $9,892.50; and

WHEREAS, the Village Board of Trustees approved Change Order #2 dated October 22, 2013 (attached) for additional field maintenance improvement work on athletic ball fields at Supply Field #1 and #2, Hyatt Field #2 and Crossway Field #3 in the amount of $7,505; and

WHEREAS, the Village Board of Trustees approved Change Order #3 dated October 12, 2014 (attached) for additional field maintenance improvement work on athletic ball fields at Crossway Fields #1, #2, #3 and Winston Field #2 in the amount of $10,834; and

WHEREAS, VM Contract #1143 – Athletic Field Maintenance expired in March of 2015 and contract specifications indicated that the Village Manager may extend the contract annually for two additional one year periods;

WHEREAS, on February 6, 2015, the Village Manager approved a one year contract renewal with Greenway Property Service in the amount of $27,107.26 in accordance with the Consumer Price Index for 2014 of 1.4%; and

WHEREAS, the Village Board of Trustees approved Change Order #4 dated November 10, 2015 (attached) for additional field maintenance improvement work on athletic ball fields at Hyatt Fields #1 and #2 and Crossway Field #3 in the amount of $8,022; and

WHEREAS, on February 18, 2016, the Village Manager approved a one year contract renewal with Greenway Property Service in the amount of $27,134.37 in accordance with the Consumer Price Index for 2015 of .1%; and

WHEREAS, in July 2016, Village staff reviewed all athletic properties and further recommends additional improvements to install sod and clay in the ball field infields at Supply Fields #1, #2, and Crossway Fields #1 and #2 in accordance with Change Order #5 (attached); and

WHEREAS, the total cost for Change Order #5 is $12,777.50, as further detailed in the attached memorandum, resulting in a total revised contract amount of $156,738.63 including a total aggregate contract change order cost of $49,031.00; and

WHEREAS, section 2.9 (A) of the Village Internal Control Policy requires the Village Board of Trustees to approve change orders that exceed $10,000 in the aggregate for contracts less than $100,000; now therefore be it

RESOLVED, that in accordance with Section 2.9 (A) of the Village Internal Control Policy, the Village Board of Trustees herein approves Change Order #5 for VM Contract #1143 – Athletic Field Maintenance, in the amount of $12,777.50; and be it further

RESOLVED, that the cost for the additional work be charged to the FY 2016/2017 Department of Parks, Recreation and Conservation operating budget Account A-7020-PLGRD-MAINT-400-499.

Submitted by: Village Manager
Date: September 8, 2016
For: September 13, 2016

TOWN BOARD MEETING

Trustees' Room
Village of Scarsdale
August 9, 2016

A Meeting of the Town Board of Scarsdale was held in the Trustees' Room of Village Hall on Tuesday, August 9, 2016 at 11:40 P.M.

Present were Mesdames Pekarek and Veron; and Messrs. Callaghan, Finger, Samwick, Stern, and Mark. Also present were Village Manager Pappalardo, Deputy Village Manager Cole, Assistant Village Manager Richards, Town Counsel Esannason, Deputy Town Counsel Garrison, , Town Clerk Conkling, and Assistant to the Village Manager Ringel.

Mr. Mark presided.

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Minutes

The minutes of the Town Board Meeting of July 12, 2016 were approved on a motion entered by Ms. Pekarek, seconded by Mr. Samwick, and carried unanimously.

The minutes of the Special Town Board meeting of July 26, 2016 were approved on a motion by Mr. Stern, seconded by Mr. Finger, and carried unanimously.

****

Report of the Custodian of Taxes

Assistant to the Village Manager Ringel reported on behalf of Custodian of Taxes McClure. He stated that the Board has received the Town financial reports for July 2016.

Mr. Ringel noted that 99.14% of the County tax levy has been collected. This is up slightly from last year's collection rate of 98.92%.

The Treasury staff continues to collect the 2016 Village Tax. Collections through August 1, 2016 were 95.53% which is up from the 2015 collection rate of 94.61% (through August 1st). Reminder notes will be sent out this week.

****

Resolutions

Upon motion by Mr. Samwick, seconded by Ms. Pekarek, the following resolution regarding an Real Property Tax Law (RPTL 556), Application for Refund and Credit of Certain Real Property Taxes for the Property at 14 Gorham Road, Scarsdale, New York was adopted the vote indicated below:

WHEREAS, Petitioners, Richard G. and Lucille A. Fontana, owners of property located at 14 Gorham Road, which is identified as Section 06, Block 11, Lot 3B on the official tax map of the Town of Scarsdale, filed Applications for Refund and Credit of Real Property Taxes on June 30, 2016, for certain years at issue; and

WHEREAS, as a result of owner remittance of a certified survey of the property to the assessor, it was shown that various prior assessment rolls reflected an error of land size for the property, .41 acre rather than .23 acre, which error went unnoticed by the property owner, resulting in taxes paid above fair value; and

WHEREAS, in accordance with the applicable three-year statute of limitations for refunds resulting from a clerical error, refunds for taxes paid for the following tax periods are owing:

- April 1, 2016 County taxes;
- April 1, 2015 County taxes, July 1, 2015 Village taxes and 2015 School taxes;
- April 1, 2014 County taxes, July 1, 2015 Village taxes and 2014 School taxes;
- July 1, 2013 Village taxes and 2013 School taxes; and

WHEREAS, in a June 30, 2016, letter from the Executive Director of the Westchester County Tax Commission, as attached hereto, the Executive Director determined that a clerical error occurred, as defined in RPTL §550.3(c) and recommended that the applications for refunds that total $17,769.83, representing the excess 2013, 2014, 2015, and 2016 taxes described above, paid by the property owner and as further detailed in the attached worksheet, be approved by the assessing body, the Town of Scarsdale; now, therefore, be it

RESOLVED, that the Town Board acknowledges and agrees with the findings of the Westchester County Tax Commission that Petitioner's Applications for Refund and Credit of Real Property Taxes for the tax years 2013, 2014, 2015, and 2016 constitute a correctible error necessitating the refund of applicable County, Village, and School taxes in the amount of $17,769.83; and be it further

RESOLVED, that Petitioner's Applications for Refund and Credit of Real Property Taxes for the tax years 2013, 2014, 2015 and 2016 are herein approved and that the Town Manager is directed to communicate the Town Board's determination to the Petitioner and effectuate the refund of said taxes set forth and described herein.

AYES	NAYS	ABSENT
Mr. Callaghan	None	None
Mr. Finger		
Ms. Pekarek		
Mr. Samwick		

Mr. Stern
Ms. Veron
Mr. Mark

* * * * * * *

Future Meetings

Mr. Mark announced the following future meeting schedule:

- *Wednesday, August 17, 2016* – Committee of the Whole – 6:55 P.M.
- *Tuesday, August 23, 2016* – Limited Agenda Village Board Meeting – 8:30 A.M. – Trustees' Room
- *Tuesday, September 13, 2016* – Finance Committee Meeting – 6:30 P.M. – Trustees' Room
- *Tuesday, September 13, 2016* - Agenda Meeting – 7:30 P.M. – Trustees' Room
- *Tuesday, September 13, 2016* - Village Board Meeting– 8:00 P.M. – Trustees' Room
- *Wednesday, September 14, 2016* – Personnel Committee Meeting – 6:30 P.M. – Trustees' Room
- *Tuesday, October 25, 2016* – Municipal Services Committee Meeting – 6:00 P.M. – Trustees' Room

* * * * * * * *

Village Hall Schedule

- *Monday, September 5, 2016* - Labor Day – Village Hall Closed

* * * * * * * *

There being no further business to come before the Board, the Town Board meeting adjourned at 11:45 P.M.

Donna M. Conkling
Town Clerk

RESOLUTION RE: **REAL PROPERTY TAX LAW (RPTL 556), APPLICATION FOR REFUND AND CREDIT OF CERTAIN REAL PROPERTY TAXES FOR THE PROPERTY AT 14 GORHAM ROAD, SCARSDALE, NY**

WHEREAS, Petitioners, Richard G. and Lucille A. Fontana, owners of property located at 14 Gorham Road, which is identified as Section 06, Block 11, Lot 3B on the official tax map of the Town of Scarsdale, filed Applications for Refund and Credit of Real Property Taxes on June 30, 2016, for certain years at issue; and

WHEREAS, as a result of owner remittance of a certified survey of the property to the assessor, it was shown that various prior assessment rolls reflected an error of land size for the property, .41 acre rather than .23 acre, which error went unnoticed by the property owner, resulting in taxes paid above fair value; and

WHEREAS, in accordance with the applicable three-year statute of limitations for refunds resulting from a clerical error, refunds for taxes paid for the following tax periods are owing:

- April 1, 2016 County taxes;
- April 1, 2015 County taxes, July 1, 2015 Village taxes and 2015 School taxes;
- April 1, 2014 County taxes, July 1, 2014 Village taxes and 2014 School taxes;
- July 1, 2013 Village taxes and 2013 School taxes; and

WHEREAS, in a June 30, 2016, letter from the Executive Director of the Westchester County Tax Commission, as attached hereto, the Executive Director determined that a clerical error occurred, as defined in RPTL §550.3(c) and recommended that the applications for refunds representing the excess 2013, 2014, 2015, and 2016 taxes described above, paid by the property owner and as further detailed in the attached worksheet, be approved by the assessing body, the Town of Scarsdale; and

WHERAES, this item was previously considered and approved by resolution of the Town Board at their August 9, 2016 meeting (attached), however subsequent to the passage of the resolution it was discovered that there was an error in the calculation of the refund amount, resulting in the resolution requiring re-approval; now, therefore, be it

RESOLVED, that the Town Board acknowledges and agrees with the findings of the Westchester County Tax Commission that Petitioner's Applications for Refund and Credit of Real Property Taxes for the tax years 2013, 2014, 2015, and 2016 constitute a correctible error necessitating the refund of applicable County, Village, and School taxes; and be it further

RESOLVED, that Petitioner's Applications for Refund and Credit of Real Property Taxes for the tax years 2013, 2014, 2015 and 2016 are herein approved and that the Town Manager is directed to communicate the Town Board's determination to the Petitioner and effectuate the refund of said taxes set forth and described herein.

Submitted by: Town Assessor
Date: September 9, 2016
For: September 13, 2016

Dear Mayor Mark,

I was hoping that you could clarify a discrepancy with the "Uniform Percent of Value" on the 2016 tax roll.

The tentative 2016 tax roll, published on the Scarsdale website, has the value of "Uniform Percent of Value" at 100. At the August 17, 2016 meeting with Mr. Ryan, he explained that the revaluation that he presented was done with the value of "Uniform Percent of Value" at 94. At this same meeting, Ms. Albanese admitted that the 100 in the tentative 2016 tax roll was a mistake.

Why hasn't this mistake been corrected? It is important to know the "Uniform Percent of Value" in order to interpret the results of the grievance process. In other words, if the house is assessed at $1M with the "Uniform Percent of Value" at 94, the market value of the house as of July 1, 2015 would be $1,063,829.79, or 6.38% higher.

Please let me know.

Since the answer could be of interest to other Scarsdale residents, could you please publish this email and the answer on Scarsdale website.

Thank you in advance,

Alexander Paranyuk

Mr. Mayor,

First of all I would like to thank you for yesterday's meeting and for answering residents questions.

At last night's meeting, you informed the residents that the format of the meeting with Mr. Ryan on August 10, 2016 would only allow for written questions. I understand your desire to keep the meeting orderly and to allow more questions to be asked. However, the format that you have chosen may prevent us from resolving the issues at hand, seeing as Mr. Ryan will have the opportunity to give evasive or incomplete answers. Perhaps, in order to compromise, Mr. Ryan could answer written questions during the first half of the meeting and use the second half of the meeting to address remaining unresolved concerns through direct follow up questions.

This format would achieve your goals by keeping the meeting organized and structured, while also appeasing the numerous residents who feel as though the board is not looking out for the best interest of the whole village but rather is trying to defend Mr. Ryan.

I kindly ask that you please publish my proposal on the Scarsdale website, and let me know if this compromise is attainable.

Thank you in advance,

Alexander Paranyuk

From: Barbara Underhill <bunderhill@optonline.net>
To: 'mayor@scardale.com'; 'jveron.villagetrustee@gmail.com'; 'stern.bill@yahoo.com'; 'debpekarekbot@gmail.com'; 'MJC49C@gmail.com'; 'marc.samwick@verizon.net'
Sent: Wednesday, August 10, 2016 11:30 AM
Subject: AUGUST 17 FORMAT

I was unable to get to the meeting last night and have read Mayra's analogy of the circumstances. She is absolutely on target. We will be allowed to write our dissatisfaction on a 2 by 5" index card? How many of the 1500 will you be able to take?

Ms. Pekarek you want residents to be civil?

How could Ms. Pekarak make such a statement. Is she not a resident? Maybe her taxes were lowered so she can be civil about the injustice that has been done. The incivility began when Ryan was hired to undo what had been done, yo great expense, two years ago. Those who were unhappy grieved and had their taxes adjusted and now either have to grieve again or sue. Where is the benefit?

You all applied for the job you are being called upon to do. Having been HIRED, you chose to take the easy way out, spend the money and get it back from the income of unwarranted taxes from the people you want to get rid of so that million dollar homes can take the place of affordable housing from those who are not fortunate enough to be billionaires.

I have already written what Ms. Pekarek would call an uncivil letter to Mayor Marks. I feel I am climbing a 12,000 foot mountain of uncivility.

Barbara Underhill

Ms. Pekarek you want residents to be civil? Have any of you considered saying to the residents 'We are sorry?' 'We are sorry that almost all of us at the dais voted for the reval. We are sorry that we never googled Ryan or his employees. We are sorry that we did not oversee the village managers and allowed them to let Albanese to inflict great damage upon the residents

COMMENTS REGARDING VALUATION METHODOLOGY

The purpose of this memo is to lay out what I believe to be John Ryan's valuation methodology. Although I am fairly confident, I may not be exactly right. Even if I am not exactly right, I think I am close enough to develop specific questions that will get the full story. I hope Mr. Ryan is prepared to explain his methodology in a complete and transparent way.

Background.
John Ryan told Nanette Albanese in a June 15, 2016, email that, "The final values used in this revaluation are determined via an ALGORITHMIC process that anyone can replicate.... [T]he process is completely transparent."

Well, perhaps "anyone" can replicate it they know what it is, but Mr. Ryan has consistently failed to explain it.

During the November 17, 2015, meeting of the Committee of the Whole, I had a dialogue with Mr. Ryan. I told him,

> I just [wonder] what you are doing. With Tyler's model, once I had the sales data, I could reproduce the model exactly using Excel, using the standard multiple linear regression. I would like to be able to do that once your model is complete. So, I'm anticipating, I'm trying to understand, what your model is, or your models, and what the inputs are, and what the mathematical techniques...

He replied, "That's a fair request, and when the time is appropriate, I'm, we'll be more than happy to share that information."

So far, nothing. On July 18, I submitted a FOIL that requested, in part

> Documents that show explicitly the derivation of all "coefficients" and "multipliers" used in the valuation of single family residences, as presented in the **Scarsdale Valuation Sheets 2016 - For Web.pdf** document that is posted on the website....
>
> This request is not limited to general descriptions of the process. I am requesting spreadsheets and/or other documents that show explicitly and mathematically how the "coefficients", "multipliers" and land "amounts" were derived from basic inputs.

Village Hall responded to most of the rest of my FOIL, but the response here was that the request "is for data Ryan has not provided the Village, therefore, no such record exists."

The Uniform Standards of Professional Appraisal Practice ("USPAP") Standard 6, Rule 6-8 states in part that,

> Each written report of a mass appraisal must:
>
> ...

(k) describe and justify the model specification(s) considered, data requirements, and the model(s) chosen;

> Comment
> …The report must include a discussion of the rationale for each model, the calibration techniques to be used, and the performance measures to be used.

….

(m) describe calibration methods considered and chosen, including the mathematical form of the final model(s); describe how value conclusions were reviewed; and, if necessary, describe the availability of individual value conclusions; …

My Best Guess

While I hope Mr. Ryan soon decides to honor his commitments and obligations, I have decided to present my best guess as to his methodology. To cut to the chase, I believe Mr. Ryan used the "Hybrid Appraisal Models" procedure of a statistical software product known as NCSS[1]. An NCSS document that explains this procedure can be found here, and I have provided a copy as Exhibit A. I believe this is a roadmap to Mr. Ryan's methodology.

I will explain in this section why I think this is the software that he used. In following sections, I will discuss the methodology built into the software and its implications.

First, Mr. Ryan referred positively to NCSS statistical software in a September 19, 2014 email to Michael Thrapp (an IT person) with cc to Ms. Albanese.[2] This was even before he had the contract with Scarsdale.

> NCSS, the statistical software that provides the capability to generate values, has two procedures that allow one to "force" otherwise statistically insignificant variables into a valuation model.

This sounds good – magically getting significance out of insignificant variables.

Second, the email includes a complicated formula that fairly well resembles a complicated formula that appears in the NCSS document. You do not have to understand these formulas to see the resemblance. This is the formula that Mr. Ryan's email provides as an "example of what a simple valuation model looks like".

Overall	Date^(B1) *(B2)^(Neighborhood=4) *(B3)^(Neighborhood=6)
Land	LotAdjusted^(B8) *((B9) *LotSize)
Building Grade	Linear^(B4) *((B5) *SqFt1stFlr +(B6) *SqFtOthFlr +(B7) *Baths)
Garage	(B10) *GarageSqFt

[1] The acronym "NCSS" refers to "Number Cruncher Statistical Software".

[2] A copy is provided as Exhibit B. I have converted the email to pdf for electronic versions of this analysis.

This is the formula that appears on Page 4 of the NCSS document[3] as, "[a]n example of the form of a full hybrid appraisal model".

$$\begin{aligned} Sale\ Price = {} & b_1^{HERRICK} \times b_2^{SKYGLADE} \times & [Overall] \\ & (SoilQuality^{b_7} \times (b_8 \times LandSQFT + b_9 \times SLOPE) + & [Land] \\ & QUAL^{b_3} \times (b_8 \times SQFT + b_5 \times KitchenUpgrades + b_6 \times Age) + & [Building] \\ & ShedQuality^{b_{10}} \times (b_{11} \times ShedSQFT - b_{12} \times ShedAge)) & [Addition] \end{aligned}$$

I see many similarities.

- Mr. Ryan stacks "Overall", "Grade", "Building" and "Garage" on the left side. The NCSS example stacks "Overall", "Land", "Building" and "Addition" on the right side.
- Same structure.
- Same types of combinations of additions, multiplications and exponents.
- Both formulas are someone's logical idea of the components of the sale price of a real estate property.
- Mr. Ryan puts "Neighborhood = 4" and "Neighborhood = 6", where NCSS puts "HERRICK" and "SKYGLADE". Herrick and Skyglade seem like they could be examples of neighborhoods.
- Mr. Ryan uses familiar Scarsdale suburban terms like "SqFt1stFlr" and "Baths", where NCSS uses "SoilQuality" and "ShedSQFT", indicating a more agricultural situation. Either way, these are the known property characteristics
- Mr. Ryan uses B1, B2, etc. where NCSS uses b_1, b_2, etc. Either way, these are the unknowns – the numbers that you want to solve for.

I will more into the theory of this in the next section. *The basic point for now is simply that the two complicated formulas, each described as an "example", are similar in form and structure. It is unlikely that all these similarities are coincidental.*

Before getting to the third point, I will digress and explain the term "hybrid appraisal model." If you have traced through the derivation of your property's value in the "2016 Residential Valuation Detail Sheet", you will have seen that the value is built up through a fairly lengthy combination of additions and multiplications. This combination of additions and multiplications is a hybrid model. A hybrid model is more complicated than models that are just additive or just multiplicative. The *IAAO[4] Standard on Automated Valuation Models (AVMs)* (2003), provided

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[3] All page numbers references are to the pdf pages. The page numbers that actually appears on the NCSS document are messed up.

[4] IAAO = International Association of Assessing Officers.

here and as Exhibit C, explains the three types of models on Pages 9-10, in the section titled, Direct Market Models.[5]

Thus, the third point is that everything here involves hybrid appraisal models. The formula embedded in our detail sheets is a hybrid model. Although his email does not use the term "hybrid", he attached a "Valuation Detail Example" from another project, provided as Exhibit D. This clearly resembles the Scarsdale sheets and a tracing through of the calculation shows that it also used a hybrid formula. And the NCSS document is titled "Hybrid Appraisal Models" and describes the how to use the software to fit these models.

Some additional points

- I have not been able to find any other vendor offering statistical software that supports hybrid models in mass appraisals.
- NCSS is an IAAO "Industry Partner".

NCSS Methodology: How do you Fit Hybrid Models and Why do you need Special Software?

The point here is not to get too technical about the NSCC methodology. I assume that any interested person with math aptitude can read the NCSS document themselves and will understand in detail how the approach differs from ordinary least square multiple regression, as was used by Tyler in 2014.

The point here is to describe the NCSS methodology in a more simple way, just deeply enough to convey the risks and issues associated the method.[6]

It is helpful to start with some basics. A "model" is simply a mathematical representation of reality. A simple model (a simple conceptualization) is that real estate sale prices are a multiple of the square footage plus a constant. As a formula, you would say

$$Sale\ Price = b_0 + (b_1 \times SquareFeet).$$

b_1 is the multiple of the square footage and b_0 is the constant. These can be referred to as the "parameters" of the model.

The next step is to use real data – real sales with real prices and real square footages – to derive numbers for b_0 and b_1. This is known as "fitting" the model.[7]

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[5] Page 2 shows that John F. Ryan, CAE, served as a reviewer for the Standard.

[6] None of this is intended as a criticism of NCSS. This appears to be fantastic software supporting many traditional and new statistical techniques applicable to many realms. NCSS is responsible about providing warnings, as discussed below.

[7] The appraisal industry refers to this as "calibrating" the model. USPAP Standard 6, Rule 6-4(c), Comment: "Calibration refers to the process of analyzing sets of property and market data to determine the specific parameters of a model."

More than 100 years ago, mathematicians developed a technique that could solve for b_0 and b_1 in our simple example. The answer might be something like this.

$$Sale\ Price = \$200{,}000 + (\$300 \times SquareFeet)$$

We can refer to this technique as simple linear regression. Scarsdale High School has courses that explain how to do this. Excel has functions that will do this. Not only can you do this, but there are associated tests to determine how good the fit is, or how bad, and how much is not explained just by square footage, etc.

A more advanced technique (multiple linear regression) can fit a model, *i.e.*, a formula, that has more data inputs and more parameters. For, enhance our simple model by also considering the lot size. In addition to b_0 and b_1, you want to find b_2 in the following formula.

$$Sale\ Price = b_0 + (b_1 \times SquareFeet) + (b_2 \times Acres)$$

And based on your data, the result could be something like this.

$$Sale\ Price = \$150{,}000 + (\$250 \times SquareFeet) + (\$750{,}000 \times Acres)$$

This can be extended to many more inputs (age, number of bathrooms, condition of the house, neighborhood, etc.), solving for more unknowns (b_3, b_4, etc.). Tyler used this for its "model estimate." Tyler's model was more complicated than the simple examples above, but it could still be solved with the multiple linear regression function in Excel, quickly.

But at some point, peoples' imaginations as to a *really good* model/formula went beyond what the traditional methods can solve for. Even before I was alerted to the NCSS software and document, and before I saw the use of the term "hybrid" in this context, it was clear to me that Mr. Ryan's formula, as implied in the detail sheets, combines the additive and multiplicative elements in ways that the traditional techniques simply cannot handle.

The NCSS document explains a relatively new type of technique. This technique is basically an advanced, computer assisted form of trial and error. NCSS actually describes it as "(intelligent) trial and error."

> The coefficients … of a hybrid appraisal model are estimated from a (hopefully large) number of properties where the attribute values are known and the sale price is known. Whereas the coefficients in additive models (and some multiplicative models) may be estimated using multiple regression analysis (a closed form solution), the coefficients in hybrid models cannot. Instead, the coefficients must be estimated by nonlinear methods and (intelligent) trial and error. (Page 5.)

This is an approach that could not have been employed before the computer era, and it cannot be done with an Excel function. Here is the idea, greatly simplified.

- Tell the computer your goal, for example, "minimize the average of the absolute percent errors. These percent errors are the difference between the actual and predicted sale prices divided by the actual price." (Page 6.)

- Set some settings that control the algorithm. By my count, there are close to 20 of these. NCSS recommends defaults, but also advises that the defaults might not always work.

- Develop some "starting values".

- The computer tweaks starting the starting values and calculates the results. If the tweak improves the numbers it is kept. Otherwise rejected.

- The computer repeats the process over and over for all the items – tweak, calculate, accept or reject.

- Of course, everything is interdependent, so if the computer tweaks one item, and then multiple other items are tweaked, the first tweak might not be helping anymore.

- Continue repeating the process until the additional iterations do not get you closer to your goal. This is called "convergence".

Hopefully, everything eventually "converges", producing a stable result that meets the standards.

What Can Go Wrong?
The traditional methods use formulas and algorithms that will always get a solution – and will always get the same solution for the same inputs. The traditional methods also come with traditional tests of significance that tell a user when a result should not be relied upon. NCSS's modern, computer assisted trial and error does not have all these protections.

I am not an expert in this field, so I will just quote some of the warnings that appear in the NCSS document itself.

The process might not converge, and if it does not converge you really have to know what you are doing to modify certain "options".

> When confronted with the series of … options in the procedure, the task of setting proper values may seem daunting. Ideally, the default set of options would always yield convergence and a 'best' estimated model. Unfortunately, in practice, convergence is sometimes not achieved with the default options. (Page 10.)

Even if it converges, there is no guarantee that the process creates the best estimate.

> Because hybrid models don't have a closed form solution, iterative methods must be used to determine the estimated coefficients of the models. While these methods allow for increased flexibility in the types of models that may be considered, convergence on a "best" model estimate is not guaranteed. (Page 8.)

What this also implies is that different goals, different setup options and different starting values can converge to different results. Even just changing the starting values could result in different results -- the algorithm might converge on different "local" optimums but not on the "global" optimum.

The data could be a problem, and could cause repeated runs to give different results.

> We have found that in some cases, the nature of the data does not give a stable solution, even though the algorithms converge. For this reason, we recommend that the analysis be run more than once, with the same settings, even when the run seems to complete normally. In the cases where repeated runs give different results (perhaps with substantially varying coefficient estimates), there may be problems in the dataset itself causing the issue. (Page 10.)

It is recognized that the process can result in poor estimates. The software actually produces a report of "Poorly Estimated Properties".

> This report shows those rows with a large (percentage) difference from the estimated sale price to the actual sale price. The percent error cutoff … is 30%. Each row in this report should be analyzed to determine if there is some underlying explanation as to why the estimation is so poor. In some cases it may be reasonable to try re-estimating the same model without these poorly estimated properties, to determine their influence. (Page 21.)

NCSS's license agreement (in another document) includes a clear disclaimer.

> NO WARRANTY OF PERFORMANCE. Dr. Jerry L. Hintze does not and cannot warrant the performance or results that may be obtained by using NCSS. Accordingly, NCSS and its documentation are licensed "as is" without warranty as to their performance, merchantability, or fitness for any particular purpose. ***The entire risk as to the results and performance of NCSS is assumed by you.*** Should NCSS prove defective, you (and not Dr. Jerry L. Hintze nor his dealers) assume the entire cost of all necessary servicing, repair, or correction. (Emphasis added.)

An Interesting Evasion

Assuming he used this methodology, Mr. Ryan's failure to explain it may have been because he was aware of the risks and complexities.

In retrospect, there was a specific occasion where Mr. Ryan avoided answering a straightforward question that should have revealed his use of the NCSS algorithm or any other similar software. At the April 21, 2016, Committee of the Whole, starting at about 192:19 on the recording posted on the village website, Ron Parlato asked a great question.

> Ron Parlato: Does your program have artificial intelligence programmed into it? Have you gotten up to that new technology or no?

John Ryan: The sales inform the model. It's all market based.

Ron Parlato: So, you don't have artificial intelligence here, okay.

Although I simplified the explanation of NCSS's trial and error algorithm, the algorithm definitely falls into the mainstream definition of "artificial intelligence".

> The method used in NCSS for making adjustments to the coefficients for each iteration is differential evolution....
>
> Differential evolution is one of a group of *genetic algorithms* (see for example, the recent book by Haupt (1998)). (Page 5.)

The Wikipedia article on Artificial Intelligence explicitly discusses "genetic algorithms" as well as "evolutionary computation" and "evolutionary algorithms".

So, Mr. Ryan just evaded Mr. Parlato's question, and left Mr. Parlato with the false impression that the assessment modeling was not dependent on this "new technology". I was at the meeting, and it also left me with that impression.

The Software Generates Reports

It is clear from the NCSS documentation that their software generates many reports. Even if he was using a different software product, it would have produced reports.

I would expect that any responsible person using software of this sort for anything important (such as the creation of a $10 billion assessment roll) would save the reports. This has to be standard operating procedure. Assuming he used this software, did Mr. Ryan not save the reports or did not provide them to the Assessor? Perhaps they are sitting in a village computer in Village Hall, but the Assessor does not know this.

Reports from prior runs would certainly help in understanding the path that Mr. Ryan took to get to the final run. Were there more sales? Were there too many "poorly estimated properties?

All available reports should be disclosed immediately.

Ratio of Estimates to Actuals

One of the mathematical features of traditional linear regression (for example as used by Tyler) is that the sum of the actuals (sales prices) always equals the sum of the estimates (value estimates based on the derived formula). In other word, overall, the ratio of the estimates over the actuals is 100%.

As a genetic algorithm – implementing an advanced form of trial and error – the NCSS model does not inherently preserve this 100% relationship. And, in fact, as seen in his sales base and

his report, the ratio for the estimates over the actuals is in the range of 93-94%.[8] In retrospect, this low ratio should have been a red flag.

Does the use of the NCSS Methodology Explain why Mr. Ryan Excluded Sales?
This is an important question and I am not quite sure of the answer.

First, as a basic point, it is always possible that the underlying data simply does not strongly support any model.

- As an example, the data could contain internal inconsistencies -- situations where one property is clearly superior to another property based on the characteristics, but the superior property had the lower sale price. This could happen, and there might not be any objective basis for saying that one of them is wrong. The market is not that efficient, and perhaps the Scarsdale real estate market really was unsettled during the analysis period.

- As another example, there may not be enough information to say that specific fitted values are statistically significant. The analogy is that you cannot poll the election by sampling only ten people. Even if seven people say Clinton, you cannot say with any confidence that she gets 70% of the vote. Or, if you test a new drug by giving it to ten people and none of them get bad side effects, you cannot confidently say the drug is safe. With a small sample size and a large diversity of neighborhoods, grades, conditions, etc, many of the derived values could have huge "margins of error" and are just not credible.

These problems could affect any model, a simple traditional model as well as NCSS's advanced algorithm, but I can think of reasons why the latter could be more problematic.

- Mr. Ryan's hybrid model is just so ambitious, with so many refinements that did not exist in the Tyler model. It is a nice idea, but it just might not have been supportable.

- Traditional regression methods have traditional tests that warn when the results are not statistically significant. In other words, better or more familiar red flags.

- The NCSS methodology – an advanced trial and error – might have just taken too long to run. Long run times without convergence would be very frustrating. This may have limited Mr. Ryan's ability to modify the model to better adapt to the data.

I repeat that these are just some thoughts I have, not hard factual claims. The whole idea is that Mr. Ryan should provide hard factual explanations and documentation.

In any event, if you are having trouble fitting a model, it has to be tempting to discard inputs. This is a temptation that has to be avoided. I know others will ask about it, so I do not want to go further in making accusations.

---

[8] I have written elsewhere that the reported Uniform Percentage of Value on the Tentative Roll should have been 94%, not 100%.

But I will say what a responsible person should have done if in fact it was clear that the data did not support a significant result. A responsible person should have "put the pencil down" and should have informed the client that the assignment could not be completed. It would not have been a terrible thing if Scarsdale had to go another year with the Tyler-based values.

Land

I did not have had time in this analysis to explore whether NCSS software or similar software many have contributed to land anomalies.

I have previously submitted questions regarding the land situation, so I hope Mr. Ryan answers them in his initial presentation.

Questions

Based on the foregoing, here are some specific questions that I would ask Mr. Ryan. I will augment this by Wednesday. Obviously, if he totally denies using NCSS or any other AI-type software, the questions go in other directions.

- Exactly what software did you use to fit your model? Did you use the NCSS Hybrid Appraisal Models procedure?
- Why have you not previously disclosed your use of this technology?
- What is your understanding of the risks associated with this technology? Did you encounter problems consistent with those risks? What did you do to manage those risks/problems?
- In the course of working with the software, did you initially begin with more than 220 sales? How many? Why were some excluded?
- Was the software installed and used on a Scarsdale computer?
- Did the software produce documentation? Did you save it? Where is it?
- Did the Appraiser or anyone in her office ask about the software and the methodology? Did you ever explain it? Did you ever explain the risks? [Parallel questions for the Appraiser.]
- When did you start the calibration process? When did you complete it? How many hours/days did you spend on it?

Michael Levine
August 13, 2016

Daniel J. Killourhy

196 Johnson Road

Scarsdale, New York 10583

daniel.killourhy@gmail.com

914-661-3804

Regarding the recent flawed and inadequately documented revaluation, it seems that there is a reasonable basis for invalidating the most recent Ryan update. If there is a way to do this legally it appears that this is the way to proceed and would be fair to the vast majority of taxpayers. Individual taxpayers will still have the option to grieve assessments established under the previous Tyler revaluation.

Daniel J. Killourhy

From: Daniel <daniel.shefter@yahoo.com>
Sent: Friday, August 12, 2016 3:22 PM
To: Mayor
Subject: Revaluation Fiasco

Mayor Mark:

I have been a Scarsdale resident for for most of the past 6 years, although I was living with my family in Europe for the past year and rented out my house on Fox Meadow Rd. While I have been out of town, I have still been paying close attention to the revaluation that was performed by J. F. Ryan and the assessor's office. This revaluation has been very distressing both from the perspective of the flawed analysis that resulted in highly distorted changes in property tax values as well as the incredibly opaque process that produced these results. Thus, I am writing to express my disappointment with the officials that have overseen this process as well as to encourage everyone in town hall to be more transparent with the residents they serve.

From a personal perspective, the revaluation resulted in a proposed assessed value that is more than 50% above the market value of my house. In fact the new proposed land value for my property is well in excess of what I paid for my house just 3 years ago and completely distorted from reality. Nobody that actually understands the Scarsdale real estate market and visited my property could have made such a mistake.

My even bigger concern is the opaque nature of the entire revaluation process and the unwillingness of those in charge to respond openly and candidly to the many residents that have worked very hard to understand how Ryan went about its revaluation exercise. In particular:

- it appears Ryan excluded a large percentage of sales transactions without justification and the town has been unwilling to disclose or explain these omissions
- it doesn't appear that anyone did any due diligence on Ryan before they were hired despite numerous complaints from residents of other towns
- it took a huge effort to get the town to agree to have Ryan come back to attend a public session where residents can ask questions about their process, and now that they are finally going to attend a meeting the town has established restrictive rules for how questions can be asked. Censoring residents by requiring them to submit questions on index cards and allowing officials to select the questions is not appropriate for this type of session
- it appears that the town has been unwilling to fulfill valid freedom of information requests from residents on a timely basis that would help residents understand important details of the revaluation process.

My belief is the results of the whole revaluation should be discarded given the flawed results. However, regardless of the decision, it is clear that this revaluation will be costly for Scarsdale both in terms of lost revenue (from those who received unjustified reductions in their property values) as well as the loss of trust of many Scarsdale residents in the governance of their village. Perhaps some of this trust can be regained by making an effort to be incredibly transparent going forward and not to try to censor residents at upcoming meetings rather than trying to ostracize those who are exercising their rights in our democracy.

Best regards
Daniel Shefter

Donna Conkling

From: David Dachinger <firetrax@mac.com>
Sent: Sunday, August 21, 2016 8:15 PM
To: Mayor; Clerk's Department; Steve Pappalardo; Wayne Esannason; Robert Cole; marc.samwick@verizon.net; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; MJC49C@gmail.com; Bill Stern
Subject: Revaluation Disaster

Dear Village Officials,

We are 19 year residents of Scarsdale, where we raised 2 children and have been active in the community, including volunteering over 10 years in emergency services.

We are appalled and dismayed with the way the 2016 reval was conceived and conducted. Every day we are hearing more disturbing details about the Scarsdale Assessor's unethical behavior, her unprofessional treatment of Scarsdale residents and wasting of our tax dollars on a reval that was unnecessary and completely flawed.

We have read numerous articles, attended Board of Trustees meetings where Ryan and Albanese spoke and have received perspective from real estate professionals who understand how all this will negatively impact Scarsdale's real estate market and home values.

Due to the coming increase in our taxes from this reval, (which has now raised our home assessment more than 12% above where the 2014 reval was), we are forced to refinance simply to help offset this impending increase.

Please consider invalidating this disastrous reval and bring in a new assessor to clean up this mess before the situation gets any worse.

Sincerely,
David & Tamara Dachinger
Crossway

From: Debrah Dweck <debrahd@verizon.net>
Sent: Monday, August 22, 2016 11:19 AM
To: Mayor
Subject: Fw: reval meeting

From: Debrah Dweck
Sent: Sunday, August 21, 2016 11:21 AM
To: editor@scarsdalenews.com
Subject: reval meeting

To the editor:

To be a witness on Wednesday night Aug. 17 at village hall was to hear one hour of obfuscation by Mr. Ryan, giving technical gobbledygook at $200 per hour.

Why the village officials allowed this, is an exercise in fiduciary ineptitude.

You don't need to be a psychologist to know that Mr. Ryan is a human parasite, hired by New Caanan and Scarsdale to fleece the taxpayers.

Abraham Dweck
Carthage Road

From: Debrah Dweck <debrahd@verizon.net>
Sent: Thursday, August 11, 2016 11:17 AM
To: Mayor
Subject: meeting at 6:55 PM on August 17

I think it is imperative that we be allowed to question Ryan orally and not submit questions on index cards. The fact that he has to be paid to appear to answer questions on his reval is outrageous enough. He should not be allowed to pick and choose which questions he will answer.

Debrah Dweck

From: Gary Levy <Gary.Levy@CohnReznick.com>
Sent: Wednesday, August 10, 2016 11:48 AM
To: Mayor
Subject:

>
> Mr. Mayor,
>
> I recently learned that you are not allowing citizens of Scarsdale speak at the upcoming meeting not ask direct questions at the meeting. Rather you would like us to provide written questions prior to the meeting. This will enable Ryan and the Board to spend time determining which questions to answer and which ones to tip toe around.
>
> I must insist in full Transparency from the Board and our hired consultant. Not allowing an open dialogue is not how our government operates. There are so many questions that have been asked that have fallen on deaf ears. Such as:
> Why were over 150 sales excluded from Ryan's work?
> Why have has the Board not provided this information as required with FOIL.
> Who reviewed Ryan's work?
> Why was it accepted in calculating the new tax assessments?
> Was there no discussion or thought about the ramifications?
> Who decided to forward to NYS so our new tax rolls would be established and our only option as a citizen is to file a grievance?
> Why was there such a large change in values from the Taylor valuations?
> Didn't Ryan review Taylor's work and approve it?
>
> The only answer we've gotten is. "We as a Board are powerless to do anything about this." Do you know how outlandish that sounds? Makes me wonder why we even have or need a Board of Trustees.
>
> I would be comfortable having a small group of concerned citizens to speak ask questions on our behalf.
>
> Thank you.

Gary Levy, CPA
Partner
Hospitality Industry Practice Leader
Tel: 646-254-7403
Mobile: 917-747-7284
Fax: 646-834-4155
Gary.Levy@CohnReznick.com

From: Sunil Subbakrishna <sunil.subbakrishna@gmail.com>
Sent: Thursday, August 11, 2016 4:26 PM
To: Mayor
Subject: Revaluation

Dear Mayor Mark & Village Trustees,

We have been watching the reval drama unfold with increasing shock and dismay. A group of vocal concerned citizens have raised substantive, disturbing issues with Ryan's revaluation methodology and the lack of proper oversight by Village staff and the board.

What we have heard from you so far is "follow the process", and "we are powerless to do anything". In other words, no accountability for either elected officials or village staff, but a full employment bonanza for the cottage industry of mass grievance filers.

Rather than waste your time criticizing these citizens for their tone and lack of civility, or telling us about your angst and sleepless nights, you should focus on the only two questions that really matter:

- Are you willing to acknowledge that there is a serious problem?
- Are you going to do something about it?

The citizens that you are disparaging have done the rest of us taxpayers a great service. The taxpayers of this town deserve to have honest, competent village staff and elected representatives who are looking out for our interests.

Geetha and Sunil Subbakrishna
22 Lockwood Rd
Scarsdale, NY 10583

Donna Conkling

From: Helen Levitin <hlevitin@yahoo.com>
Sent: Thursday, August 11, 2016 12:49 AM
To: mayor@scardale.com
Cc: marc.samwick@verizon.net; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; MJC49C@gmail.com; Bill Stern; Bill Stern; JMARK58@aol.com; Clerk's Department
Subject: Meeting with Mr Ryan on August 17, 2016

Mr. Mayor,

First of all, I would like to thank you and the whole village board of trustees for finally arranging the meeting with Mr. Ryan, so that he can answer the various questions raised by the residents regarding the 2016 revaluation.

However, as several people noted last night, the meeting format that has been selected, in which the residents are unable to directly ask Mr. Ryan questions, seems ineffective. This format appears to protect Mr. Ryan from being forced to address the resident's concerns, and does not reflect what the residents have been asking for.

The village residents have been waiting for two months for this meeting to take place and we do not want it to go to waste. As the taxpayers, the residents are paying for Mr. Ryan to appear and answer their questions. It would be reasonable to expect that the meeting be setup in a manner than suits the residents' needs.

The meeting format that you are imposing would allow Mr. Ryan to direct the conversation and spend hours addressing an issue of his choosing, while the residents would be unable to have their concerns addressed.

Based on Mr. Ryan's presentation at the meeting of the Committee of the Whole on April 21st, I am truly astonished by Mr. Ryan's ability to bloviate around the issues, without providing any actual substance. Therefore, it is necessary to ensure that Mr. Ryan is not merely spewing empty rhetoric in the meeting on August 17th.

As recent meetings in the village hall have revealed, many Scarsdale residents have a strong professional understanding of the real estate market, models, models validation, etc. These residents, as well as others, ought to have the opportunity to express their concerns and receive answers to their questions.

Without the ability to directly confront Mr. Ryan and ask him follow-up questions, the meeting will likely be a complete waste of time and money.

I hope that in light of the aforementioned reasons you will reconsider your decision, and will allow direct questions to be asked of Mr. Ryan.

Best regards,
Helen Levitin

PS.
I kindly ask that you please publish my email on the Scarsdale website.

Donna Conkling

From: Helen Levitin <hlevitin@yahoo.com>
Sent: Wednesday, August 10, 2016 11:47 PM
To: mayor@scardale.com
Cc: marc.samwick@verizon.net; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; MJC49C@gmail.com; Bill Stern; Bill Stern; JMARK58@aol.com; Clerk's Department
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Best regards,
Helen Levitin

PS.
I kindly ask that you please publish my email on the Scarsdale website.

From: hfweitz@verizon.net <hfweitz@verizon.net>
Sent: Friday, August 26, 2016 12:56 PM
To: Mayor; Wayne Esannason
Cc: Mayra Rodriguez Valladares
Subject: Fwd: Today's Scarsdale Inquirer

Dear Mr. Mark and Mr. Esannason:

In view of the newly disclosed facts reported in today's Inquirer, the Village appears to have reached a tipping point regarding the 2016 reval. This controversy is no longer only a matter of disputed models, statistics and omitted sales. It has rather graduated to emails being withheld from FOIL requests, misstatements at public meetings and withholding of material facts from from the BOT, past and present. Unfortunately this sounds too much like a Washington D.C. crises.

In short, if the reporting is correct, the Village was induced to enter into the Ryan reval contract without having been given notice of a competing bid that had been made by Tyler and without knowledge of prior contacts between Ryan and the Town Assessor.

My prior arguments to you regarding voiding of the assessment values based on breach of contract in the performance aspect of the contract pale in light of today's disclosures. While I have not used the term "fiduciary responsibility" to date, I believe there is no better time than to invoke it now. The BOT in my view has an obligation to advise the NYS Tax Department that it is withdrawing Ryan's valuations based upon the unseemly circumstances that surrounded the Village's BOT being led into a contract with major pertinent facts being withheld from the board.

Respectfully yours,
Howard Weitz

Donna Conkling

From: Jody Keltz <jodybkeltz@gmail.com>
Sent: Tuesday, August 23, 2016 9:04 AM
To: Mayor; Attorney's Office; Steve Pappalardo; Clerk's Department
Subject: Ryan reval

To whom it may concern:

I attended the meeting at Village Hall on August 17 to hear Mr. Ryan and Ms. Albanese discuss the 2016 reval. I was struck by many things including the absolute inability of Mr. Ryan to defend his results in any meaningful way, the lack of time spent vetting the credentials of Mr. Ryan and his firm and the failure by Mr. Ryan to create and/or preserve supporting documentation. I was confounded by the fact that our tax dollars went to Mr. Ryan to act as a monitor for the Tyler reval, that he approved the Tyler reval and that, not two years later, he found the methods employed by Tyler to be impractical going forward.

I was also awed by the intelligence and sense of fairness held by various village residents who took countless hours away from their families and their livelihoods to try and make some sense out of the Ryan reval by reviewing the data, but could not make any sense of it.

Before I attended the meeting, I believed that justice had not been served by the Ryan reval but that it was result oriented. However, being an attorney and not an appraiser, I had little proof except for a small detail on my 2016 residential valuation detail sheet. My family and I live in a small house in Edgewood that is on one of the most well-trafficked roads in the Village. At any given time, there are cars racing down our street to and from Immaculate Heart of Mary Church or to Equinox Gym. Cars park illegally by fire hydrants and double and triple park unloading children near the church. Interestingly, the 2016 residential valuation detail sheet states that the traffic on the road is "light".

At the meeting, I learned that the Ryan associate who did most of the "ground" work, based on his own reporting, could not have spent more than three and one-half minutes appraising each house in the Village, assuming no breaks. The statement of "light" traffic can only be supported if the appraiser gave our three and one-half minutes to some other road.

In the interests of accuracy, completeness, equity and fairness, I am not sure how the Village can continue to support the reval.

Sincerely,

Jody B. Keltz

JODY B. KELTZ
168 GAYLOR ROAD
SCARSDALE, NY 10583

August 15, 2016

Dear Mayor Mark,

I have been a resident of Scarsdale, NY since 1998, 18 years. My children grew up her and attended Scarsdale schools. They are now out of the house but I have chosen to remain in Scarsdale, and I have never questioned that decision until now.

When the first reval took place two years ago, we graciously let the inspector in our home in order that a fair evaluation could be made. At the end of the process, we were informed that our assessment would be decreased. We also learned that small homes like ours had been unfairly assuming a portion of the tax burden of the larger Scarsdale homes and that we would not see any adjustment in our taxes to the following year.

Before we had a moment to revel in the possibility of a lower and a fairer tax assessment, we were notified that Scarsdale was paying for another reval. This was incredible to us for so many reasons (waste of money and time to say the least). But we had a sense the fix was in because there had been so much rumble in the Scarsdale Inquirer about the new assessments by those residents in larger homes (with the concomitant ability to apply pressure through litigation).

I didn't speak up at that time because, as an optimist, I believed that the situation would end with a fair result.

I have been proved wrong. As a preliminary matter, no one came to my house to review anything the second time around. Just recently in June, I received a letter from the village which stated that my assessment was going up by $107,000. The letter was dated June 1, 2016. While I am not sure exactly when it was received by me, I do recall that when I checked it shortly after I received it, the time to file a grievance had already expired. So instead of the reduction which was expected, we received a 20% increase. Fascinating.

While I know ignorance of the procedure is no excuse for failure to act, I wasn't sure exactly what to do because, after the first reval, I was notified that the assessment was going down but nothing happened. So I incorrectly assumed that I could sit on my hands for a bit waiting for some sort of notice that there would be no other reval and this is the one the village really meant. I accept the responsibility for that, and I will file my grievance next year.

Thank you,

Jody B. Keltz

From: Jon L. Waldman <jonwaldman11@gmail.com>
Sent: Wednesday, August 17, 2016 3:08 PM
To: Mayor
Subject: Reval

Dear Mayor Mark,

I wanted to send you a quick email because I am unable to attend this evening's meeting regarding the recent revaluation. My name is Jon Waldman and I live at 33 Chesterfield Road in Fox Meadow.

With all of the complaints about the recent revaluation, I wanted to let you know that there are many of us who are also content with the results. As part of any revaluation, there are always going to be people who are unhappy with the outcome (likely those who have seen their home valuation increase) and people who are pleased or content with the outcome (likely those who have seen their home valuation decrease or stay the same). As such, you're never going to satisfy everyone or get an unbiased opinion. The beauty of the system is that there Gexists a mechanism in the appeals process for those who are unhappy with the results. If you are unhappy with your valuation, you can appeal it.

Throwing out the results of the revaluation would be a huge waste of money and would accomplish little. It would then require another revaluation process which would be costly to the Village and its taxpayers. It would also once again add uncertainty for all residents and in the end, I would expect to see just as many people complaining and protesting the results. As such, I would urge you to proceed with the recent revaluation results and allow people to protest their outcomes using the appeals process that is in place.

Best regards,

Jon L. Waldman
33 Chesterfield Road
C: (917) 443-5194

From: Josh Frankel <j_frankel@me.com>
Sent: Friday, August 19, 2016 12:01 PM
To: Mayor
Subject: Please Note "Sales Base" document removed from Village website

Mayor Mark:

Noting for the record here that the "Sales Base" document that I've doggedly criticized for its glaring omissions has been removed from the Village's website.

That there are apparently new "findings" being made and mistakes being corrected 2.5 months after the Tentative Roll was filed is not heartening in the least.

I've been replaying in my head the time Mr. Ryan spend reviewing his credentials - in reality just wasting everyone's time - and I'm reminded of another individual who was well regarded in his field and had a glowing CV. His name was Bernie Madoff.

Best,

Josh

Hot Topics

- 2016 Revaluation: Graphic Analysis
- Library Meeting Binder - July 19, 2016, Village Board C.O.W.
- 2016 Revaluation: Residential Valuation Detail Sheets
- Scarsdale Police Senior Citizens Academy
- 2016 Revaluation: FAQ
- 2016 Revaluation: FINAL - Scarsdale Revaluation Report by J.F. Ryan - Updated June 13, 2016
- 2016 Revaluation: Town/Village of Scarsdale Tentative Assessment Roll
- Sustainable Landscaping Guidance
- 2016 Bedroom Definition - June 1, 2016
- 2016-2017 Adopted Budget
- LED Streetlights - Update to Board 1/26/2016
- Northeast Corridor Rail Alternative 3 Mayor's Comments
- The 2016 Property Reassessment Commencement
- 2016 Revaluation: Presentation 11/17/15 - J.F. Ryan Associates, Inc.
- Parking 2016-2017
- Mayor's State of the Village Address
- Stormwater Management
- Rain Barrel Program
- Phase II Annual Report for 2016

Josh Frankel

From: Josh Frankel <j_frankel@me.com>
Sent: Thursday, August 18, 2016 2:37 PM
To: Mayor
Subject: Follow up to reval question

Mayor Mark:

I just sent the email below to Ms. Albanese, and hope that I might get the answer that proved so elusive last night. I do not consider this item closed by any stretch.

Beyond that, I found Ryan's inability to address Michael Levine's questions (during both of his visits to the mic) extremely troubling. "The ends justify the means" is not how a reval should be done. Equally troubling was his claim that, apparently, no intermediate work product was ever retained, which defies common sense and probably USPAP and IAAO standards and guidelines.

I hope you are as troubled by the substantive issues that were not closed out last night as I am. And I do not posit that rhetorically.

Thanks for holding the meeting and getting Ryan to appear. If nothing else, perhaps it was a bit cathartic.

Regards,

Josh

Sent from my iPad

Begin forwarded message:

From: Josh Frankel <j_frankel@me.com>
Date: August 18, 2016 at 2:29:10 PM EDT
To: Nanette Albanese <Nalbanese@scarsdale.com>
Subject: Follow up to reval meeting

Nanette:

I confess that I am a bit taken aback that you think I would disrespect you in any way. That is not, and has never been, the way I operate. I am trying to understand what happened with this reval and, frankly, I am more confused now than I was before I stepped to the microphone last night.

First, let's try to agree on a few things:
1) More data are better than less data
2) I have been looking at code 210 sales for the simple reason that 210s are 219 of 220 of Mr. Ryan's Sales Base Report (18 Heathcote, a 311, is on there).
3) The IAAO, USPAP, state of New York Assessor's Manual, and common sense dictate that meticulous documentation be kept on all aspects of the revaluation process.

Your July 20 document (why July 20, by the way, so long after the filing of the tentative roll?) indicates a total of 467 sales of code 210 properties. Some 99 were invalidated, most or all with reason codes (forgive me, as I do not have my folder or files with me). 467 - 99 = 368, as indicated. So far, so good. Given you had invalidated what sales you needed to (with appropriate codes), why doesn't Mr. Ryan's Sales Base document match your list, with the exception of outliers, of which he said there were only 3 (which, by the way, needed to be documented)? Why is there a gaping discrepancy between your "valid sales" and his Sales Base document? Where are those sales? That is the question to which I am trying to get an answer. His Sales Base contains either 148 (using his initial 220) or 95 (using the "new" 273) fewer sales than yours. Why? What became of those sales, and why was their exclusion not documented? This is not a trivial matter, as inclusion of those sales changes the results of the ratio studies. I understand that the Sales Base is a subset of the overall number. How did that particular subset come to be; what is its genesis? What were the rules used, if any, for inclusion or exclusion, and who determined them? For example, I note a troubling trend that almost all sales with an AV/Sales ratio over 117 percent were excluded. Why? If true, that smacks of subjectivity.

Please walk me through the exact, precise steps detailing how the whole universe of ~368 (or my 379) was reduced to the subset Sales Base of 220 (or 273).

Please advise.

Thank you.

Josh

From: Josie Forde <josieforde@hotmail.com>
Sent: Sunday, August 28, 2016 8:25 PM
To: Mayor
Subject: Scarsdale Reval

Dear Mayor Mark,

I wish to protest the 2016 reval as unsound, unfair and not properly vetted. Contrary to the intent to "tweak" the 2014 reval, Ryan used a totally different methodology that used a smaller sample of sales to compare against , with no documentation for the reason why other sales were excluded, and no file copy of the actual model. In addition to it being a sweetheart deal concocted between Albanese and Ryan, it was done 2 years earlier than the State of New York's own guidelines. It unfairly penalizes houses on smaller lots, while favoring larger homes - particularly those that protested the earlier reval. Additionally, I understand that the village stands to end up with lower revenues if one uses the current ratio.

While you have stated that the Board has no power to negate the preliminary assessment, I cannot believe that the Board will simply roll over without taking corrective action.

Sincerely,

Josie Forde
37 Jefferson Rd.

Chapter 602

Hybrid Appraisal Models

Introduction

This procedure is used to estimate the parameters of a hybrid appraisal model, based on the data of a number of properties. This model, with estimated parameters, can then be used to estimate the market value of a single property or a number of properties based on the attributes of each property. Because hybrid models are a combination of additive models and multiplicative models, multiple regression analysis techniques cannot be used to analyze these models. Instead, nonlinear regression methods with differential evolution techniques are used to determine the parameter estimates.

The Hybrid Appraisal Model

The hybrid model is a combination of both additive and multiplicative models. It relates the sale price of properties to various characteristics such as size (in square feet), lot size, construction quality, location, number of bathrooms, etc. Before going straight to the hybrid model, we will begin with the simplest appraisal models and then examine models with increasing complexity until we arrive at the hybrid model.

Model Form, Model Estimation, and Value Estimation from the Model

To make the discussion easier, we should first distinguish between the form of the model, the estimation of the model, and the final model for value estimation.

The model form describes the relationship between sale price and the attributes of the property without giving the values of the model parameters. Two examples of models where only the form is shown are

$$Sale\ Price = b_0 + b_1 SQFT$$

$$Sale\ Price = QUAL^{b_1} \times b_2{}^{IRONMONT} \times (b_3 SQFT + b_4 Age)$$

Once the form of the model has been determined, the parameters of the model are estimated. To estimate the parameters, a (hopefully large) number of properties with known sale price are used. The software uses algorithms to find values of the parameters of the model such that the model does a good job at returning the sale price of the properties. The software goes through several iterations to find the parameter estimates that return the sale prices that are closest, on average, to the original sale prices. Two examples of models where the estimation phase has taken place are

$$Sale\ Price = \$51{,}284 + \$85.63 \times SQFT$$

$$Sale\ Price = QUAL^{1.071} \times 1.348^{IRONMONT} \times (\$93.41 \times SQFT - \$1{,}453.55 \times Age)$$

Once the model parameter estimates have been determined, the model becomes useful for estimating the market value of properties where the attributes are known, but a sale price is not available. The value estimation model differs only on the left side of the equation:

$$Estimated\ Value = \$51{,}284 + \$85.63 \times SQFT$$

$$Estimated\ Value = QUAL^{1.071} \times 1.348^{IRONMONT} \times (\$93.41 \times SQFT - \$1{,}453.55 \times Age)$$

Basic Appraisal Models

The following are some very basic appraisal models. They will be used as building blocks for more complex models.

One-Term Coefficient Model

The one-term coefficient model multiplies the value of the attribute by the coefficient to obtain the estimate of the sale price:

$$Sale\ Price = b \times Attribute\ Value$$

An example of an estimated model might look like

$$Sale\ Price = \$108.12 \times SQFT$$

More commonly, the model also has a baseline (intercept) value added:

$$Sale\ Price = b_0 + b_1 \times Attribute\ Value$$

An example of an estimated model with a baseline (intercept) value is

$$Sale\ Price = \$29{,}356 + \$94.29 \times SQFT$$

This model is typically analyzed with simple linear regression, a very common statistical tool for estimating model coefficients.

Basic Binary (Coefficient) Model

The binary model adds (or subtracts) a specified amount based on whether or not the attribute is included.

$$Sale\ Price = b_0 + b_1 \times Attribute\ Value\ (Yes\ or\ No)$$

An example of an estimated model is

$$Sale\ Price = \$176{,}845 + \$14{,}587 \times POOL$$

The value for *POOL* is '0' if the property does not have a pool, and the value for *POOL* is '1' if the property does have a pool. This model is also typically analyzed using simple linear regression. In the NCSS Hybrid Appraisal Models procedure, basic binary coefficient models can only be used by creating columns of 0's and 1's and treating them as a regular coefficient model term.

Basic Exponent Model

The basic exponent model estimates the sale price by raising the attribute value to an exponent.

$$Sale\ Price = Attribute\ Value^{b}$$

This type of a model results in a curved relationship between Sale Price and the values of the attribute. An example of an estimated model is

$$Sale\ Price = SQFT^{1.583}$$

This model can still be solved using simple linear regression, but the logarithm of both sides of the equation must be used in order to do so.

Basic Binary (Exponent) Model

In the binary exponent model, the value (b_0) is multiplied by 1 if the attribute is a 'No' (${b_1}^0 = 1$), or is multiplied by the coefficient (b_1) if the value is a 'yes' (${b_1}^1 = b_1$).

$$Sale\ Price = b_0 \times {b_1}^{Attribute\ Value\ (Yes\ or\ No)}$$

An example of an estimated model is

$$Sale\ Price = \$194{,}821 \times 0.974^{SKYGLADE}$$

In this estimated model, properties in the *SKYGLADE* neighborhood are valued down by 2.6%. Properties not in the *SKYGLADE* neighborhood are valued at $194,821.

Intermediate Appraisal Models

The additive and multiplicative models involve combining multiple terms of one (or two) of the basic appraisal model types.

Additive Models

Additive models are made by adding together a series of coefficient and/or binary (coefficient) terms. The model has the form:

$$Sale\ Price = b_0 + b_1 \times Attr_1 + b_2 \times Attr_2 + \cdots + b_p \times Attr_p$$

An example of an estimated model might look like

$$Sale\ Price = \$68{,}224 + \$77.51 \times SQFT + \$1.51 \times LOTSIZE - \$838.26 \times AGE + \$14{,}342 \times HERRICK - \$9{,}346 \times SKYGLADE + \$12{,}846 \times POOL$$

In this example, *SQFT*, *LOTSIZE*, and *AGE* are continuous value terms, whereas *HERRICK*, *SKYGLADE*, and *POOL* are binary terms where the only possible values are 0 (No) and 1 (Yes). Additive models are usually estimated using multiple regression analysis tools.

Multiplicative Models

Multiplicative models are made by multiplying together a series of exponent and/or binary (exponent) terms. The model has the form:

$$Sale\ Price = b_0 \times {Attr_1}^{b_1} \times {Attr_2}^{b_2} \times \ldots \times {Attr_q}^{b_q} \times {b_{q+1}}^{Attr(Y\ or\ N)_{q+1}} \times {b_{q+2}}^{Attr(Y\ or\ N)_{q+2}} \times \ldots \times {b_p}^{Attr(Y\ or\ N)_p}$$

An example of an estimated model might look like

$$Sale\ Price = 18.93 \times SQFT^{0.954} \times QUAL^{1.114} \times LOTSIZE^{0.035} \times 1.068^{HERRICK} \times 0.974^{SKYGLADE}$$

Multiplicative Models can sometimes be estimated from property data using multiple regression techniques, but this is done by taking the logarithm of both sides of the equation before estimation. Taking the logarithm essentially converts the model into an additive model. After estimation, a transformation is used to convert the model back into its multiplicative form.

Component Hybrid Appraisal Models

Hybrid appraisal models are formed by combining additive and multiplicative models. In NCSS, the basic form of a hybrid model is

$$Multiplicative\ Model \times Additive\ Model$$

or

$$Attr_1{}^{b_1} \times Attr_2{}^{b_2} \times \ldots \times b_q{}^{Attr(Y\ or\ N)_q} \times b_{q+1}{}^{Attr(Y\ or\ N)_{q+1}} \times \ldots \times (b_p \times Attr_p + b_{p+1} \times Attr_{p+1} + \cdots)$$

This type of model may be used to estimate the value of any component of the property. For example, the form of a hybrid model for the land value might look like

$$Land\ Value = SoilQuality^{b_1} \times b_2{}^{Fenced} \times (b_3 \times LandSQFT + b_4 \times SLOPE)$$

Estimation of this model might yield the estimated model

$$Land\ Value = SoilQuality^{1.041} \times 1.067^{Fenced} \times (4.56 \times LandSQFT - 0.89 \times SLOPE)$$

Similar models may be formed for the building structure, any other property additions, as well as for the overall property.

Full Property Hybrid Appraisal Models

In NCSS, a hybrid appraisal model combining all the (hybrid model) components of the property has the general form

$$Sale\ Price = Hybrid\ Model_{Overall}\ (Hybrid\ Model_{Land} + Hybrid\ Model_{Building} + Hybrid\ Model_{Additions} + \ldots)$$

Each of the *Overall*, *Building*, *Land*, and *Additions* components of the model have the basic hybrid model form shown above in the Component Hybrid Appraisal Models section.

This general model gives the flexibility to model the building value, the land value, and other additions, each with hybrid models, and then adjust the sum of these components through a hybrid model of overall factors.

It is unlikely that every component (building, land, etc.) will use all types of model terms in construction of the model, but the flexibility is available according to the needs of the appraiser.

An example of the form of a full hybrid appraisal model might be

$$Sale\ Price = b_1{}^{HERRICK} \times b_2{}^{SKYGLADE} \times \qquad [Overall]$$
$$(SoilQuality^{b_7} \times (b_8 \times LandSQFT + b_9 \times SLOPE) + \qquad [Land]$$
$$QUAL^{b_3} \times (b_4 \times SQFT + b_5 \times KitchenUpgrades + b_6 \times Age) + \qquad [Building]$$
$$ShedQuality^{b_{10}} \times (b_{11} \times ShedSQFT - b_{12} \times ShedAge)) \qquad [Addition]$$

The estimated model might look like

$$Sale\ Price = 1.053^{HERRICK} \times 0.98^{SKYGLADE} \times$$
$$(SoilQuality^{1.013} \times (3.88 \times LandSQFT - 0.71 \times SLOPE) +$$
$$QUAL^{1.033} \times (\$93.41 \times SQFT + \$2{,}318 \times KitchenUpgrades - \$1{,}453.55 \times Age) +$$
$$ShedQuality^{1.026} \times (\$31.18 \times ShedSQFT - \$146.41 \times ShedAge))$$

Hybrid Appraisal Model Estimation Details

The coefficients ($b_1, b_2, ...$) of a hybrid appraisal model are estimated from a (hopefully large) number of properties where the attribute values are known and the sale price is known. Whereas the coefficients in additive models (and some multiplicative models) may be estimated using multiple regression analysis (a closed form solution), the coefficients in hybrid models cannot. Instead, the coefficients must be estimated by nonlinear methods and (intelligent) trial and error.

General Algorithm

The general steps for finding the 'best' estimates of the coefficients of the hybrid model are

1. Obtain a set of starting values, one for each coefficient ($b_1, b_2, ...$).

2. Compare the predicted sale prices from this model with the actual sale prices, using a summary statistic, such as the average absolute difference or average absolute percent error.

3. Adjust the values of each of the coefficients in a direction that (hopefully) improves prediction.

4. Again compare the predicted sale prices to the actual sale prices.

5. Continue to repeat steps 3 and 4 until there is no more (or very little) change in the evaluation criterion (average absolute difference or similar). This is called convergence.

The method used in NCSS for making adjustments to the coefficients for each iteration is differential evolution. It differs slightly from the general algorithm described above, but the notion is similar. In the differential evolution algorithm, instead of evaluating a single model each time, a pool of models is examined at each iteration. This pool of models is allowed to evolve until it converges on a single model.

Differential Evolution

Differential evolution is one of a group of *genetic algorithms* (see for example, the recent book by Haupt (1998)). By studying how generations respond over time to their environment, mathematicians have discovered new, more robust, sets of algorithms for minimizing an objective function, e.g., average absolute difference or average absolute percent error. Differential evolution uses the concept of inheritance of coefficient values for a pool of models from a pool of models of the previous iteration. The differential evolution technique performs a similar function to that of the formerly popular feedback algorithm.

To begin the differential evolution algorithm, a small group of 'individuals' (or estimated models) must be formed. This is done by assigning the nonlinear regression coefficients to one individual and then randomly assigning the other individuals (model estimates) to a grid of values around this first individual. This is the initial population.

The next step is the evolution of the population. The population progresses through a series of *generations*. At each change in generation, depending on a member's well-being (low average absolute percent error), each population member may move on to the next generation or be replaced by a better member. For each member, a trial replacement is constructed as follows:

1. The best member of the population is found (smallest absolute difference).

2. The attributes of each replacement member are computed as a weighted average of those of the member and the best member. The amount of weight of the best member is controlled by the *inheritance factor*. This is a value between 0 and 1. The closer this value is to 1, the more the replacement member resembles the best member. The closer this value is to 0, the more the replacement member resembles their parent. The value of 0.85 seems to work in many cases.

3. As in living populations, *mutations* are permitted to occur at a given rate. When a mutation occurs, a particular trait is changed randomly. This tends to maintain diversity in the population. A mutation rate of about 30% (0.30) seems to work well.

4. The algorithm proceeds from generation to generation until the population seems to converge to a single individual. The number of generations needed is specific to each case. Usually, about 100 generations are needed for the algorithm to converge.

Minimization of Error

There are various criteria upon which the estimated models may be evaluated. Each criteria should focus on minimizing the distance between the predicted sale prices and the actual sale prices. In the NCSS Hybrid Appraisal Models procedure, there are eight options for minimization criteria.

- **Minimize Squared Errors (Nonlinear Regression)**
  This is the classical approach and gives reasonable estimates relatively quickly. This method tends to emphasize relatively expensive properties as compared to less expensive properties. It also is used as a starting value for the other minimization techniques.

- **Minimize the Average |Percent Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize the average of the absolute percent errors. These percent errors are the difference between the actual and predicted sale prices divided by the actual price. This method gives equal weight to all properties, regardless of price.

  The function minimized is

$$MAPE = \frac{\sum_{properties} \left| \frac{100(actual - predicted)}{actual} \right|}{N}$$

  where |X| represents the absolute (positive) value of X and $\sum_{properties} X$ is interpreted as the sum of the values of all properties. Note that this is the quantity minimized by typical *feedback* algorithms.

  If you want to use a solution that minimizes the percent errors, this is the solution that we recommend.

- **Minimize the Maximum |Percent Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize the maximum of the absolute percent errors. These percent errors are the difference between the actual and predicted sale prices divided by the actual price.

- **Minimize the Median |Percent Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize the median of the absolute percent errors. These percent errors are the difference between the actual and predicted sales price divided by the actual price.

- **Minimize the Percentile |Percent Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize a designated percentile of the absolute percent errors. These percent errors are the difference between the actual and predicted sale prices divided by the actual price. The percentile is specified in the Min Percentile box.

- **Minimize the Average |Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize the average of the absolute errors. These absolute errors are the absolute values of the differences between the actual and predicted sale prices.

- **Minimize the Median |Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize the median of the absolute errors. These errors are the absolute values of the differences between the actual and predicted sale prices.

- **Minimize the Percentile |Error|**
  Using the genetic search algorithm called *differential evolution*, this method finds estimates that minimize a designated percentile of the absolute errors. These errors are the absolute values of the differences between the actual and predicted sale prices. The percentile is specified in the Min Percentile box.

Data Structure

Each column of the spreadsheet (dataset) represents a property attribute and each row represents a property. A sale price column is required. At least one (but likely more) attribute column(s) is needed to run the Hybrid Appraisal Models procedure. A column may contain a continuous range of values, such as square feet or number of bathrooms, or a set of discrete values, such as neighborhood or style.

The following dataset of residential property sales gives an example of what a hybrid appraisal model dataset may look like.

Recent Sales dataset (subset)

Sale_ Price	Main_ SF	Walls_ Type	Baths	BS_SF_ Fin	Age	Pool	Garage	Lot_SF	Lake_ Front	NBHD
147900	2612	Brick	2.5	0	23	0	2	14778	Yes	Park Grove
184000	2478	Siding	2.5	0	26	0	2	8465	Yes	Park Grove
225000	2617	Wood	2.5	0	26	0	2	8277	Yes	Park Grove
108561	2354	Siding	2.5	0	26	0	2	8277	Yes	Park Grove
165500	2603	Siding	2.5	0	24	0	2	8277	Yes	Park Grove
191000	2549	Brick	2.5	510	22	0	2	10280	Yes	Park Grove
.	.	.	.	.	.	.	.	.	.	
.	.	.	.	.	.	.	.	.	.	
.	.	.	.	.	.	.	.	.	.	
261000	2177	Siding	2.5	0	8	0	3	8170	Yes	Wood Village
260000	2337	Siding	2.5	0	8	0	3	8312	Yes	Wood Village
268900	2413	Brick	2.5	0	8	0	3	14238	Yes	Wood Village
281000	2015	Brick	2.5	0	8	0	2	9800	Yes	Wood Village
300000	2453	Brick	3.5	936	9	0	3	9361	Yes	Wood Village
225000	2536	Siding	2.5	0	9	0	2	9367	Yes	Wood Village

Recent Sales dataset column definitions

Sale_Price: Purchase price
Main_SF: Non-basement square feet
Walls_Type: Material of exterior walls
Baths: Number of (finished) bathrooms
BS_SF_Fin: Finished basement square feet
Age: Age in years of the residence
Pool: 0 = No pool, 1 = Pool
Garage: Number of attached garage spaces
Lot_SF: Size of lot in square feet
Lake_Front: Lake front property
NBHD: Name of subdivision

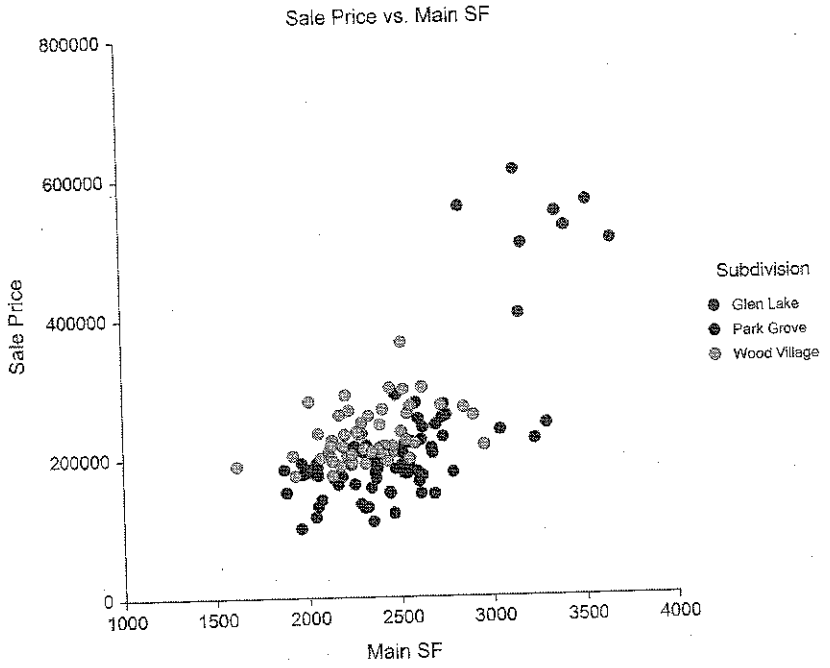
Model Building and Model Estimation Practical Notes

Because hybrid models don't have a closed form solution, iterative methods must be used to determine the estimated coefficients of the models. While these methods allow for increased flexibility in the types of models that may be considered, convergence on a 'best' model estimate is not guaranteed.

Model Building Notes

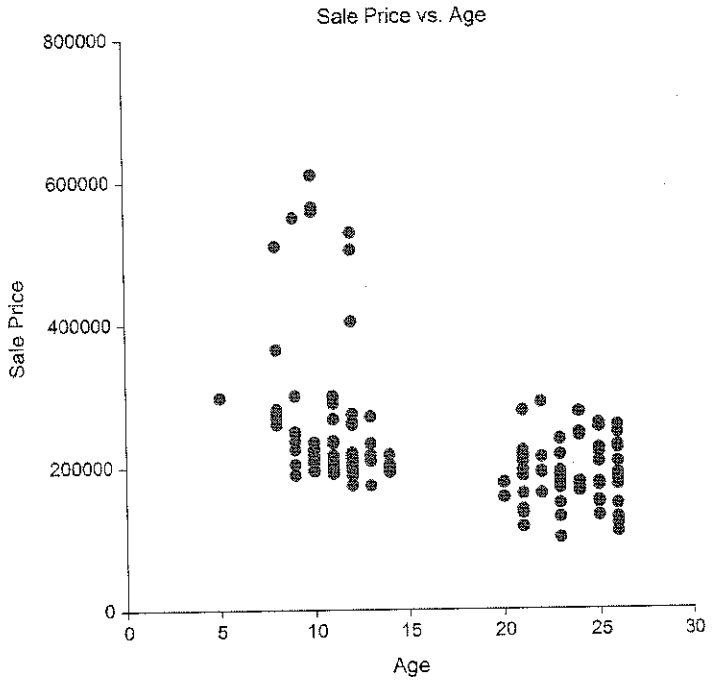
Plots of Sale Price versus Model Terms

Plots can aid in model building in two ways. First, plotting the sale price versus each term allows the appraiser to see any obvious problems in the relationship (e.g., extreme outliers or unexpected curves or direction). Second, the plots help the appraiser determine what to expect for each of the model coefficients (linear or curved, positive or negative relationship). However, since the plots can only be used to examine one or two terms at a time, they do not tell the whole story about how all the terms interact in their relationship with the sale price.

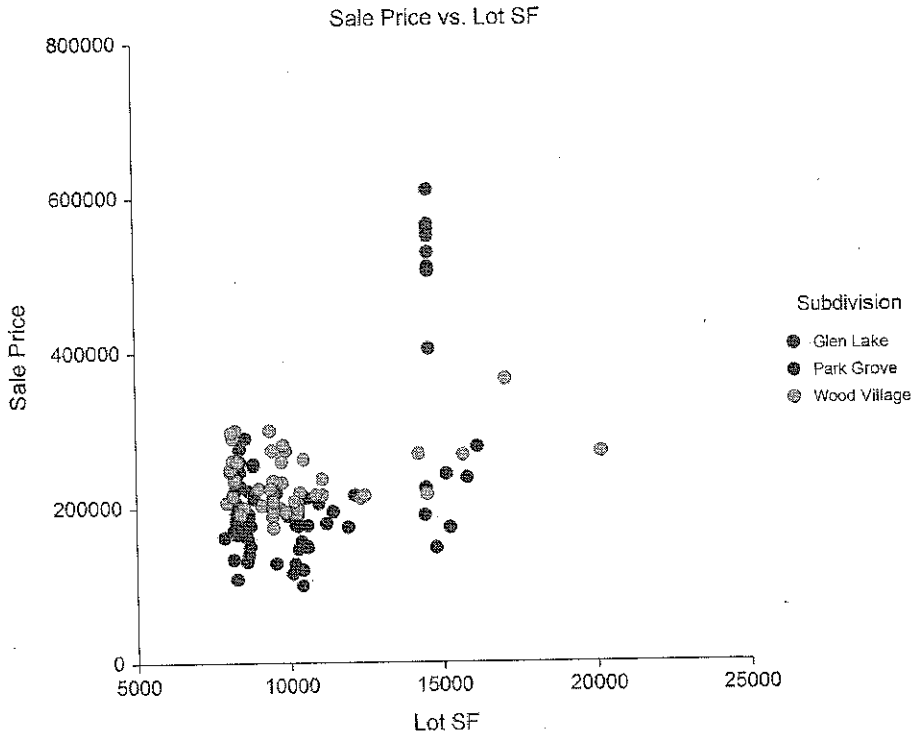


This scatter plot from data of the Recent Sales dataset shows the relationship between sale price and non-basement square feet for each of the three subdivisions. This plot quickly shows what to expect from the model for these terms.

Hybrid Appraisal Models



A plot of sale price versus age shows the relationship of lower values for older properties.



Perhaps surprisingly, the size of the lot seems to have very little effect on price, after accounting for subdivision.

Minimum, Maximum, and Starting Values

The plots (and common sense) can give a feel for the general region that is expected for the coefficients. The minimum, maximum, and starting values should be set accordingly. For example, the default minimum and maximum values for the coefficient for the age of the property might be 0.001 (minimum) to a large number (maximum). However, the plot, as well as experience, would tell us that the coefficient for age might be negative (properties sometimes decrease in value as they age). In this case, we should change the minimum allowed coefficient to be a significantly negative number, to include the option for the algorithm to find a negative relationship for age. The starting value might be adjusted accordingly as well.

Nonlinear Regression and Differential Evolution Option Notes

When confronted with the series of nonlinear regression and differential evolution options in the procedure, the task of setting proper values may seem daunting. Ideally, the default set of options would always yield convergence and a 'best' estimated model. Unfortunately, in practice, convergence is sometimes not achieved with the default options.

If the model estimation does not converge, the output should be examined to see if convergence failed during the nonlinear regression (initial) estimation, or during the differential evolution process. If the failure occurs during nonlinear regression estimation, adjustments to the nonlinear regression options should be the focus. Each option should be considered, perhaps one by one, with an adjustment to the value and a re-run of the procedure. The option notes will hopefully give some direction in how the option affects the process.

Similarly, if convergence fails during the differential evolution process, the corresponding options should be adjusted and the analysis re-run until convergence is achieved.

We have found that in some cases, the nature of the data does not give a stable solution, even though the algorithms converge. For this reason, we recommend that the analysis be run more than once, with the same settings, even when the run seems to complete normally. In the cases where repeated runs give different results (perhaps with substantially varying coefficient estimates), there may be problems in the dataset itself causing the issue. One example would be an extreme outlier, or a group of outliers. Another example would be too few properties of a given type, or too few properties in general. Visualization of the data through scatter plots is recommended in this case, to determine problematic properties. Likely those rows will need to be removed.

You can feel more comfortable with the stability of the results if multiple runs with the same settings give the same results, or multiple runs with varying settings give the same results. Changing the estimation method (minimization criteria) will likely give different coefficient estimates, but it is hoped that the differences aren't too extreme.

Missing Values

Rows with missing values for any of the columns in the analysis are ignored. That is, the whole row is removed from the analysis when there is a missing value for any used column in that row.

When the value of the sale price is missing (i.e., it is left blank), but values for all other used columns are non-missing, the estimated sale price for that row is generated (see Estimated Values for Estimation Rows report).

Procedure Options

This section describes the options available in this procedure.

Model Columns Tab

Sale Price

Sale Price Column

Specify the column that contains the sale prices of the properties. For properties (rows) for which the sale price is to be estimated, the sale price value should be left blank in this column. You may type the column name or number directly, or you may use the column selection tool by clicking the column selection button to the right.

Model Columns and Specification

Component

Use this option to specify the component of the general model for the term(s) of this column.

The general model has the form

Overall(Land + Building + Additions + ...)

All the terms with the same component type will be used together to form that component of the model.

Column

Specify a column containing property attribute values. This column identifies a term (or collection of terms) in the model. You may type the column name or number directly, or you may use the column selection tool by clicking the column selection button to the right.

Binary Exponential Terms

If the term type (specified to the right) is set to 'Bin Exp', or Binary Exponential, there is some additional notation that may be used.

For Binary Exponential terms, the column values are categories. When this is the case, one of categories becomes the reference value. The reference value is that value for which no term is generated. The number of binary exponential terms generated from a column is always one less than the number of unique values.

If desired, the reference value may be specified directly by entering it parentheses after the column name. If a reference value is not specified directly, the program sorts the values and selects the last sorted value as the reference value.

For example, suppose you will use a column called ExtType that has three possible values: B for brick, U for stucco, or S for siding. Further, suppose that in the area of interest, siding is the most common exterior type. Hence, siding might be the choice for the reference value. In this case, ExtType(S) could be entered for this column. The software would generate two binary terms: one for brick and the other for stucco.

Single Binary

In this procedure it is also possible to specify that only a single term be generated for a Binary Exponential column. This is done by adding a comma and an I after the reference value. For example, using the exterior type example given above, the statement ExtType(S,I) would cause the procedure to generate a single indicator variable that is '1' when the value is S and '0' otherwise.

Multiple columns per line

Usually, only one column per line is specified, but more are allowed if desired. If more than one column is specified, they will use the same component, type, minimum, maximum, and starting values.

Type

This option is used to define the type of term to be generated for this column. The options available are Coefficient, Binary Exponential, and Exponential. All terms with the same Component choice are combined to make a single Component. See the Component Hybrid Appraisal Models section of the documentation to see how terms of different types are combined to form a component model.

Coef (Coefficient)

Form: B * X

B is the coefficient and X is the value of the term (column).

The coefficient type is that which is used in multiple linear regression analysis. It assumes X is a binary (0 and 1) term (e.g., POOL) or a term with continuous values (e.g., SQFT).

Bin Exp (Binary Exponential)

Form: B ^ X

B is the parameter to be estimated and X is the value of the term (column).

This type should be chosen when the column values are categories. One of the categories is the reference value and a separate term is created for each of the other (non-reference) categories. See the Option Info for the Column for additional details. A typical Binary Exponential term is NBHD.

Exp (Exponential)

Form: X ^ B

B is the parameter to be estimated and X is the value of the term (column).

Used to multiply adjustments (using exponent terms) rather than to add adjustments. This is probably the least used term type in hybrid appraisal models.

Min Start Max

Enter the minimum followed by a space or comma, followed by a starting value, followed by a space or comma, followed by a maximum for the model parameter(s) associated with this column (or term). Or you may enter the word Defaults to use the default values specified on the Estimation tab for each term type.

The minimum is the lowest value that will be considered for the parameter during the course of the search. The starting value is the initial value that will be using when beginning the (nonlinear regression) search for the optimal parameter value. The closer this value is to the final optimal value, the more quickly the algorithm will converge. The maximum is the highest value that will be considered for the parameter during the course of the search.

Note that you can use the letter B to represent one billion (1000000000). There is nothing special about one billion, it is simply meant to be a large number to open up the search space. For example, the triplet 0.1 1.0 2.0 sets the minimum at 0.1, the maximum at 2.0, and the starting value at 1.0. The triplet -B 0 B would search between negative one billion and positive one billion, starting at 0.

The following are some suggestions for selecting starting values:

1. Make sure that the starting values you supply are reasonable. A quick look at a scatter plot (or dot plot for binary exponential) of the sale price vs. the term values can be very insightful.

2. Before spending too much time selecting a starting value, make a few trial runs using starting values of 0.0, 0.5, and 1.0. Often, one of these values will converge.

3. If you have a very large number of observations and the convergence is slow, you may consider taking a small subset of (say, 50) observations from your original dataset and work with this subset dataset. When you find a set of starting values that converges on this subset dataset, use the resulting parameter estimates as starting values for

the complete dataset. Since nonlinear regression is iterative and each iteration must pass through the complete dataset, providing good starting values can save a considerable amount of time when searching for optimal parameter values.

Add Additional Terms

Use this selection to add more available lines for terms in the model. Some of the additional terms may be left blank. That is, if you need only 3 additional terms, select Add 10 Terms and then use only the first three.

Estimation Tab

Estimation (Error Minimization) Specification

Estimation Method

The Estimation Method chosen here reflects the criteria that is used to determine the best estimated model. The model form is set by the options and columns specified on the Model Columns tab. The estimates of the model parameters are found by setting parameter values, evaluating how well the model estimates the known sale price, and then iterating until the optimal model is found. The error for each property is the difference between the estimated value (from the model) and the sale price. Thus, the best model is one for which the errors are the least. The Estimation Method method sets how the errors are minimized. For any selection, the first step is to compute the parameter values that minimize the squared errors, using nonlinear regression estimation. Historically, the most common choice is probably the second option, to minimize the average absolute percent error.

Estimation Method Options:

- Minimize Squared Errors (Nonlinear Regression)
- Minimize the AVERAGE |PERCENT Error|
- Minimize the MAXIMUM |PERCENT Error|
- Minimize the MEDIAN |PERCENT Error|
- Minimize the PERCENTILE |PERCENT Error|
- Minimize the AVERAGE |Error|
- Minimize the MEDIAN |Error|
- Minimize the PERCENTILE |Error|

Definitions:

Error: Sale Price - Estimated Sale Price

Squared Error: Error^2

PERCENT Error: 100 * Error / Sale Price

|X|: Absolute Value of X

PERCENTILE: A percentile corresponds to a given percent, say, P. The percentile is the value such that P% of the values are below the value and (100 - P)% of the values are above the value. For example, the median is the 50th percentile.

Min Percentile

A percentile corresponds to a given percent, say, P. The percentile is the value such that P% of the values are below the value and (100 - P)% of the values are above the value. For example, the median is the 50th percentile. If the Estimation Method is set to Minimize the PERCENTILE |Error|, and the Min Percentile is set to 30, the

algorithms will search for models with the lowest absolute error for which 30% of the absolute errors are lower. Values between 1 and 99 are eligible. Typical values are between 50 and 95.

Nonlinear Regression Options

Lambda

This is the starting value of the lambda parameter as defined in the Levenberg-Marquardt least squares algorithm. We recommend that you do not change this value unless the algorithm is not converging. Changing this value will influence the speed at which the algorithm converges.

Recommended Lambda: 0.0001

Nash Phi

The Nash phi modifies Lambda. When the sum of squared differences is large, increasing this value may speed up convergence.

Lambda Increase Factor

This is a factor used for increasing Lambda when necessary. It influences the rate at which the algorithm converges.

Lambda Decrease Factor

This is the factor by which Lambda is decreased when necessary. It influences the rate at which the algorithm converges.

Maximum Iterations

This sets the maximum number of iterations before the algorithm is aborted. If the starting values are not appropriate or the model form does not fit the data, the algorithm may diverge. Setting this value to an appropriate number (say 1000) causes the algorithm to abort rather than iterating indefinitely.

Recommended Max Iterations: 1000

Minimum Iterations

This sets the minimum number of iterations before the algorithm can converge. This is useful to avoid early termination of the algorithm before it finds a reasonable solution.

Recommended Minimum Iterations: 6

Differential Evolution Options

Maximum Generations

Specify the maximum number of differential evolution iterations used by the differential evolution algorithm. A value between 100 and 200 is usually adequate. For large datasets (number of rows greater than 1000) where the running time may be slow, you may want to reduce this number.

Individuals

This is the number of trial points (estimated models) that are used by the differential evolution algorithm during each iteration. In the terminology of differential evolution, this is the population size. A value between 15 and 25 is recommended. More individuals may dramatically increase the running time. Fewer individuals may keep the algorithm from converging.

Inheritance

This value controls the amount of movement of the differential evolution algorithm toward the current best. Larger values accelerate movement toward the current best, but reduce the chance of locating the global

maximum. Smaller values improve the chances of finding the global, rather than a local, solution, but increase the number of iterations until convergence. Usually, a value between .5 and 1.0 is used.

Recommended Inheritance: 0.85

Mutation Rate

This value controls the mutation rate of the differential evolution algorithm. This is the probability that the random adjustment of a parameter is set to zero, which constitutes a mutation, in the algorithm. Values between 0 and 1 are allowed.

Recommended Mutation Rate: 0.3

Grid Range

This is the initial range about the initial parameter value that is sampled during the differential evolution algorithm. The algorithm is not limited to this range, but specifying a value large enough to include the solution will increase the probability of convergence.

Recommended Grid Range: 4

Minimum Percent

This option stops the estimation iterations when the objective function (minimization function, i.e., absolute percent error), is lower than this amount.

Minimum Amount

This option stops the estimation iterations when the objective function (minimization function, i.e., absolute error), is lower than this amount.

Seed

Use this option to specify the seed value of the random number generator. Specify a number between 1 and 32000 to seed (start) the random number generator. If the same seed is used for multiple runs, the same result will occur for each run (as long as all other settings remain the same). If you want to have a random start (i.e., different each time the procedure is run), enter the phrase "Random Seed".

'Min Start Max' Default Options

Default 'Min Start Max' for Type = (Coef)ficients

Enter the default values to be used for all (Coef)ficients type terms when 'Defaults' is entered for 'Min Start Max' on the Model Columns tab. Coefficients terms have the form B * X (Here B represents the coefficient).

Suggested values are:

0.001 1 B (if it is expected that the coefficient will be positive)

or

-B 1 B (if positive and negative coefficients are both possible)

Here, B represents one billion.

Default 'Min Start Max' for Type = (Bin)ary (Exp)onential

Enter the default values to be used for all (Bin)ary (Exp)onential type terms when 'Defaults' is entered for 'Min Start Max' on the Model Columns tab. Binary Exponential terms have the form B ^ X, where X is a 0 or 1.

Suggested values are:

0 1 5 (since B ^ X is a multiplier term, B is usually in the vicinity of 1)

Default 'Min Start Max' for Type = (Exp)onential

Enter the default values to be used for all (Exp)onential type terms when 'Defaults' is entered for 'Min Start Max' on the Model Columns tab. Exponential terms have the form X ^ B, where X is a continuous value, such as AGE.

Suggested values are:

-5 0 5 (since X ^ B is a multiplier term, B is usually not too far from 0)

Reports Tab

Specify Reports

Run Summary Report

The Run Summary report gives the following:

- Model (Component Form)
- Estimation Method
- Final Value of Minimization Criteria
- R-Squared (from Nonlinear Reg.)
- Random Number Seed
- Number of Columns Used
- Number of Parameters in Model
- Number of Rows for Model
- Number of Nonl. Reg. Iterations
- Number of Diff. Evol. Iterations

Nonlinear Regression Iteration Report

This report shows the iterations and convergence (or lack thereof) of the nonlinear regression minimization of the sum of squared errors.

Differential Evolution Iteration Report

This report shows the iterations and convergence (or lack thereof) of the minimization of the specified minimization criteria.

Model Specification and Estimation Report

This report summarizes the terms as specified on the Model Columns tab, and includes the model parameter estimates.

Model Component Form

This report shows the model in parameter form. That is, it shows the unestimated model form.

Estimated Model (Reading Form)

This report gives the estimated model with a specified number of decimal places for each of the parameter estimates.

Decimal Places

This is the number of decimal displayed for each estimated parameter of the model in reading form.

Estimated Model (Transformation Form)

This report displays the estimated model with the complete number of decimals available. This model can be copied and pasted as a transformation to the Column Info portion of the spreadsheet to give property value estimates.

Appraisal Ratio Report

This report gives a number of summary statistics about the actual sale prices, estimated sale prices, sale price ratios, and percent errors.

Estimated Values for Estimation Rows

This report gives the estimated sale price for each of the rows for which the sale price is blank on the spreadsheet.

Estimated Values and Residuals Report

This report gives the actual sale price, estimated sale price, residual (actual - estimated), ratio (estimated / actual), and absolute percent error for each property in the dataset.

Poorly Estimated Properties Report

This report shows a list of the properties with an absolute percent error that is above a specified threshold.

Percent Error Cutoff

This cutoff defines which properties will be shown in the Poorly Estimated Properties Report.

Report Options

Decimal Precision

Specifies whether unformatted numbers are displayed as single (7-digit) or double (13-digit) precision numbers in the output. All calculations are performed in double precision regardless of the Decimal Precision selected here.

Single

Unformatted numbers are displayed with 7-digits. This is the default setting. All reports have been formatted for single precision.

Double

Unformatted numbers are displayed with 13-digits. This option is most often used when the extremely accurate results are needed for further calculation.

Double Precision Format Misalignment

Double precision numbers sometimes require more space than is available in the output columns, causing column alignment problems. The double precision selection is for those instances when accuracy is more important than format alignment.

Ratio and Percent Decimal Places

Specify the number of digits after the decimal point to be displayed for ratios and percents in the output.

Sale Price and Residual Decimal Places

Specify the number of digits after the decimal point to be displayed for sale prices and residuals in the output.

Component Labels

Component Label

Specify here the label that will be used in the reports for the corresponding component.

Storage Tab

Storage Columns

Store Estimated Values in Column

If you wish to store the estimated sale price values back to the dataset, enter the desired (usually empty) result column here. The estimated values will not be saved with the dataset until the dataset is saved. You may type the column name or number directly, or you may use the column selection tool by clicking the column selection button to the right.

Store Residuals (Actual - Estimated) in Column

If you wish to store the residuals back to the dataset, enter the desired (usually empty) result column here. The residuals will not be saved with the dataset until the dataset is saved. You may type the column name or number directly, or you may use the column selection tool by clicking the column selection button to the right.

Store Ratios (Estimated / Actual) in Column

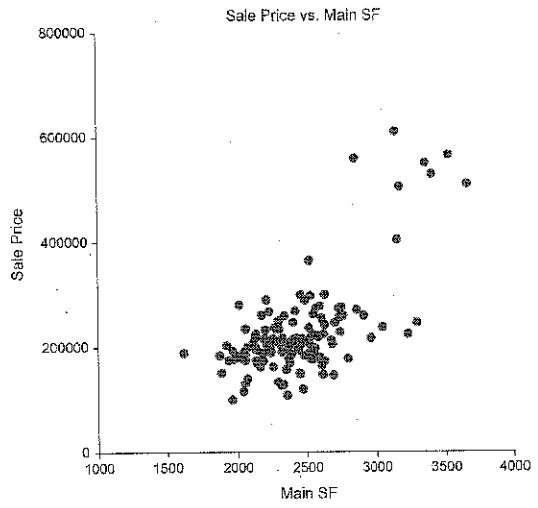
If you wish to store the ratios back to the dataset, enter the desired (usually empty) result column here. The ratios will not be saved with the dataset until the dataset is saved. You may type the column name or number directly, or you may use the column selection tool by clicking the column selection button to the right.

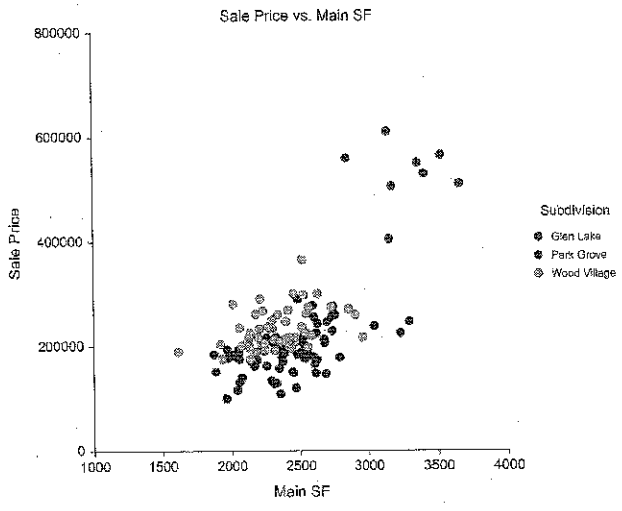
Example 1 – Hybrid Appraisal Model

This section presents an example of estimating the parameters of a hybrid appraisal model based on the Recent Sales dataset. The Recent Sales dataset contains the sale price and attribute information about 125 properties. The property values of 3 properties without sale price information are to be estimated. The attribute values for these 3 properties are given in the last three rows (126, 127, and 128) of the dataset.

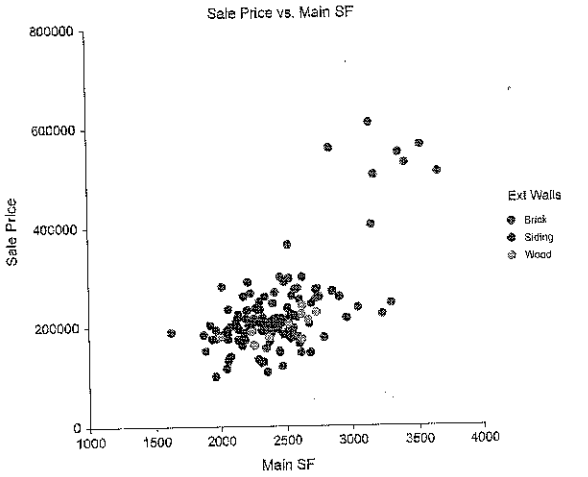
Pre-Modeling Analysis: Relationship Visualization

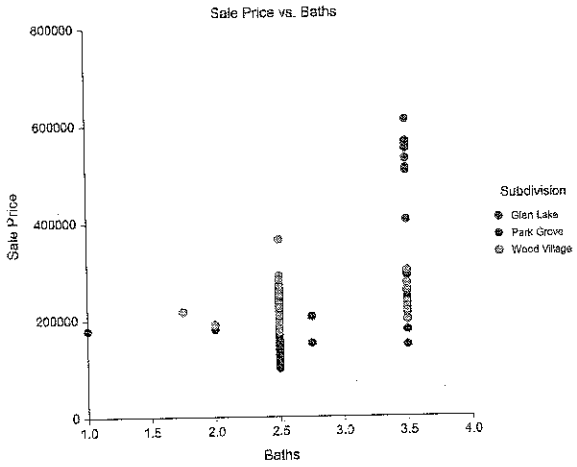
Before going straight to the full hybrid appraisal model, the graphical relationship of the sale price with each of the attributes of the dataset is examined. This is done using the Scatterplots procedure (Graphics > Scatterplots > Scatterplots). Sale_Price is entered as the Vertical Variable. Each of the numeric columns may be entered, in turn, for the Horizontal Variable. Columns with categorical values may be entered as a Grouping (Symbol) Variable for some cases. Labels are selected for Variable Names, for easier reading.

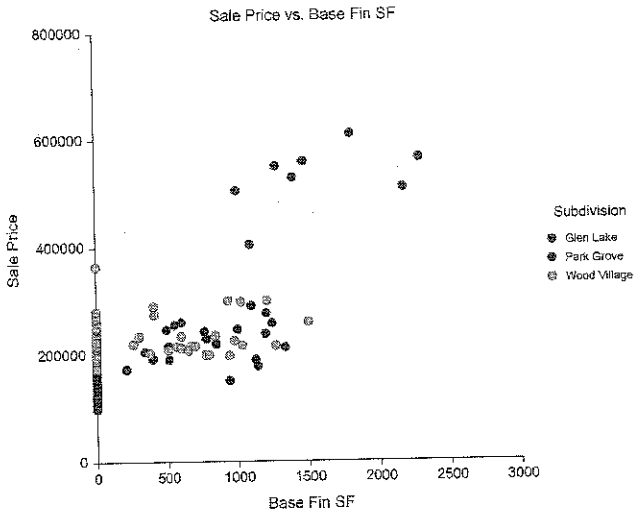


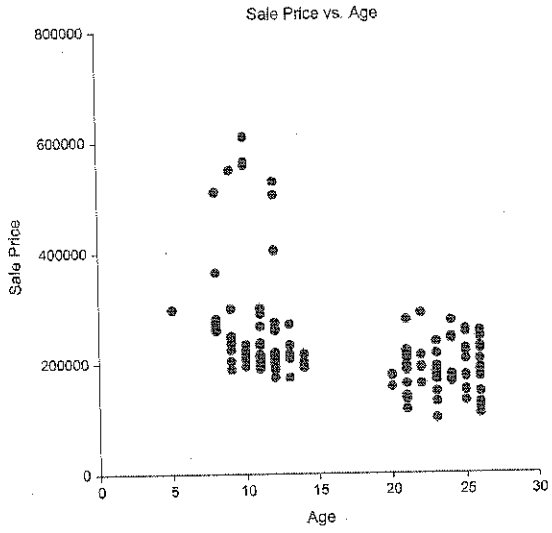


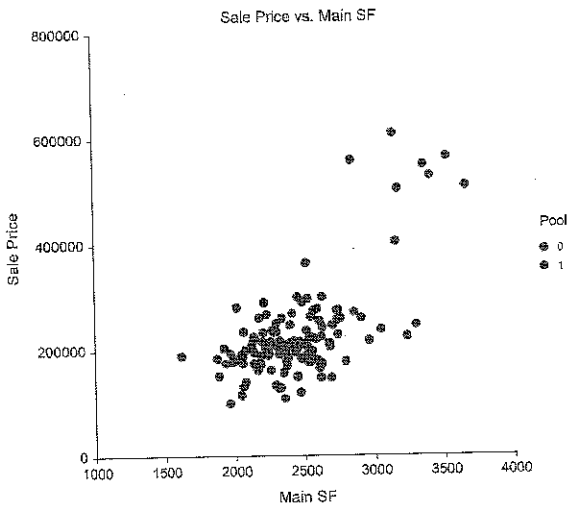
Hybrid Appraisal Models

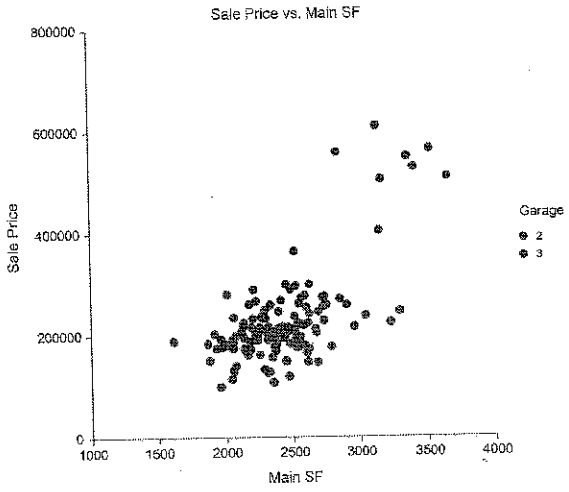


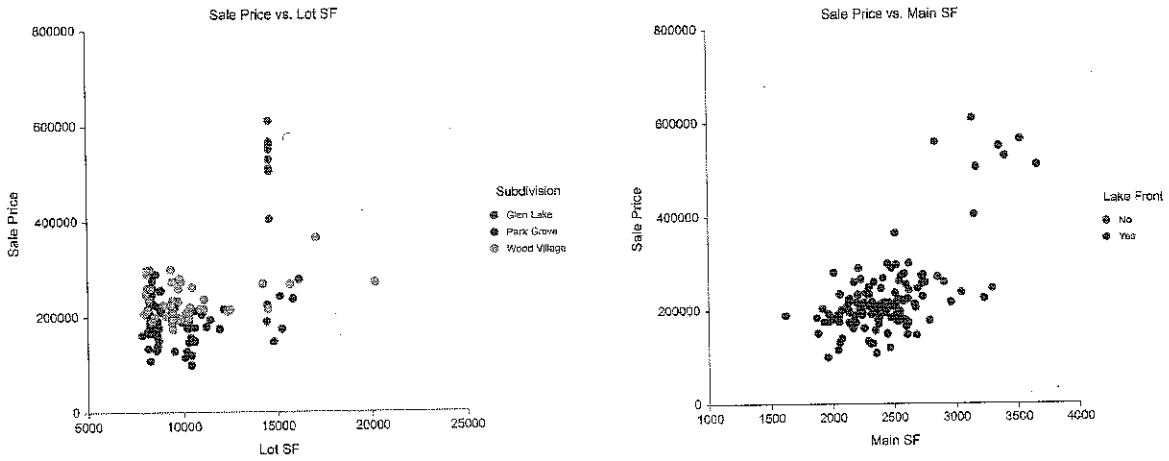












While these plots do not give a full picture of all the interactions that occur among all the attributes, they do give a feel for the relationship of each attribute with the sale price. Some of the obvious tendencies include a fairly clear subdivision difference, a negative trend for age, little or no trend for basement square feet or lot size, and a limited number of properties with pools (making the pool term difficult to estimate).

Considering the available attributes of the properties and the type of data in each column (numeric or categorical), a reasonable general form for the model is

$$Sale\ Price = Hybrid\ Model_{Overall}\ (Hybrid\ Model_{Land} + Hybrid\ Model_{Building} + Hybrid\ Model_{Garage} + Hybrid\ Model_{Pool})$$

The model form for each component that will be used in this example is

$$Hybrid\ Model_{Overall} = b_1^{NBHD=Glen\ Lake} \times b_2^{NBHD=Park\ Grove} \times b_3^{Lake\ Front=Yes}$$

$$Hybrid\ Model_{Land} = b_4 \times LotSQFT$$

$$Hybrid\ Model_{Building} = b_5^{Wall\ Type=Brick} \times b_6^{Wall\ Type=Siding} \times (b_7 \times MainSQFT + b_8 \times BATHS + b_9 \times BaseSQFT + b_{10} \times AGE)$$

$$Hybrid\ Model_{Garage} = b_{11} \times GARAGE$$

$$Hybrid\ Model_{Pool} = b_{12} \times POOL$$

Thus, the general form of the full model is

$$Sale\ Price = b_1^{NBHD=Glen\ Lake} \times b_2^{NBHD=Park\ Grove} \times b_3^{Lake\ Front=Yes} \times (b_4 \times LotSQFT + b_5^{Wall\ Type=Brick} \times b_6^{Wall\ Type=Siding} \times (b_7 \times MainSQFT + b_8 \times BATHS + b_9 \times BaseSQFT + b_{10} \times AGE) + b_{11} \times GARAGE + b_{12} \times POOL)$$

The reference value for *NBHD* is Wood Village and the reference value for *Wall Type* is Wood.

The best model fit (best set of estimated parameters) will be determined as the model with the lowest average absolute percent error.

You may follow along here by making the appropriate entries or load the completed template **Example 1** by clicking on Open Example Template from the File menu of the Hybrid Appraisal Models window.

1 Open the Recent Sales dataset.

- From the File menu of the NCSS Data window, select **Open Example Data**.
- Click on the file **Recent Sales.NCSS**.
- Click **Open**.

2 **Open the Hybrid Appraisal Models window.**
- Using the Analysis menu or the Procedure Navigator, find and select the **Hybrid Appraisal Models** procedure.
- On the menus, select **File**, then **New Template**. This will fill the procedure with the default template.

3 **Specify the sale price column.**
- On the Hybrid Appraisal Models window, select the **Model Columns** tab.
- Set the **Sale Price Columns** box to **Sale_Price**.

4 **Specify the Overall Component terms of the model.**
- On the first line, set **Component** to **Overall**, **Column** to **NBHD**, and **Type** to **Bin Exp**.
- On the next line, set **Component** to **Overall**, **Column** to **Lake_Front(No)**, and **Type** to **Bin Exp**. The 'No' in parentheses causes No to be the reference value.

5 **Specify the Land Component terms of the model.**
- On the next line, set **Component** to **Land**, **Column** to **Lot_SF**, and **Type** to **Coef**.

6 **Specify the Building Component terms of the model.**
- On the next line, set **Component** to **Bldg1**, **Column** to **Walls_Type**, and **Type** to **Bin Exp**.
- On the next line, set **Component** to **Bldg1**, **Column** to **Main_SF**, and **Type** to **Coef**.
- On the next line, set **Component** to **Bldg1**, **Column** to **Baths**, and **Type** to **Coef**.
- On the next line, set **Component** to **Bldg1**, **Column** to **BS_SF_Fin**, and **Type** to **Coef**.
- On the next line, set **Component** to **Bldg1**, **Column** to **Age**, and **Type** to **Coef**. Change **Min Start Max** from **Defaults** to **–B 0 B**, since we anticipate Age could have a negative coefficient.

7 **Specify the Garage Component terms of the model.**
- On the next line, set **Component** to **Garage**, **Column** to **Garage**, and **Type** to **Coef**.

8 **Specify the Pool Component terms of the model.**
- On the next line, set **Component** to **Pool**, **Column** to **Pool**, and **Type** to **Coef**.

9 **Specify the estimation details.**
- On the Hybrid Appraisal Models window, select the **Estimation** tab.
- Set the **Estimation Method** to **Minimize the AVERAGE |PERCENT Error|**.
- Leave all other options at the default values.

10 **Specify the reports.**
- Select the **Reports tab**.
- Check all reports.
- Set the **Percent Error Cutoff** to **30**.
- Set the **Sale Price and Residual Decimal Places** to **0**.
- All other settings may be left at the default values.

11 **Run the procedure.**
- From the Run menu, select **Run Procedure**. Alternatively, just click the green Run button.

Run Summary Report

Item	Value
Model (Component Form)	Sale_Price = Overall(Land + Building + Garage + Pool)
Estimation Method	Minimize Average |Percent Error| (AAPE)
Final Value of AAPE	11.72
R-Squared (from Nonlinear Reg.)	0.8802978
Random Number Seed	27562
Number of Columns Used	11 (One Sale Price column plus 10 columns for the model.)
Number of Parameters in Model	12
Number of Rows for Model	125
Number of Nonl. Reg. Iterations	21
Number of Diff. Evol. Iterations	1

This report displays summary information about the model estimation process.

Model (Component Form)

This shows the general form of the model that was estimated. In the context of the documentation formulas, this would be

$$Sale\ Price = Hybrid\ Model_{Overall}\ (Hybrid\ Model_{Land} + Hybrid\ Model_{Building} + Hybrid\ Model_{Garage} + Hybrid\ Model_{Pool})$$

Estimation Method

The estimation method indicates the criteria that is minimized during the model estimation process.

Final Value of AAPE

This shows the final (minimum) value of the absolute average percent error. The result 11.72 may be interpreted as the average percent difference of the estimated sale price from the actual sale price.

R-Squared (from Nonlinear Reg.)

This is the R-Squared that was achieved by the nonlinear regression portion of the model search. There is no direct R-Squared defined for nonlinear regression. This is a pseudo R-Squared constructed to approximate the usual R-Squared value used in multiple regression. The following generalization of the usual R-Squared formula is used:

$$R\text{-}Squared = (ModelSS - MeanSS)/(TotalSS - MeanSS)$$

where

MeanSS is the sum of squares due to the mean, *ModelSS* is the sum of squares due to the model, and *TotalSS* is the total (uncorrected) sum of squares of Y (the dependent variable, i.e., sale price).

This version of R-Squared tells you how well the model performs after removing the influence of the mean of Y. Since many nonlinear models do not explicitly include a parameter for the mean of Y, this R-Squared may be negative (in which case we set it to zero) or difficult to interpret. However, if you think of it as a direct extension of the R-Squared that you use in multiple regression, it will serve well for comparative purposes.

Random Number Seed

The random number seed is shown so that if you want to duplicate these results, you can enter this random number seed.

Number of Columns Used

This is the total number of columns of the dataset used in the estimation process.

Number of Parameters in Model

This is the number of parameters that were estimated by the model.

Number of Rows for Model

This is the number of rows from the dataset that were used to estimate the model. It does not count the rows for which the sale price is estimated.

Number of Nonl. Reg. Iterations

This is the number of iterations used by the nonlinear regression procedure.

Number of Diff. Evol. Iterations

This is the number of iterations used by the differential evolution algorithm.

Nonlinear Regression Iteration Section

Nonlinear Regression Iteration Section
Minimization of the Sum of Squared Errors

Iteration Number	Sum of Squared Errors	Message
0	6.801228E+12	
1	5.772725E+12	Stepsize reduced to 0.09796838 by bounds.Lower bound active on B6.
2	2.204183E+12	Freeing parameter B6.Stepsize reduced to 0.7163185 by bounds.Stepsize reduced to 0.7214025 by bounds.Stepsize reduced to 0.7646232 by bounds.Stepsize reduced to 0.9217642 by bounds.
3	8.483604E+11	
4	4.4043E+11	
5	3.029399E+11	
6	2.252354E+11	
.	.	
.	.	
.	.	
18	1.250265E+11	
19	1.250265E+11	
20	1.250265E+11	
21	1.250265E+11	

Convergence criterion met.

This report displays the sum of squared errors for each iteration of the nonlinear regression process. It allows you to observe the algorithm's progress toward the solution. If you do not see the message 'Convergence criterion met' at the bottom, it means that the algorithm did not terminate normally and you should take corrective action—which usually means that you should increase the maximum number of iterations or provide different starting values.

The Message column gives notes of adjustments that are made in the algorithm during the iteration process.

Differential Evolution Iteration Section

Differential Evolution Iteration Section
Minimization of the Average |Percent Error| (AAPE)

Iteration Number	Value of AAPE
0	11.72251
1	11.72251

This report displays the value of the criteria that is being minimum by the differential evolution algorithm. In this example, the criteria is the average absolute percent error between the actual and estimated sale price. The differential evolution search converged very quickly. Apparently the nonlinear regression result was very close to or exactly the average absolute percent error estimate.

Model Specification and Estimation Section

Model Specification and Estimation Section
Model (Component Form): Sale_Price = Overall(Land + Building + Garage + Pool)

Parm. Name	Component	Type	Column or Term	Parameter Estimate	Starting Value	Parameter Bounds
B1	Overall	Bin Exp (B^X)	NBHD="Glen Lake"	1.399654	1	0 to 5
B2	Overall	Bin Exp (B^X)	NBHD="Park Grove"	0.8573917	1	0 to 5
B3	Overall	Bin Exp (B^X)	Lake_Front="Yes"	1.040628	1	0 to 5
B4	Land	Coef (B*X)	Lot_SF	1.453138	1	0.001 to B
B5	Building	Bin Exp (B^X)	Walls_Type="Brick"	1.007641	1	0 to 5
B6	Building	Bin Exp (B^X)	Walls_Type="Siding"	0.805634	1	0 to 5
B7	Building	Coef (B*X)	Main_SF	61.75835	1	0.001 to B
B8	Building	Coef (B*X)	Baths	10721.02	1	0.001 to B
B9	Building	Coef (B*X)	BS_SF_Fin	19.66311	1	0.001 to B
B10	Building	Coef (B*X)	Age	-1374.53	0	-B to B
B11	Garage	Coef (B*X)	Garage	27416.4	1	0.001 to B
B12	Pool	Coef (B*X)	Pool	62428.48	1	0.001 to B

This report displays the details of the estimation of each parameter in the model.

Parm. Name

The name of the parameter shown on this line.

Component

This shows the component of the model term. The general form of the model is shown at the top of the section.

Type

This shows the type (form) of the model term as specified on the Model Columns tab.

Column or Term

This gives the name of column from the dataset. Note that for columns where the type is binary exponential, a separate term is generated for each non-reference value. For example, the term for NBHD="Glen Lake" has a 1 whenever NBHD is Glen Lake, and 0 otherwise.

Parameter Estimate

This is the estimated value of the parameter in the hybrid model. Note that these values should not be analyzed individually, but together as a group. Parameter estimates may change, even dramatically, if the model is re-estimated with a change in the form of the model (e.g., including or excluding terms).

Starting Value

These are the values (as specified on the Model Columns tab) used by the nonlinear regression algorithm in the first iteration. Since the differential evolution algorithm uses the nonlinear regression estimation results as its starting values, these values have little influence on the results of the differential evolution algorithm. Instead, they influence the speed of convergence.

Parameter Bounds

These are the user-specified limits for the parameter estimates. If you notice an estimate that is equal to one of its bounds, the term should be carefully analyzed to determine if the bound should be relaxed to allow a wider search range.

Model (Component Form) Section

Model (Component Form) Section
Model (Component Form): Sale_Price = Overall(Land + Building + Garage + Pool)

Component	Detail
Overall	(B1)^(NBHD="Glen Lake")*(B2)^(NBHD="Park Grove")*(B3)^(Lake_Front="Yes")
Land	(B4)*Lot_SF
Building	(B5)^(Walls_Type="Brick")*(B6)^(Walls_Type="Siding")*((B7)*Main_SF+(B8)*Baths+(B9)*BS_SF_Fin+(B10)*Age)
Garage	(B11)*Garage
Pool	(B12)*Pool

This report displays the terms that make up each component. The parameters to be estimated are B1, B2, ...

This report gives the output form of

$$Hybrid\ Model_{Overall} = b_1^{NBHD=Glen\ Lake} \times b_2^{NBHD=Park\ Grove} \times b_3^{Lake\ Front=Yes}$$

$$Hybrid\ Model_{Land} = b_4 \times LotSQFT$$

$$Hybrid\ Model_{Building} = b_5^{Wall\ Type=Brick} \times b_6^{Wall\ Type=Siding} \times (b_7 \times MainSQFT + b_8 \times BATHS + b_9 \times BaseSQFT + b_{10} \times AGE)$$

$$Hybrid\ Model_{Garage} = b_{11} \times GARAGE$$

$$Hybrid\ Model_{Pool} = b_{12} \times POOL$$

Component

The name of the higher level component of the hybrid model.

Detail

The terms of the component as they are used in the model.

Estimated Model (Reading Form) Report

Estimated Model: Estimated Market Value =
(1.40)^(NBHD="Glen Lake") * (0.86)^(NBHD="Park Grove") * (1.04)^(Lake_Front="Yes") * (((1.45) * Lot_SF) + ((1.01)^(Walls_Type="Brick") * (0.81)^(Walls_Type="Siding") * ((61.76) * Main_SF + (10721.02) * Baths + (19.66) * BS_SF_Fin + (-1374.53) * Age)) + ((27416.40) * Garage) + ((62428.48) * Pool))

This report shows the model in reading form. The number of decimal places for the parameter estimates is set by the user. In the documentation formula form, this model would look like

$$Sale\ Price = 1.40^{NBHD=Glen\ Lake} \times 0.86^{NBHD=Park\ Grove} \times 1.04^{Lake\ Front=Yes} \times (1.45 \times LotSQFT + 1.01^{Wall\ Type=Brick} \times 0.81^{Wall\ Type=Siding} \times (61.76 \times MainSQFT + 10721.02 \times BATHS + 19.66 \times BaseSQFT - 1374.53 \times AGE) + 27416.40 \times GARAGE + 62428.48 \times POOL)$$

Estimated Model (Transformation Form) Report

Estimated Model (Transformation Form) Report
This model can be copied and pasted as a transformation to the Column Info portion of the spreadsheet to give property value estimates.

Estimated Model: Estimated Market Value =
(1.39965383923748)^(NBHD="Glen Lake")*(0.857391728281951)^(NBHD="Park Grove")*(1.04062843036637)^(Lake_Front="Yes")*(((1.45313794582045)*Lot_SF)+((1.00764055666536)^(Walls_Type="Brick")*(0.805633962785495)^(Walls_Type="Siding")*((61.7583507785408)*Main_SF+(10721.0156090402)*Baths+(19.6631092449847)*BS_SF_Fin+(-1374.52982803653)*Age))+((27416.4016963174)*Garage)+((62428.4812000623)*Pool))

This is the model with full precision parameter estimates. This expression may be copied onto the Clipboard and pasted into a transformation cell of the dataset to estimate other properties. This expression is always provided in double precision.

Appraisal Ratio Section

Statistic	Actual Sale_Price	Estimated Sale_Price	Ratio	Percent Error
Number of Properties	125	125	125	125
Mean	228407	227882	1.02	11.72
Minimum	99900	139343	0.70	0.39
Lower Quartile	179900	180239	0.90	3.78
Median	208000	208785	1.00	9.98
Upper Quartile	246500	238826	1.09	15.70
Maximum	610000	584393	1.46	46.20
Range	510100	445050	0.76	45.81
I. Q. Range	66600	58588	0.19	11.92
Variance	8423219100	7656332267	0.02	97.77
Std. Deviation	91778	87500	0.15	9.89
Ave |Dev. from Median|	53924	49361	0.12	7.30
Coef. of Variation x 100	40.18	38.40	15.02	84.35
Coef. of Dispersion x 100	25.92	23.64	11.67	73.13
Weighted Mean			1.00	
Price Related Differential			1.02	

This report provides some of the basic statistics of an appraisal ratio study. For a much more comprehensive ratio study analysis, the estimated values should be stored in a column of the spreadsheet (see the Storage tab), and the Appraisal Ratio Studies procedure should be used.

The following are definitions that are not found in the Descriptive Statistics procedure.

Ave |Dev. from Median|

The average of the absolute values of the deviations from the median.

Coef. of Dispersion (COD)

This is 100 times the average absolute deviation about the median divided by the median.

Coef. of Variation (COV)

This is 100 times the standard deviation divided by the mean.

Weighted Mean

The weighted ratio mean is the mean of the estimated values divided by the mean of the actual values.

Price Related Differential (PRD)

The price related differential is the mean ratio divided by the weighted mean ratio. It provides an a measure of assessment regressivity or progressivity. A PRD greater than 1.0 indicates that the more expensive properties are underappraised. A PRD less than one indicates that the more expensive properties are overappraised.

Estimated Values for Estimation Rows Section

Row No.	Estimated Sale_Price
126	225691
127	228452
128	200963

This section shows the estimated sale price for all rows where the attribute data is given, but the sale price column value is left blank.

Estimated Values and Residuals Section

Row No.	Actual Sale_Price	Estimated Sale_Price	Actual - Estimated (Residual)	Estimated / Actual (Ratio)	Percent |Error|
1	147900	208785	-60885	1.41	41.17
2	184000	163480	20520	0.89	11.15
3	225000	195885	29115	0.87	12.94
4	108561	157732	-49171	1.45	45.29
5	165500	170761	-5261	1.03	3.18
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
120	261000	223913	37087	0.86	14.21
121	260000	232412	27588	0.89	10.61
122	268900	279958	-11058	1.04	4.11
123	281000	218943	62057	0.78	22.08
124	300000	304272	-4272	1.01	1.42
125	225000	214628	10372	0.95	4.61
126		225691			
127		228452			
128		200963			

This reports shows the actual and estimated sale prices as well as 3 measures of disagreement. Assessors commonly study the ratio and/or the absolute percent error of estimated values to determine the quality or accuracy of appraisal.

Poorly Estimated Properties Section

Poorly Estimated Properties Section
Properties with absolute percent error greater than 30% are displayed.
Absolute Percent Error = 100 * |(Actual - Estimated) / Actual|.

Row No.	Actual Sale_Price	Estimated Sale_Price	Actual - Estimated (Residual)	Estimated / Actual (Ratio)	Percent |Error|
1	147900	208785	-60885	1.41	41.17
4	108561	157732	-49171	1.45	45.29
8	178000	238826	-60826	1.34	34.17
16	115500	151244	-35744	1.31	30.95
18	134000	184150	-50150	1.37	37.43
39	99900	146054	-46154	1.46	46.20
45	255000	178203	76797	0.70	30.12
47	120000	165590	-45590	1.38	37.99
85	197900	257331	-59431	1.30	30.03
104	216900	282717	-65817	1.30	30.34

This report shows those rows with a large (percentage) difference from the estimated sale price to the actual sale price. The percent error cutoff, as set on the Reports tab, is 30%. Each row in this report should be analyzed to determine if there is some underlying explanation as to why the estimation is so poor. In some cases it may be reasonable to try re-estimating the same model without these poorly estimated properties, to determine their influence.

Storing Estimated Values to the Spreadsheet

Although no values were stored to the dataset in this example, the option is available to store the estimated values, residuals (actual sale price – estimated sale price), or ratios (estimated sale price / actual sale price) to the spreadsheet. This is done by entering a column name or number on the Storage tab of the procedure and then running the procedure.

Model Refinement

Determining the appropriateness of each model term is more difficult when using hybrid models as compared to multiple regression analysis. In multiple regression, the influence of each term may be measured directly, and even tested. In hybrid models, one can only look at the change in the minimization criteria when including or excluding a term. The tradeoff is flexibility. Hybrid models are more flexible.

Two statistics to consider when comparing hybrid model estimations are the final value of the minimized criteria (e.g., Final Value of AAPE) and the R-squared from nonlinear regression. When inclusion or exclusion of a term changes either of these values dramatically, it is likely an important term to include in the model.

Parameter estimates can also be monitored to determine if they make practical sense. For example, the plots tell us that the Glen Lake subdivision sale prices are generally much higher, and the Park Grove subdivision sale prices are lower. We would expect the parameter estimates to reflect this observation. In this example the Glen Lake parameter estimate is 1.40, while the Park Grove parameter estimate is 0.86. These multipliers are consistent with the observed plots.

On the other hand, the pool coefficient estimate of 62428.48 may be of concern, since it is such a large estimate, and only three properties were used in the estimation process. If the pool term is removed from the model, the model estimate changes from

Estimated Model: Estimated Market Value =
(1.40)^(NBHD="Glen Lake") * (0.86)^(NBHD="Park Grove") * (1.04)^(Lake_Front="Yes") * (((1.45) * Lot_SF) + ((1.01)^(Walls_Type= "Brick") * (0.81)^(Walls_Type="Siding") * ((61.76) * Main_SF + (10721.02) * Baths + (19.66) * BS_SF_Fin + (-1374.53) * Age)) + ((27416.40) * Garage) + ((62428.48) * Pool))

to

Estimated Model: Estimated Market Value =
(1.41)^(NBHD="Glen Lake") * (0.88)^(NBHD="Park Grove") * (1.02)^(Lake_Front="Yes") * (((1.73) * Lot_SF) + ((1.01)^(Walls_Type= "Brick") * (0.81)^(Walls_Type="Siding") * ((61.86) * Main_SF + (12086.52) * Baths + (17.62) * BS_SF_Fin + (-1740.03) * Age)) + ((27807.47) * Garage))

and the Final Value of AAPE changes from 11.72 to 12.17. The R-Squared changes from 0.880 to 0.871. Given this information, if $62,428 seems well outside the reasonable range for the effect of a pool, one may consider running the model without this term. The model should always be re-run when adding or removing a term. The change in all the other estimated parameters can be seen by comparing the estimated parameters of the before and after models.

From: John Ryan <jfryan@comcast.net>
Sent: Friday, September 19, 2014 9:13 AM
To: 'mike thrapp'
Cc: Nanette Albanese
Subject: RE: Revaluation - discussion on updating
Attachments: Valuation Detail Example.pdf

Mike,
It was a pleasure meeting you this past Wednesday. I found the meeting productive and informative.

As we discussed, attached is a copy of a "Valuation Detail Sheet" which details the components of a property value estimate.

While not specifically categorized as to their source, unit values and percentage adjustments are derived either directly using inferential statistics or heuristically based on informed local appraisal knowledge. We didn't discuss this in detail but NCSS, the statistical software that provides the capability to generate values, has two procedures that allow one to "force" otherwise statistically insignificant variables into a valuation model. What this simply means is that a final value (land and total value) can simply be passed in a file. Alternatively, using a stored procedure in your database, the valuation model is replicated and values are generated directly in the database.

An example of what a simple valuation model looks like is as follows:

Factor Detail

Overall	Date^(B1) *(B2)^(Neighborhood=4) *(B3)^(Neighborhood=6)
Land	LotAdjusted^(B8) *((B9) *LotSize)
Building Grade	Linear^(B4) *((B5) *SqFt1stFlr +(B6) *SqFtOthFlr +(B7) *Baths)
Garage	(B10) *GarageSqFt

Valuation Model

Date^(4.66215216533015E-02) *(0.945168518786127)^(Neighborhood=4)
(1.00666919375535)^(Neighborhood=6)((LotAdjusted^(3.0643663225902) *((0.499066748801895)
*LotSize))+(GradeLinear^(1.77611087858318) *((2.22552851585402) *SqFt1stFlr +(1.63455938516463)
*SqFtOthFlr
+(5.39127079611148) *Baths))+((2.32523766293606) *GarageSqFt))

The valuation report as noted simply drops the model coefficients and transformation, if any, of the original unit values (total living area is adjusted .990 in this example). The goal of course is to place the most value on the factors that the market indicate are significant and to minimize the value placed on factors referred to in our meeting as "PR" factors. In conclusion, the goal of a Valuation Detail Sheet is to provide the Assessor and ultimately the public with an easy to understand description of their property value. While some may not like the individual component values, this sheet provides the components that gets one to their the total value which at the end of the day is the only estimate subject to appeal.

I'll be happy to answer any questions going forward.

Have a good weekend.
John

Standard on Automated Valuation Models (AVMs)

Approved September, 2003

International Association of Assessing Officers

The assessment standards set forth herein represent a consensus in the assessing profession and have been adopted by the Executive Board of the International Association of Assessing Officers. The objective of these standards is to provide a systematic means by which concerned assessing officers can improve and standardize the operation of their offices. The standards presented here are advisory in nature and the use of, or compliance with, such standards is purely voluntary. If any portion of these standards is found to be in conflict with the *Uniform Standards of Professional Appraisal Practice* (*USPAP*) or state laws, *USPAP* and state laws shall govern.

Acknowledgments

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Richard Almy
Richard A. Borst
Man Cho
John S. Cirincione
Robert C. Denne
Brian G. Guerin
M. Steven Kane
Josephine Lim
Mark R. Linne, CAE
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John F. Ryan, CAE
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Russ Thimgan
James F. Todora, CAE
Robert Walker

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Contents

Standard on Automated Valuation Models (AVMs)

1. SCOPE

This standard is intended to provide guidance for both public sector CAMA and private sector AVM systems. This standard provides recommendations and guidelines on the design, preparation, interpretation, and use of automated valuation models (AVMs) for the appraisal of property. The standard presents market analysis based appraisal applications and aspects of such models. The principles addressed in this standard are considered applicable to all appraisals of real property, which are designed to estimate market value.

The standard does not address appraisal of personal property, such as machinery and equipment, and AVMs are not considered applicable for appraisal of highly specialized or unique property.

As presented in this standard, the development of an AVM conforms to *USPAP* Standard 6 (Appraisal Foundation 2003, 46–56). The appraiser using AVM output should follow *USPAP* standards that relate to their assignment.

2. INTRODUCTION

2.1 Definition and Purpose of an AVM

2.1.1 Definition

An automated valuation model (AVM) is a mathematically based computer software program that produces an estimate of market value based on market analysis of location, market conditions, and real estate characteristics from information that was previously and separately collected. The distinguishing feature of an AVM is that it is an estimate of market value produced through mathematical modeling. Credibility of an AVM is dependent on the data used and the skills of the modeler producing the AVM.

2.1.2 Purpose

The purpose of an AVM is to provide a credible, reliable, and cost-effective estimate of *market value* as of a given point in time. Market value is the most probable price (in terms of money) that a property should bring in a competitive and open market under the conditions requisite to a fair sale—the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. AVM values reviewed for reliability, and generated in compliance with *USPAP* Standard 6 are considered appraisals.

AVMs are developed and used by both the public and private sector. Assessment officials use AVMs to produce estimates of value as of a common date for purposes of property assessment and taxation. Private sector appraisers and their clients use AVMs to estimate the value of a subject property at a given point in time for a wide variety of purposes.

2.1.3 Applicability

AVMs are applicable to any type of property for which adequate market information and property data are available in the relevant market area. The relevant market area is the area that would be considered by potential purchasers. For residential properties, this is typically all or a portion of a metropolitan area, one or more towns in a geographic area, or a given rural or recreational area. The market area for larger multi-family, commercial, and industrial properties can be regional or even national in scope, depending on the relevant investors and market participants.

The development of an AVM is an exercise in the application of mass appraisal principles and techniques, in which data are analyzed for a sample of properties to develop a model that can be applied to similar properties of the same type in the same market area. These may be either individual properties of interest or all properties that meet the requirements of the model.

Although the same underlying principles are applicable to all AVMs, the specific formulation and calibration techniques will vary with the purpose of the AVM, type of property, available data, and experience and preferences of the market analyst. Sections 3 and 4 discuss the general principles of model specification and calibration. Section 5 addresses residential AVMs. Section 6 focuses on commercial and industrial AVMs and section 7 focuses on AVMs developed for vacant or improved land.

2.1.4 Distinction from Traditional Valuation Applications

Although AVM development requires skilled analysis and attention to quality assurance, AVMs are characterized by the use and application of statistical and mathematical techniques. This distinguishes them from traditional appraisal methods in which an appraiser physically inspects properties and relies more on experience and judgment to analyze real estate data and develop an estimate of market value. Provided that the analysis is sound and consistent

with accepted appraisal theory, an advantage to AVMs is the objectivity and efficiency of the resulting value estimates. Of course, sound judgment is required in model development and an appraiser should review the values produced by the model.

2.2 Purpose and Use of AVMs

2.2.1 General

AVMs are used to provide estimates of market value for a variety of public and private sector purposes. AVM estimates reflect a given time period and should be calibrated to produce market values as of a specific date. Although past market trends can be projected over a short time horizon, the credibility of appraisal estimates increasingly suffers as the projection is lengthened.

AVMs have the advantage of objectivity and consistency, reduced cost, and faster delivery time. It is important, however, that the AVM follow sound statistical and mathematical modeling practices and be tested for accuracy and uniformity before application. Section 8 discusses the important area of model testing and quality assurance and section 9 focuses on reporting of results.

2.2.2 Analysis of Impaired Properties

Properties subject to significant defects or that are affected by atypical circumstances impairing market value, including superadequacy or functional obsolescence, cannot be accurately modeled with an AVM. An appraiser may choose to apply the AVM to the property, but the defect or unique circumstance should be noted and a special adjustment made to compensate for the defect or special circumstance.

2.3 Steps in AVM Development and Application

The remaining portion of this section outlines the steps to take in development of an AVM. The following sections of this standard provide clarification and details concerning these steps and their application to particular property types.

2.3.1 Property Identification

The first step in any appraisal problem is to identify the property to be appraised. In developed economies, identification is normally straightforward, as maps, ownership records, property addresses, and legal descriptions will identify the property and owner. The appraisal assignment will usually require identifying physical characteristics and property rights to be valued as of the appraisal date. When applying an AVM to a particular property, improvements and renovations made before this date should be included in the appraisal; those made subsequent to the appraisal date should not.

The bundle of rights to be appraised generally includes the fee simple interest or full bundle of rights inherent in ownership of property. Nevertheless, the market analyst should make clear what rights are assumed and any limitations to full use or restrictions to transfer of the property.

2.3.2 Assumptions

The AVM supporting documentation should state all assumptions, special limiting conditions, extraordinary assumptions, and hypothetical conditions. A key assumption in many AVM applications concerns the assumed use of the property. Most real estate databases contain the actual use of property as of the inspection date. In some property tax systems, current use is stipulated as the basis for valuation. However, comparable market sales reflect the concept of highest and best (most probable) use. Market analysts and users of AVMs need to be aware of these subtleties.

Another key assumption relates to whether or not the fee simple bundle of rights is being appraised. This is generally the case for residential properties, but many commercial appraisals are made to estimate only the leased fee or leasehold interest when there is an existing lease (or leases) on the property.

Government appraisal agencies are responsible for collecting and maintaining property databases, although they often contract with private vendors for this purpose. Commercial AVM providers generally use data maintained by a government agency or third party service. In all cases, it is imperative that AVM market analysts test the reliability of the data and clearly state assumptions concerning its accuracy. If data important to value estimation are missing or the statistical process has shown the data to be inconsistent or unreliable, the AVM provider has a responsibility to not provide a potentially misleading value estimate to the intended user.

2.3.3 Data Management and Quality Analysis

The reliability of any appraisal depends on accurate data. Appraisal data fall into two general categories: property data and market data. Property data relate to location, land characteristics, and building features. Market data include sales, income, and cost information. Asking prices and independent appraisals can sometimes be used to supplement sparse sales data.

Computerized statistical tools used to develop AVMs afford the opportunity to screen data for missing or out-of-range occurrences and inconsistencies; examples include homes with more than two fireplaces or a bi-level home with no listed lower level living area.

Geographic information systems (GIS) can also help in data reviews. GIS software is used to maintain computerized maps and provide geographic representations of property attributes and features. It can be used to

highlight properties with impossible, unlikely, or inconsistent data. For example, properties coded as being waterfront can be color-coded, displayed on a map, and reviewed for accuracy.

Only valid, open market sale and income data should be used in model development. (As mentioned, asking prices and independent appraisals can sometimes also be used to bolster sample sizes.)

Since the reliability of an AVM is dependent on the data from which it is generated, the integrity of the database should be monitored on a systematic and ongoing basis.

2.3.4 Model Specification

Model specification is the important process of determining the format (model structure) of the AVM. The market analyst must determine the type of model to be employed and specify the variables to be used in the model.

AVMs that employ property features, often characterized as "hedonic" models, can be categorized as additive, multiplicative, or hybrid models (see Section 3 on Specification of AVM Models). Market analysts must also determine the variables to be included in hedonic AVMs. These can represent property characteristics (e.g., square feet of living area and building age), location information, demographic data (e.g., income levels or school quality), or variables derived from property characteristics (e.g., the square root of lot size or living area multiplied by a quality index). The objective is always to include property features important in value determination and to capture actual market relationships. Skilled analysis is required to adequately specify an effective model structure.

Some models that are referred to as AVMs have only a time component; in other words, they merely track changes in property values over time. Where property characteristic information is unavailable or limited, these models can be used to trend a previous sale or value estimate to the target appraisal date.

2.3.5 Model Calibration

Calibration is the process of determining the coefficients in an AVM as well as which variables should be retained or deleted due to statistical insignificance. Several statistical tools can be used to calibrate AVM models (see Section 4 on Calibration Techniques). Proper use of these tools requires experience and training in statistical analysis and the software employed.

2.3.6 Model Testing and Quality Assurance

An AVM must be tested to ensure that it meets required accuracy standards before being deployed. This is accomplished through statistical diagnostics and a ratio study in which value estimates (e.g., estimated sale price or estimated rent) are compared to actual values (e.g., sale price or reported rent) for the same properties. GIS can be used to display color-coded ratios on maps and help spot groups of under- or over-valued properties. For more information, see Section 8 on Automated Valuation Model Testing and Quality Assurance. Before it is implemented, the AVM also should be tested on a holdout sample, which is a set of properties and their selling prices that were not used in the calibration process.

Properties with unusually large errors, termed "outliers," should be reviewed. It is likely that the sale price (or other value serving as the dependent variable in the model) is not representative, the data are partially incorrect, or the property exhibits atypical features that cannot be adequately accounted for in the model. Except where the data can be corrected, the property should be removed from the sample, and it and similar properties with similar features should not be valued by the AVM alone.

2.3.7 Model Application and Value Review

Once tested and validated, the AVM can be applied to estimate the value of other properties of the same type in the area or region where the model applies. These values should be reviewed for reasonableness and consistency with recent sales, either of the subject property itself or of similar properties in the same neighborhood or surrounding area, or where sales are not available, recent asking prices.

It is also good practice to systematically review the generated values for reasonableness and consistency with nearby properties in the same neighborhood. This affords the opportunity to ensure that the data are accurate, and to make individual adjustments to properties with unique features or that are subject to special influences, such as being located at a busy intersection or having a premium or obstructed view.

2.3.8 Stratification

Stratification is the process of grouping properties for modeling and analysis. Stratification begins with property type. Properties are delineated into generic use categories such as: single-family residential, condominium (if applicable), multi-family, commercial, and industrial. The number of property types will depend on the size and diversity of the geographic area being analyzed and the number of sales available within the proposed strata.

Residential properties in urban areas are generally stratified into "market areas." Market areas are broad, somewhat homogeneous geoeconomic areas that appeal to buyers in similar economic brackets. One AVM may be developed for each market area, or a regional model may be developed and individually calibrated for each market area. Location within the market area can be handled through neighborhood variables or other variables related to geographic location and desirability. Alternatively, a location value response surface analysis

(LVRSA) may be used to measure and adjust for location within the model formula (see Section 3.4 Location).

Commercial properties are usually modeled across a wider geographic area than residential. For example, one model may be sufficient for all properties of a given type (e.g., office, retail, or warehouse) in an entire urban county or metropolitan area.

2.3.9 Value Defense

Market analysts must be prepared to review and defend values developed through AVMs. The review process begins with checking the accuracy of the data. If no problem is found, the estimated value should be evaluated for consistency with similar properties and with any recent sales of the subject property or similar properties. The fact that a property sold for a price different from the AVM estimate does not mean that the AVM estimate is wrong. The sale date may differ significantly from the appraisal date, and the property may have sold for a relatively low or high price, depending on the peculiarities of the situation and motivations of the buyer and seller. If the estimated value appears to be unreasonable or inconsistent with market evidence, the AVM estimate is not reliable and should be discarded or adjusted (the reason for the breakdown should be investigated and corrected). If the estimate is supported by market evidence, then it should be defended.

The best support for an AVM value is recent sales of comparable properties. Current listings can also be used, although they must be given less credence than consummated sales. For income properties, it may be possible to support a value estimate derived from one AVM (say, a sales comparison model) with estimates derived from alternative methods (e.g., an income model). The consistency of the value estimate with others produced by the AVM model, as well as the overall reliability of the AVM model as evidenced by a ratio study of the holdout sample or other statistical measures can also be evaluated and used to defend the value.

AVM developers should prepare documentation that will allow clients and other appraisers to understand in non-technical terms how the model was developed and applied.

3. SPECIFICATION OF AVM MODELS

The two major components of valuation are specification and calibration. Model specification is the process of developing the proposed model structure. Model calibration relates to testing the specified model structure using data sets to generate the model variable coefficients.

In practice the specification and calibration are performed in an iterative process which includes the following steps:

1. Specify a model
2. Test the specification with calibration
3. Make adjustments to model specification
4. Test new specification with calibration
5. Continue to repeat the process until statistically significant improvement is minimized

The AVM specification and calibration iterative process makes the assumption that data are collected and verified in a consistent and professional manner.

3.1 Data Quality Assurance

The model specification process begins with an evaluation of the data availability. The availability of data will influence the specification of the model and may indicate the need for revisions in the specification and/or limit the usefulness of the resulting value estimates. Publicly available data from government sources, such as government assessors, deed recorders, registrars and census agencies, are the basis for most statistical models. Commercial sector information services may be used to supplement that data. Because more than one source will provide information toward the AVM model process, the AVM market analyst must use statistical data analysis to confirm the assumption that the quality of the data will provide reasonable support for the modeling process.

AVM models are based on a sample of the universe of data. The specification process must review the sample data used to develop the model as well as the population to which the model will be applied. The sample should be representative of the population in all key elements of value including the types of properties, market conditions, value range, land and building sizes, and building ages. Property types where market information is not available, should be excluded from both the sample and total population files as the model specification will not be representative of these properties.

Indicators of value may include sale prices, rents, expenses, and capitalization rates. Limitations in the integrity and availability of the data are important determinants of the model specification. Knowledge of key property characteristics is crucial to model specification. Models should not be specified without an understanding of the data in the sample and population.

Data field verification is common in public, but not in commercial, AVM development. Commercial AVM market analysts rely on the accuracy of the data provided to them. In cases where AVM data is not field verified, data quality can only be measured by its typical relationship to the value. When data items that appraisers would consider highly correlated to value do not prove to have such a relationship (correlation matrix or regression T or F values), this could be an indication of inconsistent data collection or scarcity of data. Data that are not consistently collected or that are mostly missing from the population should not be used in the model

specification or calibration phases, as it can be insignificant and may produce misleading results.

Data may be qualitative or quantitative. Quantitative data is objective and can be counted or measured. Qualitative data is usually descriptive, subjective, and subject to judgmental decisions that require experience by the person collecting the data.

3.2 Model Specification Methods

AVM models are based upon one or more of the three approaches to value (cost, sales comparison, and income).

3.2.1 Cost Approach

Model specification for the cost approach requires the estimation of separate land and building values.

The cost approach formula converts to a model specification:

$$MV = \pi GQ * [(1-BQ_D) * RCN + LV]$$

- MV is the market value estimate.
- πGQ represents the general qualitative variables such as location and time;
- BQ_D is a building qualitative variable representing depreciation;
- RCN is the replacement/reproduction cost new;
- LV is the land value; and

(Gloudemans 1999, 124.)

If a third party provides the cost tables, it is the responsibility of the AVM market analyst to calibrate the cost tables to the local market in order to provide a valid indicator of value by the cost approach.

3.2.2 Sales Comparison Approach

The sales comparison approach can involve either a two-step process, in which comparable sales are identified and adjusted to the subject property, or the specification and calibration of a direct sales comparison model.

3.2.2.1 Comparable Sales Method

In the two-step process (also referred to as the "appraisal emulation" method), one model is developed to identify comparable sales and a second model is developed to make adjustments for differences between the subject property and the identified comparables. The first model will include data items important in determining comparability and may involve the calculation of a dissimilarity measure, such as the Minkowski or Euclidean metrics. A second model will include data items significant in directly estimating value from the market and is used to adjust the selected comparable sales to the subject. Model specification for the comparable sales method can be summarized as follows:

$$MV_S = SP_C + ADJ_C$$

- MV_S represents the market value estimate;
- SP_C represents the selling price of a comparable sale property; and
- ADJ_C represents adjustments to the comparable sale.

(Gloudemans 1999, 124.)

3.2.2.2 Direct Market Method

The direct market method involves specification and calibration of a single model to predict value directly. The model may take one of three forms: additive (also termed "linear"), multiplicative, or hybrid (also termed "nonlinear'). Basically, in an additive model, the contribution of each variable in the model is added together. In a multiplicative model, the contributions are multiplied. Hybrid models can accommodate both additive and multiplicative components. The choice of model specification usually depends on the prior experience of the market analyst and the type of property being appraised. Additive models are the most prevalent of the three, based on tradition and wide availability of software programs. Nonlinear (hybrid) models are used the least due to limited software availability, but these models more accurately reflect the combination of additive and multiplicative relationships in the real estate market.

Additive models have the form:

$$MV = B_0 + B_1*X_1 + B_2*X_2 + \ldots$$

- MV is the dependent variable;
- B_0 is a constant;
- X_i represents the independent variables in the model; and
- B_i are corresponding rates or "coefficients."

In a direct sales comparison model, "MV" is either sale price or sale price per unit. In an income model, the dependent variable is income or income per unit. Additive models are relatively easy to calibrate and understand.

In a multiplicative model the contribution of the variables is multiplied rather than added:

$$MV = B_0 * X_1^{B1} * X_2^{B2} * \ldots$$

In this example each variable is raised to a corresponding power. However, the process can also be reversed as illustrated by the third variable in the equation below:

$$MV = B_0 * X_1^{B1} * X_2^{B2} * B_3^{X3} \ldots$$

Multiplicative models consist of a base rate (B_0) and percentage adjustments. They have several advantages, including the ability to capture curvilinear relationships more effectively and the ability to make adjustments proportionate to the value of the property being appraised. Multiplicative models are usually calibrated using linear regression packages. This requires some of the variables to be converted to logarithmic format for calibration, which can complicate model development and application.

Hybrid (nonlinear) models are a combination of additive and multiplicative models. As such, they are theoretically the best alternative of the three, but software is relatively limited.

A general hybrid model specification that separates value into building, land, and "other" components (e.g., outbuildings) is:

$$MV = \pi GQ * [\pi BQ * \Sigma BA) + \pi LQ * \Sigma LA) + \Sigma OA]$$

- MV is the estimated market value;
- πGQ is the product of general qualitative variables;
- πBQ is the product of building qualitative variables;
- ΣBA is the sum of building additive variables;
- πLQ is the product of land qualitative variables;
- ΣLA is the sum of land additive variables; and
- ΣOA is the sum of other additive variables.

(IAAO 1990, 351; Gloudemans 1999, 124.)

3.2.3 Income Approach

Income-producing real property is usually purchased for the right to receive future income. The appraiser evaluates this income for quantity, quality, direction, and duration and then converts it by means of an appropriate capitalization rate into an expression of present worth: market value. If expense data are available, the steps in this approach are:

1. Estimate gross income, expenses, and net income from market data.
2. Select the appropriate capitalization method (model specification).
3. Estimate a capitalization rate or income multiplier (model calibration).
4. Compute value by capitalization.

(IAAO 2002.)

While there are many model specifications of the income approach, the basic overall direct capitalization formula is:

$$MV = NOI/R$$

- MV is the price examined in the calibration and resulting estimate of market value;
- NOI is the net operating income; and
- R is the overall capitalization rate.

Another income approach methodology uses gross income multipliers (GIMs):

$$MV = GI * GIM$$

- MV is the price examined in the calibration and resulting estimate of market value;
- GI is the gross annual income; and
- GIM is the gross income multiplier.

Gross rent multipliers are the same as gross income multipliers but relate to monthly gross incomes.

3.3 Stratification

In stratification, parcels are sorted into relatively homogeneous groups based on use, physical characteristics, or location. Properties are first stratified by use such as agricultural, apartments, commercial, industrial, and residential. Additional stratification by physical characteristics or value ranges may be performed to minimize the differences within strata and maximize differences among strata. Geographic stratification is appropriate wherever the value of various property attributes varies significantly among areas and is particularly effective when housing types and styles are relatively uniform within areas (IAAO 1990, 119). Location stratification reduces the need for complex models. However, excessive stratification may provide too little variation in the data.

When the market for a given type of property is national in scope, it may be possible to create national valuation models without stratification if location adjustments are included as part of the model specification and calibration processes.

3.4 Location

Location is the numerical or other identification of a point (or object) sufficiently precise so the point can be situated. Location has a major influence upon property value. Location analysis can be used to measure the relative impact on value from the neighborhood level down to the individual property level. Location influences within a given model area can be measured by including location variables in the model, or can be established through an analysis of the residuals (errors) from a model developed without location factors.

Two specific methods to develop location adjustments are the creation or use of existing neighborhoods and LVRSA. Neighborhoods are the traditional and most

common form of location analysis. In AVMs, neighborhoods may be based upon streets and natural boundaries, government assessor-designated areas, census tracts, or postal delivery codes. LVRSA techniques relate relative prices as measured, for example, by the ratio of each sale price to the median price to each property's unique location, as represented by its geographical coordinates. Software that provide the ability to perform LVRSA use a variety of smoothing techniques to compute a unique location adjustment, termed the relative location value (RLV), for each property. At a more sophisticated level, residuals from a first model developed without location variables can be plotted and analyzed to create the RLV grid. This variable is then included, along with other variables, in a multiple regression or other model to capture location influences.

4. CALIBRATION TECHNIQUES

Model Calibration is the development of the adjustments or coefficients through market analysis of the variables to be used in an AVM. The definition of an AVM used in this standard, emphasizes the use of statistical models and procedures in the development of the AVM. The majority of AVMs in use rely strictly on statistical models as the method of calibration, however *USPAP* Standard 6 (Appraisal Foundation 2003, 46–56) provides recognition of other acceptable methods.

Multiple linear regression and nonlinear regression are clearly based in statistics, while adaptive estimation procedure is based on a tracking method from the engineering sciences. Neural networks emulate some of the observed properties of biological nervous systems and draw on the analogies of adaptive biological learning. Artificial neural networks are collections of mathematical models that can emulate some of the observed properties found in the real estate market.

4.1 Calibration Using Multiple Regression Analysis (MRA)

MRA is a statistically based analysis that evaluates the linear relationship between a dependent (response) variable and several independent (predictor) variables, and extracts parameter estimates for independent variables used collectively to estimate value in a mathematical model. Models produced using MRA come with a rich set of diagnostic statistics that provide evaluation tools for the market analyst to compare results between and among specified models. These goodness-of-fit statistics provide information about each variable's significance in predicting value, and how well the variables in the model work together to produce creditable results overall. Users of AVMs should be familiar with the key measures of goodness-of-fit, and review them before accepting AVM results generated by the MRA process.

4.1.1 MRA Assumptions

The accuracy and credibility of an MRA model depend on the degree to which certain assumptions are met. The most important assumptions are complete and accurate data, linearity, additivity, normal distribution of errors, constant variance of the errors, uncorrelated independent variables, and sample representativeness.

Complete and accurate data is required if MRA is to achieve predictive accuracy.

Linearity assumes the marginal contribution to value by an independent variable is constant over the entire range of the variable. When additive models are used, this assumption may not be supported in the market place, requiring a transformation of the variable. Additivity continues with the concept of marginal contribution in that any one independent variable is unaffected by the other variables in the model. In other words, linear additive models do not possess the ability to measure nonlinear effects or interactive effects of market conditions, without transforming raw variables. In such cases, one must consider using nonlinear or hybrid models.

Normal distribution of errors follows the assumption that the data are normally distributed, and therefore, any error in predictions is also normally distributed. Without the assumption of the normally distributed errors, the inferences for using the standard error of estimate and coefficient of variation (COV) as a measure for goodness of fit are meaningless. Constant variance of the error term implies that the residuals are uncorrelated with the dependent variable, which is the sale price. In other words, as the price level changes, the error term remains constant or homoscedastic; when unequal variances occur at different price ranges, it is heteroscedastic.

A term known as multicollinearity describes the condition where independent variables are correlated (measure the same thing) with each other. Depending on the method used, regression may reject one variable as insignificant or exaggerate coefficients for both variables, if multicollinearity is introduced into the model. A correlation matrix is a good tool when testing for multicollinearity.

It is assumed the sold properties data from which models are constructed are representative of the properties to which they are applied. It is important that both low and high value properties be represented in the model. Data should also be divided into training samples used to develop the model, and holdout samples (control samples) used to test model results.

Because of its robust character, minor violation of this assumption will not dramatically impact results. Poor data quality or samples not representative of the population will produce poor performing models.

The market analyst must be able to present the MRA results in an understandable and defensible format that appraisers and AVM clients can easily understand.

To avoid seriously violating assumption of linearity, additivity, and constant variance of the error term, the market analyst must consider the use of transforming variables or other calibration methods described in the standard. A multiplicative, nonlinear, or hybrid model structure is best for measuring interactive effects.

4.1.2 Diagnostic Measures of Goodness-of-Fit

Both the market analyst using regression and the user of AVM output must be aware of and understand how the various key statistical measures used in regression relate to the reliability of results. These statistics fall into two categories: overall measures that aid in the interpretation of model performance and individual variable measures that assist in the understanding of how well an individual variable performs in helping to estimate value, as well as keeping the standard error term to a minimum. Primary measures of goodness-of-fit for overall model performance are the coefficient of determination (R^2), standard error of the estimate (SEE), COV, and average percent error.

Goodness-of-fit measures for individual variables in a model are produced by most MRA software packages and include the coefficient of correlation (R), T-statistic, F-statistic, and beta coefficients. Each of these measures will provide information about an individual variable's linearity or importance of contribution toward improving predictive success, and relative importance, as variables are compared to each other.

(D'Agostino and Stephens 1986.)

When all the measures are used collectively, along with an understanding of data quality issues, those skilled in developing and using MRA can fully evaluate the credibility of the AVM estimates. Appraisers asked to review AVM results must understand the role that *goodness-of-fit* statistics play in evaluating AVM results. The application of AVM results to a single property may be better evaluated using historical market comparisons selected from a subset of data. Appraisers asked to review AVM results should review the Appraisal Standards Board's *USPAP* Standard and AO-18.

(Appraisal Foundation 2003, 46–56, 180–187; IAAO 1990; D'Agostino and Stephens 1986.)

4.1.3 MRA Software, Options and Techniques

MRA is the most widely used method for calibrating models. As such, the availability of MRA software provides users many choices. No one software package is deemed superior to another, as success using MRA is a combination of modeling skills and software familiarity. Variations of a selected MRA technique can be a decisive factor in selecting an MRA and statistical application package. Many MRA techniques have been adopted over the years to help regression take better advantage of its predictive powers. Stepwise, constrained, robust, ridge regression, and others are acceptable techniques used to improve predictive success. Many of the statistical software packages include variable selection routines that aid the market analyst in selection of significant variables.

4.1.4 MRA Strengths

1. Goodness-of-fit statistics—gives credence to the validity of results.
2. Software availability—many regression software products are available.
3. Widely-accepted calibration method.
4. Broad education network—MRA is taught at most colleges and universities around the world.
5. Credible values—in the hands of a skilled market analyst, MRA is proven to produce results that meet the test of model performance.

4.1.5 MRA Weaknesses

1. Requires a high level of statistical knowledge—market analysts must possess significant background in data analysis and statistical methods.
2. Predictive accuracy is restrained by assumptions.
3. Requires data sets that meet the test of sample size.
4. Interactive and nonlinear market trends are difficult to measure without transforming data.

4.2 Calibrating Using Adaptive Estimation Procedure (AEP)

Adaptive Estimation Procedure (AEP) is a calibration technique that was adapted to real estate value in the early 1980s. Also known as feedback, AEP is based on an engineering concept that relies on continual adjustment to coefficients as the calibration engine passes, or tracks, back and forth through the data until convergence, (minimum error is achieved) thus the feedback. For property valuation, the algorithm tracks the sale price as a moving target. It compares property characteristics as variables that measure the change in sale price, and calibrates a coefficient for each variable. The coefficients are used to estimate value that is then compared to sale price. A running tally is kept on the error term as the process continues. Figure 1 depicts the feedback loop.

AEP will make multiple passes through the sales file constantly adjusting coefficients before a final solution is reached. Success using AEP is dependent upon the

market analyst's ability to properly specify a model with characteristics that measure and evaluate local market conditions. Market analysts using AEP have considerable control over the variables used in the model and the coefficient amounts. AEP uses whatever variables are introduced into the model. No variable is excluded because of insignificance. As part of the specification phase, the model can be pre-calibrated with starting, minimum, and maximum coefficients in order to help it converge sooner, and to help ensure that rational coefficients will be produced. Setting the starting, minimum, and maximum coefficients is analogous to constraining coefficients used in constrained regression.

4.2.1 AEP Model Structure

A hybrid model structure has the ability to directly deal with interactive and nonlinear effects found in the market place. The structure closely resembles a cost model; however, the calibrations give it the benefit of a direct market model. The flexibility of the hybrid model built into AEP allows the qualitative variables to be calibrated in two different ways: as multiplicatives, that is Xi^{B1} (rates), or binaries $B1^{Xi}$. Deployment of a feedback model in an AVM format allows for flexibility without the added complexity of transformations found with additive models.

4.2.2 Variable Control in AEP

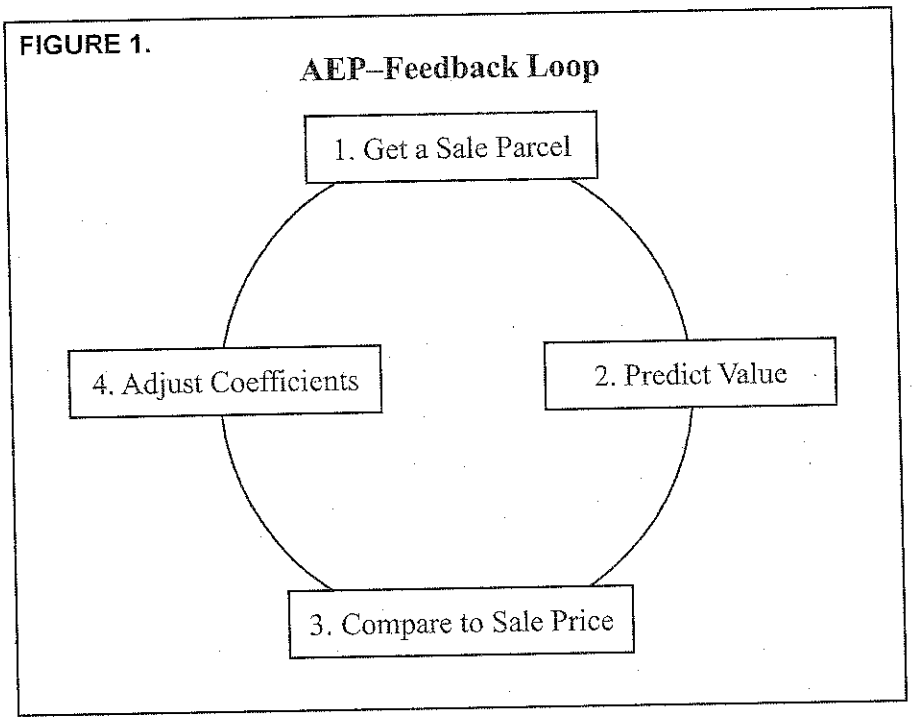
Calibration of individual variables in AEP differs significantly from the fitting of a straight line or curve in linear or nonlinear regression. Controlling for extremes in the coefficient amounts is a concern when using feedback. The use of smoothing and damping factors will help provide model stability during the calibration phase. Smoothing is applied to only the quantitative variables. Using an algorithm, smoothing keeps track of each variable's exponentially smoothed mean (moving average) as a way of learning until a final solution is reached. Smoothing factors are used in conjunction with damping factors. The market analyst provides the settings for the smoothing factor. Additionally, damping factors control the amount of movement each coefficient (quantitative and qualitative) will have as each new case is introduced into the model while calibrating. Some feedback systems will dynamically adjust damping and smoothing for optimized results. Locking or constraining coefficient movement, forces residuals onto another variable. With so much control over the model, even similarly specified models may produce different final answers.

4.2.3 Results and Goodness-of-Fit Measures

Final results using AEP are measured first by the comparison of how close the estimated price comes to the actual price. Another measure, the reasonableness of coefficient amounts, is based on the skill and knowledge of the analyst in pre-defining the model prior to calibration. AEP does not care if a model uses square foot of living area at a price or the window count at a price. If either can logically predict accurate value estimates, AEP will generate a coefficient that produces the lowest error term. Feedback understands that grouped patterns of property characteristics are the determinants of price and the individual characteristics do not necessarily produce marginal contributions to price.

The AEP is not reliant on statistical measures of the model, or variable significance. Convergence occurs

FIGURE 1.



when the average absolute error does not change appreciably from one iteration to another. Some software allows other criteria to be set by the user (e.g., maximum iterations, pre-defined absolute error). There is no statistical measure that accounts for significance of a variable. Pseudo-R^2 statistics can be generated after the feedback model is complete. Output should include the accounting for calibration of each variable by giving information on the number of observations, starting, minimum and maximum ranges, and the low, high, and final coefficient of the variable.

4.2.4 AEP Advantages

1. Produces separate estimates for land and improvements.
2. Based on reducing the absolute error term, not just minimizing the squared error term.
3. Outliers' influence can be diminished during variable calibration cycle.
4. Requires fewer observations than regression.
5. Individual variable movement can be easily constrained.
6. Cost system attributes can be directly calibrated.

4.2.5 AEP Disadvantages

1. Software availability is limited, and there is no standardized algorithm.
2. Does not contain standard goodness-of-fit statistics found in regression software.
3. Requires initial model be specified carefully.

As an alternative, some market analysts have turned to using nonlinear regression software. Nonlinear regression supports the hybrid model and can calibrate interactive effects and curves simultaneously like the AEP/Feedback routine.

(Ward and Steiner 1988; Gloudemans 1999, 196; Woolery and Shea 1985; Carbone 1976.)

4.3 Artificial Neural Networks

The most recent adaptation for use in calibrating real estate valuation models is Artificial Neural Networks (ANN). The concept is borrowed from the biological sciences and functions of the human brain. The key element of the ANN paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements that are analogous to neurons and are tied together with weighted connections that are analogous to synapses. As the name implies, ANN comes as close to producing artificial intelligence models as any calibration method. Like nonlinear regression and feedback, neural networks can calibrate models that consist of both linear and nonlinear terms simultaneously. The user inputs each variable with assigned weights (coefficients). The software exposes the data using an algorithm in a hidden layer where the weights are adjusted (calibrated) in a manner that reduces the squared error. This is an iterative process much like those found with feedback and nonlinear regression. The final output results in a single estimate of value with the exact formula remaining hidden from the market analyst.

4.3.1 The Artificial Neuron

The basic unit of neural networks, the artificial neurons, simulates the four basic functions of natural neurons. Those functions are represented by inputs, the processing of inputs (summation), transfer (linear, sigmoid, sine, and so on), and outputs an answer. Artificial neurons are much simpler than the biological neuron; Figure 2 shows the basics of an artificial neuron.

Inputs to the network are represented by the mathematical symbol x(n). Each of these inputs are multiplied by a connection weight that is represented by w(n). In the simplest case, these products are simply summed, fed through a transfer function to generate a result, and then output.

Even though all artificial neural networks are constructed from this basic building block, the fundamentals may vary in these building blocks.

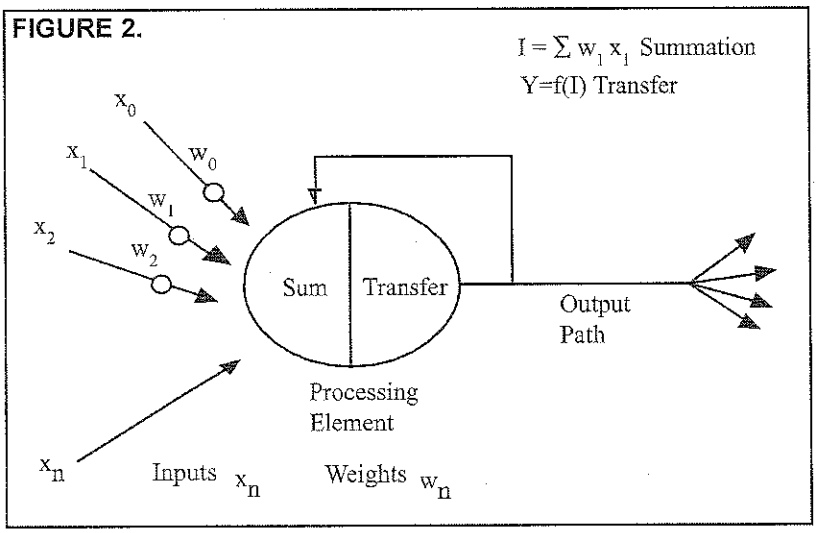
4.3.2 Strengths of Neural Networks

1. The ability of the neural network to "learn" as it goes and to take new information and process as it has been trained.
2. Neural networks can recognize and match complicated, vague, or incomplete patterns in data.
3. Options that provide analysts confidence about future use of neural network applications, such as helping to improve data quality.
4. Studies completed indicate that the accuracy of neural networks is comparable to other calibration methods found in the standard.

4.3.3 Weakness of Neural Networks

1. The complexity of how the process actually works in the hidden layer.
2. Lack of a definable model structure at the output stage makes explanation of value and support of the value more difficult.
3. Requires considerable background in data analysis, data structure, and mathematical concepts.
4. Limited research links pertaining to use in real property valuation.
5. Requires considerable investment in computer power and software.

(Gloudemans 1999, 329.)



4.4 Time Series Analysis

Time series analyses are a family of techniques that can be used to measure the cyclical movements, random variations, seasonal variations, and secular trends observed over a period of time. In property valuation, these analyses can be used to develop a multiplier or index factor to update existing appraised values or to adjust sales prices for individual properties to the valuation date. Since values can change at different rates in different markets, separate factors should be tested for each property type and market area.

Four methods used to develop time trend factors in the appraisal and assessment industries are: (1) value per-unit analysis, (2) re-sales analysis, (3) sales/assessment ratio trend analysis, and (4) inclusion of time variables in sales comparison models. These methods are summarized below (for a more detailed explanation and discussion, see *Mass Appraisal of Real Property* (Gloudemans 1999, 263-270).

Value per-unit analyses track changes in sale price per unit (e.g., per square foot for residential properties or per unit for apartments) over time. The method is easily understood and lends itself well to graphical representation, as well as to statistical modeling to extract the average rate of change. A downside is that the method does not account for the myriad of other value influences, such as age and construction quality, that impact per-unit values.

Re-sales analysis uses repeat sales occurring over a given time period. Price changes between sales are converted to monthly rates and an average (or median) rate of change is extracted. As can be imagined, the larger the number of repeat sales, the more reliable the estimated rate of change. The method can overestimate rates of change if repeat sales reflect substantial improvements (or other alterations) made to the property since the first sale.

Sales/assessment ratio trend analysis involves tracking changes in the ratio of sales prices to existing assessments made as of a common base date. Increases in the ratios indicate inflation and vice versa. The ratio also provides the index factor required to convert assessed value to a full value estimate. Like value per-unit analysis, the method lends itself well to graphical and statistical analysis. An advantage of the method is that assessments account for most value determinants and thus can isolate time trends better than the value per-unit method. The method assumes that the assessments share a common basis, and its reliability depends partly on the accuracy or uniformity of the assessments.

Time variables can be included directly into AVM models to capture the rate of price change over the period of analysis. This is usually the most accurate of the various methods. However, model developers must be careful that time variables are properly specified so that coefficients developed from the model reflect the desired valuation date.

Once a time trend is established, it can be used to adjust values to any point within the sales period.

Trend factors can be extrapolated for a short period beyond the sales period, but this must be done with caution and grows increasingly unreliable as the time frame is lengthened. If more than several months are involved, the first three methods can be used to calibrate the trend (one would not ordinarily develop time adjustments through use of a modeling approach without recalibrating the entire AVM model).

(The Appraisal Institute 2002, 291.)

4.5 Tax Assessed Value Model

Tax assessed value models derive an estimate of value by examining values attributed to properties by the local taxing authorities. As a matter of local law and custom,

the values reported by the taxing authorities often (but not always) vary from the current market value in some reasonably predictable manner. For example, some jurisdictions require the taxing authority to report the assessed value at 25 percent of the estimated market value. Some jurisdictions may not have reappraised in a long time, so values lag far behind the current market. Also, some jurisdictions report multiple values: assessed, appraised, and market values. By examining local laws and customs with respect to how values are determined, as well as applicable time trends (see Section 4.4) and information reported in local or state-level ratio studies (see Section 8.4), it may be possible to develop adjustment factors to apply to values reported by taxing authorities in order to approximate current market values.

The reliability of a tax assessed model will depend on the uniformity of appraisals to which the adjustment factors are applied, as well as the accuracy of the adjustment factors themselves, which can vary with how current the assessments are, and the reliability of the ratio studies or other information on which they are based. Extreme caution must be exercised when local assessment uniformity is poor, because factoring an unreliable assessed value will only result in an unreliable market value. On the other hand, local assessments that meet IAAO standards can provide a sound basis for market values estimation.

4.6 Calibration Summary

The various methods and procedures used to calibrate the AVM are the engines that drive accuracy and credibility of the estimate made. By itself, no one calibration method is better than another. Data integrity and the skill level of the analyst define the accuracy of one calibration technique as compared to others. Users of AVM products must be aware of the interdependence between skills and technologies of calibration when deciding how well the AVM will perform.

The use of MRA has been the longstanding choice for calibration and has a proven track record. Feedback, nonlinear regression, and neural networks are emerging technologies that require different levels of skill and knowledge concerning modeling real property values. Understanding calibration in relation to this standard encourages the AVM market analysts and clients to understand that AVM development is not a black box process; instead, it is based on well-defined concepts surrounding the appraisal process. Details for learning and understanding the skills and technical aspects of calibration are found in the references throughout this section of the standard.

AVM clients must understand that developers of AVM products are not limited to using a single method of calibration. Product market analysts often base their value estimates on multiple technologies. Included in these technologies are simple sales listings of automated sales comparison selections, with adjustments derived from the modeling process. Appraisers asked to use or review an AVM should read Advisory Opinion 18—published as part of *USPAP* Standard 6 by the Appraisal Foundation (2003, 46–56, 180–187).

5. RESIDENTIAL AVMS

The residential property class has the longest history of being valued by AVMs. Residential property includes detached single-family homes, condominiums, townhouses, and zero-lot-line property. Other property types included in the residential class are properties with four units or less. Traditional methods of valuing these properties are cost approach and direct sales comparison. Both methods have been automated and are considered a part of the AVM category of methods and techniques available.

5.1 Detached Single-Family

When adequate sales data is available, the direct sales comparison approach is the preferred method of valuing residential property. The approach may take two forms: direct market models and comparable sales.

Direct market models developed from sales analyses use various model structures, with coefficients derived via a mathematical calibration method. The comparable sales method is a two-part method in which comparable sales are found and then adjusted to the subject property.

Some AVMs combine the strengths of direct market models and comparable sales models, to the point where comparable sales model coefficients are derived from direct market model analysis.

Cost models, like sales comparison models, have a strong history of reliability and credibility for valuing residential property. However, the origin and accuracy of coefficients are unknown to most users and may not reflect the actual market.

5.1.1 Cost Models

The cost approach works best when applied to newer properties that do not exhibit a great deal of measurable depreciation, and where the land value can be reasonably estimated from recent land sales. Cost models are anchored in tables developed by studying local building cost data. In the AVM format, the tables are converted to a formula and applied by simply entering basic building (improvement) information. Such models are used for deriving the Replacement Cost New (RCN). The initial cost coefficients supplied with a cost model represent the supply side of the residential market. These RCN estimates need further calibration for actual property condition (depreciation), location (macro and

micro), and a supportable estimate of vacant land value, in order to arrive at market value. These items represent the demand side of the market. A strength of the cost model is that it can be applied to any improvement regardless of size, quality, age, condition, or style. The accuracy and credibility of the cost model is tied to the analyst's ability to calibrate depreciation, location, and land value.

5.1.2 Comparable Sales Models

Knowing the sale price of a property with attributes similar to the subject property is a concept that consumers can easily understand. This approach provides the theoretical basis for the Sales Comparison Model using comparable sales. Sales comparison of residential property has been accepted by real estate consumers and the courts for many decades; however, this method does have limitations in the automated world. It essentially requires two models. The first one is a comparable selection model. Many AVMs rely on identification and summarization of all recent sales within a specified radius of the subject. The advantage of this model is that all recent sales with close proximity to the subject are considered. This method may work well in homogeneous areas with a high sales volume. If the comparables have significant attribute differences, the confidence of the adjustments being made also begins to suffer. For quality comparables, an AVM routine may consider using a weighted selection model (e.g., regression coefficients, Minkowski or Euclidian metrics). Another choice would be cluster analysis.

All of these methods can select comparables based on attribute comparisons that pick the comparables most similar to the subject, based on defined parameters. These methods are not limited to selecting only three sales, as has been the tradition. Once the best comparables are selected, they must be adjusted for attributes that are dissimilar to the subject. How these adjustments are developed has much to do with how accurate and reliable the sales comparison estimate will be. Mathematically, the adjustments can be derived from just two sales; one sale possesses the attribute, while the other does not. The difference in sale price measures the value of the missing attribute. Sales comparison methods that rely on direct market models that use quantitative methods for deriving the adjustments, are more stable and reliable than simple match pair analysis.

In its formatted form, the comparable sales approach should display how each attribute adjustment in the AVM contributes to the overall value estimate. Users of AVMs are cautioned that matched pairs analysis is not a statistical calibration method. Any comparable sales approach claiming to be an AVM as defined in this standard must meet the criteria of being supported by an automated market analysis process.

5.1.3 Direct Market Models

The basic premise of direct market models (also termed hedonic models) is that the price of a marketed good is related to its characteristics, or the services it provides. For example, the price of a home reflects the characteristics of that home (e.g., size, construction quality, style, location). Therefore, we can value the individual attributes of a home by looking at the prices people are willing to pay for them. Direct market models lend themselves well to the calibration methods and techniques discussed in Sections 2–4 of this standard. If a value-determining attribute can be captured in a database, then the model can calibrate a coefficient that measures its contribution to the total value estimate. Properly designed direct market models will produce AVMs capable of very accurate and credible value estimates.

All three model structures introduced in Sections 2 and 3 are well suited to the valuation of single-family residences. Additive models have been the traditional workhorse and work very well in most cases. Multiplicative models carry certain advantages discussed earlier and can also be effectively adopted. Because they accommodate dollar and percentage adjustments, hybrid models provide the most flexibility. Where an additive model will add the same lump sum amount to all property having air conditioning, multiplicative and hybrid models will attribute different amounts depending on the style, quality, and location of the property. Both model structures also lend themselves well to the valuation of spatially dispersed or highly heterogeneous residences.

5.2 Attached Residential Property (Condominiums, Townhouses, Zero-Lot-Lines)

Structures built on an individually plotted lot designed for only one family to occupy, are termed "detached single family residences" and make up the majority of residential property in most communities. Zoning and other spatial changes in a community dictate the density of residential land use. Other methods of dividing land, besides using land-based boundaries, lead to other types of residential use and ownership. Structures where multiple living units are all joined together take on different forms of ownership depending on how the title is legally conveyed in the market place. These structures are commonly referred to as "attached residential units." A ten-story building with five units per floor could be an investment property with each unit rented. Property divided into air lots is known as condominiums. Another division of ownership rights is by time, where each day, week, or month represents units of ownership. Structures where the ownership is divided vertically are

known as townhouses, row houses or zero-lot-lines, depending on geographic location throughout the world. All of these uses are residential in nature.

Valuing these various residential properties is somewhat similar to valuing detached single-family structures. All of the same principles apply and all can be modeled and valued using an AVM. In fact, because these properties exhibit a high degree of homogeneity compared to the detached single-family population, sales-based AVMs can produce values that are extremely reliable and accurate. The cost approach can also work well, in some cases, if adjusted to the market, but it is not appropriate for valuating condominium units because depreciated replacement cost will not properly reflect resale values. Data requirements for attached residences will not be the same as with detached residential properties. For example, floor level can be an important value determinant for condominiums, while lot size and yard improvements are irrelevant.

5.3 Two- to Four-Family Residential Property

Part of the residential housing market consists of structures built for the purpose of housing more than one family. Improvements designed to accommodate two, three, and four families within their own separate living areas are often referred to as small income-producing properties. A common theme among these property types is that the owner of the property may reside in one of the units. This concept, however, is not a requirement for classifying these structures in the market. Two-unit properties are more likely to be owner-occupied than four-unit properties. The concept to be recognized here is how such properties are treated in the marketplace, because that impacts their price and ultimately the value generated by any AVM. The ability to model the selling price of these small-income properties is reliant on what specific data is available, relating to number of units, age, condition, location and gross income. The motivation of buyers shifts when consideration is given to other property attributes that relate to producing rental income and not just owner occupancy. Direct market models, comparable sales models, and cost models are acceptable methods for valuing these small income-producing properties. With their income-producing potential, the income approach is also a model to be considered. With an adequate sample of gross income values for comparison to sale price, a model of GI * GIM will yield credible results where GI = Gross Income and GIM = Gross Income Multiplier (sale price/gross income). Some AVMs may even be set up to predict GI and the GIM. Each of these indicators can vary with size, age, location, style, and condition of a property.

5.4 Manufactured Housing

A manufactured home is a residential structure built in a factory. Construction standards for manufactured housing are controlled and monitored by the Department of Housing and Urban Development in the United States (HUD), and by the Canada Mortgage and Housing Corporation (CMHC) in Canada. While many manufactured homes are built with the same materials as site-built homes, the factory-controlled engineering process helps control cost and quality. The house can be financed as personal or real property on leased land, in a manufactured home community, or on a privately owned site. Buyers who desire to acquire land in conjunction with the home can finance the land and home together. Market conditions and trends will indicate how the manufactured homes compete in the market place. In some communities, zoning only allows manufactured homes in certain areas, confining the market area from which comparables can be derived. Once market conditions for a manufactured home are known, it can be modeled just like any other property type. Consistency is important when using an AVM for manufactured homes. Some manufactured homes are strictly treated in the market as mobile homes (i.e., personal property). An AVM developed to value manufactured homes as real property would give a false value in the case where the home was personal property, and vice versa. AVMs developed to value manufactured personal property homes cannot be used for homes classified as real property. Some manufactured homes compete in the market place with site-built homes. Where this is the case, it is possible that an AVM designed to value detached single-family structures will produce credible results, although the model should include a variable (or variables) to capture any differences between otherwise comparable manufactured and site-built homes.

5.5 Time Series Models for Residential Property

Indexed models relate to time-series analysis (see Section 4.4 on Time Series Analysis) as described earlier. Use of these models represents a common method of delivering quick automated value estimates. These models simply measure the average change in value over time and factor the value forward from a benchmark starting-place, such as the average value in a census block or market area. The accuracy of indexed models is inconsistent and less reliable than fully specified models. These models work best in areas of homogeneity where the range of value is close to the average value.

Indexing is a common method used to update cost tables to reflect current cost. As with market models, a benchmark in time is required as a starting point. Cost coefficients are then updated, using a single index factor representing the measurable change since the original cost coefficients were generated. One current method of indexing is to use an economic indicator such as the consumer price index (CPI). In the cost approach, indexed models have no way of adjusting values at the micro level for location and other market influences that impact value. Time adjustments may be developed from

the analysis of known sale prices within a geographic area, such as a neighborhood or postal code, and over a specified time reference.

Users and consumers of index models must understand how the index factor is created and how the accuracy of the original value was derived before giving a lot of credibility to an AVM using an indexed model.

5.6 Summary and Conclusions for Using Residential AVMs

AVM developers (or users) must understand the intended use of the residential property. The residential housing market is diverse. AVMs lend themselves to estimating the value of residential property. However, each class of residential property has some unique circumstances that will influence how well the AVM can perform when estimating the value. When the uniqueness is captured as part of the data used to develop the AVM, the chances of the value estimate being accurate and credible increase greatly. When unique characteristics are ignored, they are not measured in the market and the error term of the values produced will increase, destroying confidence in the AVM's ability to estimate accurate and credible values.

The overall ability of the AVM to accurately estimate value can be evaluated using the quality assurance measures found in Section 8 of this standard. If the assurance standards are being achieved, then the validity of the AVM is known, and the market analyst and users can understand what degree of confidence to expect from the ensuing value estimates.

6. COMMERCIAL AND INDUSTRIAL AVMS

Commercial and industrial properties, including apartments and multifamily residences with greater than four (4) units, are usually income-producing properties acquired for their ability to generate income. As a result, commercial and industrial properties are best valued using an Income Approach where adequate income data are available or the sales comparison approach where adequate sales are available. However, a solid Cost Approach is needed where sales and/or income data are insufficient to calibrate an appropriately structured model. Also, care must be taken in developing and applying income valuations, to appraise only the real property and not the business, and to value based on typical management, not on the present management.

Commercial and industrial properties provide their unique AVM challenges. First, in some markets there are relatively few sales of commercial and industrial properties. This creates problems with land valuation for the cost approach, development of comparable sales or statistical models, and for developing capitalization rates and multipliers for the income approach. The market analyst may have the additional problem of needing to provide separate land and building values that most income models are not designed to deliver.

Location for commercial and industrial properties can range from relatively little effect to extremely important.

Finally, special purpose properties and limited market properties, such as theme parks and casinos, are generally included with commercial and industrial properties. These properties tend to be unique and, as a result, are difficult to categorize and value.

6.1 Commercial and Industrial Model Specification

Valuation of commercial and industrial properties requires market and income or cost data. Income and market data are preferred. Cost data is needed where insufficient sales and income data are available. Commercial and industrial sales comparison models, like residential models, require data on use, location, and physical characteristics.

6.1. Property Use

The property use is extremely important as a comparison characteristic. It is necessary to determine the general category of property use. The property use does not need to distinguish detailed specific uses, such as shop versus liquor store or gift shop. Use of broad categories will increase the number of properties for which information can be captured, analyzed, and compared.

6.1.2 Location

As with residential properties, location can be included either through the use of neighborhoods or market areas with binary (dummy) variables or categorical variables with percentage adjustments, LVRSA, or as a distance variable to Value Influence Centers (VICs), such as the central business district. For commercial and industrial properties, location analysis relates largely to identifying zones or groups of properties subject to similar influences. Proximity to VICs is important in commercial and industrial valuation, but a lack of commercial and industrial sales may make location of the VICs, as well as measuring their effect, difficult.

The importance of a location adjustment will also vary considerably with the property use. For example, while the value of a service station generally depends on location on a major street, such a variable may not be needed if all service stations throughout the jurisdiction, or area, enjoy such locations. Other uses, such as hotels, may be highly dependent on location, such as being on a beach area or near a convention center. Finally, what is considered a nuisance for residential properties, such as a railroad track or heavy traffic pattern, could be an important amenity for commercial and industrial properties.

The most common method of modeling location is through the delineation of economic areas or neighborhoods. Central Business Districts, cities/towns, and other areas of significant deviation from the norm, are used to identify economic areas or neighborhoods. When using economic areas or neighborhoods for location adjustment, care must be taken not to create too many as this may result in too few sales or insufficient income data for analysis and modeling.

LVRSA using GIS or manual grids is also used for developing location adjustments where sufficient data is available.

6.1.3 Physical Characteristics and Site Influences

Commercial and industrial properties require a number of physical characteristics for comparison and modeling. These may be quantitative or qualitative variables.

The most significant quantitative characteristic is building area. Different building areas may be used for cost, sales comparison, and income approaches. Areas are differentiated by type, such as basement, ground floor, and upper floors, for cost valuation; whereas income models generally use net rentable areas, differentiated by use, such as retail, office, etc. Sales comparison models also benefit from use differentiations, although either gross or rentable areas can be used. Some sales comparison and income AVMs utilize other units of comparison, such as units for apartment buildings, rooms for hotels, and spaces for parking garages. Other key quantitative variables are the year built and effective age or condition, which are used to capture accrued depreciation and Remaining Economic Life (REL). Effective age (EA) or REL is a critical factor of comparison for cost, market, and income modeling. The EA or REL is also a key variable in determining the relationship between income and value because it establishes the time remaining for the income stream.

Other significant quantitative and qualitative variables are similar to those used for residential AVMs. Such examples include building quality and lot size. While others, such as traffic patterns or ceiling height, may be important to specific property uses or occupancies.

6.1.4 Income Data

An income value is essentially a calculation of the present worth of the future benefits to an income stream. It is used to estimate the market value of a property based on what an investor would pay for the property. Income data includes revenues, expenses, net income, and capitalization rates or income multipliers, which are then used to develop a projection of an income stream to estimate the market value.

The income value is generally estimated by either capitalizing the Net Operating Income (NOI) or developing a multiplier for the potential or effective gross income. The capitalization rate can be developed as an Overall Capitalization Rate (OCR) from the market place by comparing the estimated NOI against sales prices, where available. Sales and gross income data can be used to develop a GIM from the market place. GIMs can be accurate, require less data, and eliminate the need for expense analysis. They can be developed from potential or effective gross income as long as the data is collected on the same basis. While GIMs may be easier to develop, overall rates and NOIs may more accurately and directly reflect the value of the income stream critical to investors.

Due to the sensitivity of income data, the widely varying manner in which it is kept, and the differences in information maintained for differing property types, income data is difficult to ascertain. Creating different reporting forms for different property types makes the forms easier to use and understand, thereby increasing the likelihood that more forms will be completed and returned. Breaking income and expenses into generic categories also facilitates reporting. However, creating too many categories may only complicate the form and minimize the number of completed returns while not necessarily contributing to a more accurate net income calculation. Minimizing the detail collected, including avoiding tracking information about individual tenants, serves to make the data more likely to be completed and easier to maintain.

The pool of sales and income data can be expanded by using multiple years of data and making any indicated time adjustments. However, if the income and sales data are from the same time period, neither needs to be adjusted for time for the purposes of developing capitalization rates and income multipliers. In addition, trade publications and local banks may serve as sources of information to build capitalization rates and multipliers.

6.2 Development of the Model(s)

Commercial and industrial properties can be valued by sales comparison, income, and cost AVMs. Because there are fewer commercial and industrial sales, it is often difficult to develop comparable sales and statistical market models for commercial and industrial properties. However, a number of income-approach models may be developed using sales to develop capitalization rates, and GIMs using gross incomes and expenses derived from the local market or industry-specific publications when local data are insufficient. The cost approach, while generally the least desirable, is still necessary for property types that have insignificant sales and insufficient revenue or expense information.

Income models may be developed using stratification or global methods. Stratification requires grouping commercial and industrial sales by factors that affect the relationship between income and value. This is accom-

plished by groupings based on use or occupancy, age or condition, and location. As with any valuation approach, the more strata you create, the fewer data in each strata are available for analysis. The use of global methods, such as MRA, can be used to overcome the limited data in many strata by combining selected property types (such as all retail-related properties) into a single model and using binary variables to differentiate the specific uses or occupancies (such as general retail, restaurant, or convenience mart).

Industrial properties may be modeled in the same manner as commercial properties, but there are even fewer industrial sales than commercial sales. Often warehouses and light industrial properties can be combined into a single model to increase sample sizes.

6.2.1 Cost Models

While commercial and industrial cost models are similar to residential cost models, they typically comprise different structural components. The commercial and industrial cost model requires a number of extra features or miscellaneous items. Cost models are most appropriate for commercial, industrial, and special purpose properties where there is insufficient sales and income information.

6.2.2 Sales Comparison Models

It is often difficult to get sufficient qualified sales to develop commercial and industrial comparable sales and statistical models. However, where sufficient sales can be found, direct market models can be developed using variables for location, size, construction quality, age or condition, land size or frontage, and relevant amenities or nuisances. Additive, multiplicative, and hybrid models can all be used; yet proper model specification is critical.

6.2.3 Income Models

The income approach can be used to develop commercial and industrial AVMs. Because these properties are frequently sold based on their income streams, the income approach can be the most desirable. The two most popular approaches are direct capitalization and GIMs. Discounted cash flow (DCF) analysis can also be used; however, the data requirements for developing yield capitalization estimates from DCF analysis make the method more challenging than direct capitalization. Also, a number of the assumptions required for DCF analysis, including anticipated yield, holding period, and value at the end of that period, can be difficult to derive from the market and, therefore, may be subjective.

6.2.3.1 Modeling Gross Income

Gross incomes may be analyzed from local market surveys or questionnaires or they may be obtained from industry publications. Typically the gross rent per unit (e.g., square feet/square meters, rental unit, or room rate) is the dependent variable in the model. Gross income models are ordinarily easier to develop than net income models because the data is easier to obtain and less subject to manipulation. Gross income models can be developed for either potential or effective gross incomes. The independent variables are those that affect the expected gross income, including: location, age or condition, amenities and nuisances, etc. Where data is limited, to develop separate models for each use or occupancy, a single model may be developed by determining a reference use or occupancy group and using binary or categorical variables for the other use or occupancy groups.

6.2.3.2 Vacancy and Collection Losses

Vacancy and collection losses are deducted from the Potential Gross Income (PGI) to account for typical losses due to vacancy and bad debts based on local market conditions. The vacancy and collection loss usually varies by property use and is expressed as a percentage of the annual PGI. The percentage may be determined by a market analysis of PGIs compared with actual income, or from information supplied by local lenders and industry trade publications.

6.2.3.3 Modeling Expenses

Expense data may be obtained from the same sources as the revenue data. Expense ratios can be developed by either stratification or a modeling approach. The expense ratio is the dependent variable, and the independent variables are similar to (but typically fewer than) those used to determine the gross income per unit. Like gross income models, a single expense ratio model may be developed, where insufficient data are available for multiple models, by determining a reference use or occupancy group and creating binary variables for the other use or occupancy groups.

6.2.3.4 Direct Capitalization

Direct capitalization involves developing an overall rate (OAR) directly from the market place. The OAR is then used with the estimated net income to estimate the value by income capitalization. Like expense ratios, capitalization rates can be developed using either stratification or a modeling approach. The advantage of OARs is that they use the NOI that includes both gross incomes and expenses, and thus may specifically reflect a typical investor analysis of commercial properties. The dependent variable in developing a direct capitalization rate is the indicated OAR (estimated net income divided by the sale price). In developing an OAR model, a single model can be developed by determining a reference use or occupancy group, and creating binary or categorical variables for the other uses or occupancy groups. As in the revenue and expense models, this permits more data to be used in the model. In addition to variables for location, age or condition, and amenities and nuisances, the OAR model should include an adjustment for at-

tributes that affect the recapture portion of the OAR (such as land/building value ratios, REL estimates, and expense ratios).

6.2.3.5 Gross Income Multiplier

GIM models involve developing multipliers directly from the market place for either the potential gross income or the effective gross income, depending on the data collected. Effective Gross Income Multiplier models are generally more stable. GIMs have the advantage of not requiring expense data that may be missing, unreliable, difficult to interpret, or incomplete. The GIM is the dependent variable while the independent variables are typically the same as those previously described for an OAR model. However, it is important to ensure that variables related to differences in expense ratios are included because gross incomes are unadjusted for expenses.

6.2.3.6 Property Taxes

Care should be taken to treat property taxes consistently in the development and application of AVMs. Property taxes may be included as an expense or as a component of the OAR.

6.3 Quality Assurance

Commercial and industrial quality assurance is particularly critical due to the limited amount of sales and income data available for analysis and modeling. Commercial and industrial quality assurance is accomplished in much the same manner as with any other type of property. Valuation research and appraisal procedures are subject to review, and the values tested and statistically analyzed for accuracy and consistency.

In addition, quality assurance must be extended to the income data collected. Estimated gross incomes, expense ratios, OARs, and GIMs should all be reviewed for consistency. Gross income and expense data should be compared with like properties to identify outliers that may need to be removed from the modeling process unless the data can be corrected.

7. LAND MODELS

If ample sales are available, vacant land is generally best valued using a sales comparison approach. The most significant exceptions to this are leased land and rural/agricultural land that are usually valued using the income approach.

Land provides a set of unique problems for AVMs. Land is highly speculative and there frequently are relatively few sales for analysis and modeling (see Section 2.3.3 on Data Management and Quality Analysis).

Land values are highly affected by location. This is also one of the reasons why land values appear to be more speculative. Other factors affecting land values include Federal, state, and local regulations affecting development and what stage the neighborhood is in its life cycle. Developed land will command a significant premium over underdeveloped land, especially when there is no guarantee that the purchaser or potential developer will be successful. In addition, neighborhoods evolve from growth to stability, to decline, and potentially to being a land-driven market where the improvements have no value.

GIS is extremely valuable as an aid in establishing the effect of location on land. Where a GIS is not available, neighborhoods can be developed based on appraisal judgment, or grids can be developed and x, y coordinates manually derived from the grids to better handle location.

Land that is significantly distant from urban areas may be best valued based on its income potential.

7.1 Land Valuation Model Specification

Market land valuation modeling requires data on use, location, and physical characteristics. Land models, like improved models, require qualitative and quantitative variables, as well as data transformations.

7.1.1 Property Use

The analyst must estimate the property use of a parcel of land for any AVM. This will serve to determine how it should be appraised as well as provide a key variable for comparison and to determine what sales are best suited for building the model. Although many states and provinces provide use codes for reporting, currently there are no generally accepted standards for classifying land uses. The American Planning Association (APA) has recently provided an update on their Web site of the 1965 Standard Land Use Coding Manual (APA 2003). However, the APA is not an appraisal organization and its solution contains multiple dimensions—whereas appraisers generally focus on the current use and the highest and best use.

7.1.2 Location

Location and parcel size are arguably the most important pieces of land data. The most common method of modeling location is through the delineation of economic (or submarket) areas or neighborhoods. More recently, variations of LVRSA have been developed to determine location adjustments both with and without delineating economic areas.

Appraisers, using maps and their judgment (based on knowledge of market conditions), generally decide neighborhood or submarket boundaries. All parcels in a neighborhood or submarket receive the same location adjustment. There are two factors to be aware of when using this approach. First, boundaries may be drawn to coincide with major streets, natural barriers, and/or political subdivision boundaries. And, secondly, the market analyst should be aware that location adjustments can change abruptly from one submarket or neighborhood to another.

LVRSA is another method of developing location adjustments. LVRSA uses a geographic grid to display value residuals or sales ratios based on values derived from a model lacking a location variable, to develop factors that quantify the relative locational advantage or disadvantage of the property. This process may include identifying positive and negative VICs. Distance variables from all of the VICs are computed for each parcel. If VICs are used, the distance variables are then included in the model to calculate the location adjustment for each parcel. The location adjustments determined in this manner may be developed for cost, sales comparison, and income AVM models. Due to the method LVRSA uses to develop the location adjustment, it will include anything that is not accounted for elsewhere in its estimate of the location adjustment.

Geographic grids for LVRSAs are best obtained from a GIS. However, where one does not exist, a geographic grid can be manually developed by using maps and arbitrary grids, such as every 100 feet. The x, y coordinates can then be determined for each parcel and entered into the database. Although not as accurate and effective as a GIS, this approach can be used where one does not exist or is not yet available to the market analyst.

When using neighborhoods or submarkets for location adjustment, care must be taken not to create too many neighborhoods or submarkets; because this may result in too few sales for effective analysis and modeling. Central Business Districts, cities/towns, natural features, and major streets can be used to define neighborhood boundaries. Because the single property appraiser generally values only a single, or few properties, and the AVM market analyst must value many parcels and sometimes deal with adjacent parcel review by the public, the AVM market analyst might prefer to use blocks, subdivisions, or neighborhoods for location adjustments so that adjacent and nearby parcels receive the same adjustment.

7.1.3 Physical Characteristics and Site Influences

In addition to land use and location variables, AVMs require a number of physical characteristics and site influences for comparison and modeling. These may be quantitative or qualitative variables.

The most significant quantitative characteristic is land size. Land size is determined by the number of land units by type such as lot, site, front feet or meter, square feet or meter, acre, hectare, etc. Therefore, it is usually necessary to develop some form of land size adjustments to reflect the changing rate per unit based on the total parcel size.

Most of the other important characteristics and influences are qualitative. These include topography, site amenities (such as government services), property access, water and sewer, proximity to negative influences (like railroads or treatment plants), and proximity to positive influences (like view, golf courses, water frontage, or recreational areas). However, keep in mind that a negative influence under one condition might be considered positive in another situation. An example might be high traffic volume that could be positive for commercial properties and negative for residential properties.

7.2 Land Data Collection

Sales and income data for land are collected, verified, and maintained in the same manner as improved parcels. Maps and aerial photographs are used to supplement field reviews to effectively collect, maintain, and review land data.

Land use/soil productivity data for income modeling of agricultural property may be obtained from Federal and state/province agricultural agencies, universities, and agricultural cooperatives and associations. When insufficient arms length sales are available, data to develop capitalization rates for agricultural properties may be obtained from farm lenders such as the Federal Land Bank and Farm Credit Bank, as well as local lenders.

7.3 Development of the Model(s)

Sales comparison is the primary approach for estimating the market value of land. The valuation of land by sales comparison shares many of the same analyses and modeling processes with improved valuation models. The dependent variable in a sales comparison model should be sales price or sales price per unit. For example, if land sales in an area are based on square feet of land area, then the dependent variable should be sale price per square foot. Typical independent variables include property use, zoning, size, or location; site characteristics including physical characteristics; amenities (positive influences); and negative influences.

For leased land, and agricultural and rural properties, where insufficient sales are available, a capitalized income stream is commonly used to estimate the market value. Income land appraisal relies on capitalized income analysis.

7.3.1 Land Valuation Modeling by Sales Comparison

Land values may be modeled separately from improved values, or vacant and improved property may be modeled in a single combined valuation model (Guerin 2000). The primary benefit of a combined model is that both vacant and improved sales are used, which significantly increases the sales sample size for analysis and modeling. When developing a combined model, a binary variable should be used to separate vacant and improved sales. In addition, separate time and size adjustments should be tested for vacant and improved sales.

7.3.2 Land Valuation Modeling by Income

Income data can be used to value rented or leased land. Income capitalization for land follows the same general principles as commercial and industrial properties.

8. AUTOMATED VALUATION MODEL TESTING AND QUALITY ASSURANCE

AVM testing and quality assurance is necessary to determine the applicability of the model and/or the need for further specification. The process of developing and deploying an automated valuation model must include safeguards to insure the accuracy of data used and the integrity of results produced. Those safeguards are similar in kind and effect to those employed in evaluating the performance of any mass appraisal project.

8.1 Data Quality Assurance

All data used in model specification and calibration must pass the following screening tests:

1. Data must be sufficient to produce reasonable predictive models with regard to the property characteristics utilized in model calibration and implementation. As a general rule, the number of sales should be at least five times (fifteen times is desirable) the number of independent variables (Gloudemans 1999, 127).
2. Sales data must reflect, to the maximum extent possible, the conditions requisite to market value transactions.
3. Subjective data must be consistent across the population of properties to be valued using the model. Examples would include quality, physical condition, and effective age.
4. Accurate property characteristic data is essential to model quality. If the data were to be verified through a field audit, it should be found to be correct 95 percent of the time.

Data quality assurance should measure the quality and quantity of data, as well as provide a means of evaluating the application of the developed AVM formula to a specific population of properties. The product of that evaluation may include the acceptable ranges of specific property characteristics and ranges of estimated market values to which the model can be applied.

In addition to the quality assurance statistics discussed below, it is good practice to provide the user with a measure or index of the relative confidence that can be placed in individual value estimates, especially at the extremes of the data ranges. Using stratified ratio studies to examine the extreme low and high ends of various property characteristics in the modeling and holdout data sets, the market analyst will be able to determine the applicability of the model at these extremes.

The market analyst should decline to provide an estimate at those points where the value estimates become unreliable due to the data falling outside of acceptable parameters (see Section 8.4 on Sales Ratio Analysis).

8.2 Data Representativeness

Because AVMs use a relatively small sampling of properties from which inferences about the total population of properties are drawn, care must be taken to ensure that the sample adequately represents the total population of properties to be valued. In many kinds of statistical studies, samples are selected randomly from the population to ensure representativeness. Because sales do not represent true random samples, extra care must be taken to ensure representativeness. A sample is considered representative when the distribution of values of properties in the sample reflects the distribution of values in the population. Because the distribution of values in the population cannot be directly ascertained and appraisal accuracy may vary from property to property (depending on property type and characteristics), representativeness can be achieved by selecting a sample that adequately reflects salient value-related property characteristics. A property should be included in a sample based on characteristics of the property and not actions or characteristics of the owner.

This same degree of care should be taken in selecting sales samples used to test the quality of the AVM once it is developed

(IAAO 1999, 12.)

8.3 Model Diagnostics

The specific diagnostic tools available to market analysts and users of automated valuation models will vary with the model methodology employed. Multiple regression analysis provides the market analyst and user with a wide range of diagnostic statistics that may not be available with other calibration methodologies. In any event, the market analyst must make effective use of the diagnostic tools available during model calibration and be prepared to explain their use and significance to end users.

Standards do not exist for goodness-of-fit statistics (such as the coefficient of determination) or measures of individual variable significance (such as the T-statistic). Nonetheless, the market analyst should be able to explain how those statistics were used and how they relate to the predictive quality of a specific model in relation to the sales data available for calibration.

8.4 Sales Ratio Analysis

Sales ratio analysis is a type of statistical study based on comparisons between an estimated value and

market value as indicated by sales prices. For AVM use, the numerator would be the estimated value generated from the model, while the denominator would be the sale price. The ratios thus calculated are subjected to statistical analysis to determine central tendency (level), and vertical (value related) and horizontal uniformity or variation. Central tendency statistics provide information about the overall or typical level in relation to market value that would be achieved given the results of the model. Variability statistics provide information about the degree to which model-determined values for individual properties are similar with respect to market value.

Sales based ratio studies are among the most objective methods for testing the performance and quality of any mass appraisal system. Much of the information in this section has been reprinted from the *Standard on Ratio Studies* (IAAO 1999).

8.4.1 Measures of Appraisal Level

Statistically, measures of central tendency provide an indication of the overall level of appraisal for any group of properties represented by a particular sales sample. Point estimates of these measures are calculated as shown in table 1. Reliability statistics should also be calculated around each of these measures (see Section 8.4.3 on Measures of Reliability). Common measures of appraisal level include the mean, sales weighted mean, and median ratios.

8.4.2 Measures of Variability

Several statistical tests are available and should be used to determine the degree of variability (uniformity) in the products of any AVM model. Common measures of appraisal variability include the coefficient of dispersion (COD) and coefficient of variation (COV).

8.4.2.1 Coefficient of Dispersion

The most useful measure of variability is the COD, which measures the average percentage deviation of the ratios from the median ratio and is calculated by (1) subtracting the median from each ratio, (2) taking the absolute value of the calculated differences, (3) summing the absolute differences, (4) dividing by the number of ratios to obtain the "average absolute deviation," (5) dividing by the median, and (6) multiplying by 100. For the data in table 1:

Average Absolute Deviation =

9.271 ÷ 36 = 0.2575;

COD = (0.2575 ÷ 0.864) * 100 = 29.8.

The COD has the desirable feature that its interpretation does *not* depend on the assumption that the ratios are normally distributed. Standards for interpreting CODs are contained in Section 14.2 of the *Standard on Ratio Studies* (IAAO 1999). Note that the COD represents the mean (not the median) percent deviation from the median. In general, more than half the ratios will fall within one COD of the median.

The COD should not be calculated about the mean because the mean is more affected by extreme ratios than the median, and because of the inherent (upward) bias of the mean of a set of ratios. The COD also should never be calculated about the weighted mean, which implicitly weights each ratio based on its sale price.

(IAAO 1999, 24.)

8.4.2.2 Coefficient of Variation

The COV can be another important measure of appraisal variability. The COV for a sample is calculated by (1) subtracting the mean from each ratio, (2) squaring the calculated differences, (3) summing the squared differences, (4) dividing by the number of ratios less one to obtain the "variance," (5) taking the square root to obtain the "standard deviation," (6) dividing by the mean, and (7) multiplying by 100. Note that the COV is calculated only about the mean—not the median or weighted mean (although other methods permit calculation about the weighted mean). For the data in table 2:

Variance = 3.0808 ÷ 35 = 0.0880;

Standard Deviation = sqrt 0.0880 = 0.2966;

COV = (0.2966 ÷ 0.900) * 100 = 33.0.

The interpretation of the standard deviation and COV rests on the assumption that the ratios are normally distributed. When this is the case, approximately 68 percent of the predicted ratios in the population will lie within one standard deviation of the mean, and approximately 95 percent will lie within two standard deviations of the mean. When the ratios do not approximate a normal distribution, these relationships no longer hold (although there always will be at least 75 percent of the ratios in any population within two and at least 89 percent of the ratios within three standard deviations of the mean). Hence, one should determine whether ratios are approximately normally distributed before using the COV. When the normality assumption is met, the COV provides the most precise measure of variability.

Because the deviations between each ratio and the mean ratio are squared in determining the COV, ratios that differ greatly from the mean influence the COV more than they do the COD, in which the deviation of each observation from the median is equally weighted.

(IAAO 1999, 25.)

8.4.3 Measures of Reliability

Reliability, in a statistical sense, concerns the degree of confidence one can place in a calculated statistic for a

Table 1. Example of Ratio Study Statistical Analysis

Data analyzed

Rank of ratio of observation	*Appraised value (AV in $)*	*Market value (MV in $)*	*Ratio (AV/MV)*
1	48,000	138,000	0.348
2	28,800	59,250	0.486
3	78,400	157,500	0.498
4	39,840	74,400	0.535
5	68,160	114,900	0.593
6	94,400	159,000	0.594
7	67,200	111,900	0.601
8	56,960	93,000	0.612
9	87,200	138,720	0.629
10	38,240	59,700	0.641
11	96,320	146,400	0.658
12	67,680	99,000	0.684
13	32,960	47,400	0.695
14	50,560	70,500	0.717
15	61,360	78,000	0.787
16	47,360	60,000	0.789
17	58,080	69,000	0.842
18	47,040	55,500	0.848
19	136,000	154,500	0.880
20	103,200	109,500	0.942
21	59,040	60,000	0.984
22	168,000	168,000	1.000
23	128,000	124,500	1.028
24	132,000	127,500	1.035
25	160,000	150,000	1.067
26	160,000	141,000	1.135
27	200,000	171,900	1.163
28	184,000	157,500	1.168
29	160,000	129,600	1.235
30	157,200	126,000	1.248
31	99,200	77,700	1.277
32	200,000	153,000	1.307
33	64,000	48,750	1.313
34	192,000	144,000	1.333
35	190,400	141,000	1.350
36	65,440	48,000	1.363

Note: Due to rounding, totals may not add to match those on following table, which reports results of statistical analysis of above data.

Results of statistical analysis

Statistic	*Result calculated on preceding data*
Number of observations in sample	*36*
Total appraised value	*$3,627,040*
Total market value	*$3,964,620*
Average appraised value	*$100,751*
Average market value	*$110,128*
Mean ratio	*0.900*
Median ratio	*0.864*
Geometric mean ratio	*0.849*
Weighted mean ratio	*0.915*
Price-related differential (PRD)	*0.98*
Coefficient of dispersion (COD)	*29.8%*
Standard deviation	*0.297*
Coefficient of variation (COV)	*33.0%*
Probability that population mean ratio is between 90% and 110%	*49.7%*
95% mean two-tailed confidence interval	*0.799–1.000*
95% median two-tailed confidence interval	*0.684–1.067*
95% weighted mean two-tailed confidence interval	*0.806–1.024*
Shape of distribution of ratios	*Normal (based on binomial distribution)*
Date of analysis	*9/99/9999*
Category or class being analyzed	*Residential*

sample (for example, how accurately does the sample median ratio approximate the true [population] median appraisal ratio?). There are two related measures of reliability: confidence intervals and standard errors. A confidence interval consists of two numbers that bracket a calculated measure of central tendency for the sample; one can have a specified degree of confidence that the true measure of central tendency for the population falls between the two numbers. Standard errors relate to the distance one must add to and subtract from certain measures of central tendency to compute the confidence interval.

For the data in table 1, the 95 percent confidence interval for the median is 0.684 to 1.067 (calculations not shown)—from the sample data, one can be ninety-five percent confident that the median level of appraisal for the population is in this range. Although most commonly calculated around the mean, confidence intervals can be calculated about various measures of appraisal level and variability, or about a resulting property value estimate; standard errors can be properly calculated about the mean and weighted mean, or about an estimate of value for the population. (See IAAO [1990, 515–546] and Gloudemans [1999, 257–339] for information on performing these calculations.) The article, "Confidence Intervals for the COD: Limitations and Solutions" (Gloudemans 2001), provides criteria for evaluating whether CODs can be deemed to have exceeded standards.

Measures of reliability explicitly take into account the errors inherent in a sampling process. In general, these measures will be tighter (better) when samples are relatively large and the uniformity of ratios is relatively good. Although the mathematics of calculating these measures is comparatively straightforward, their correct interpretation is critical and requires someone well grounded in the underlying statistical principles.

Users must give careful consideration to reliability measures in evaluating AVM output.

(IAAO 1999, 25.)

8.4.4 Vertical Inequities

The COD and COV relate to "horizontal," or random, dispersion among the ratios in a stratum, regardless of the value of individual parcels. Another form of inequity may be systematic differences in the appraisal of low-value and high-value properties, termed "vertical" inequities. When low-value properties are appraised at greater percentages of market value than high-value properties, appraisal regressivity is indicated. When low-value properties are appraised at smaller percentages of market value than high-value properties, appraisal progressivity is the result. Appraisals should be neither regressive nor progressive.

An index statistic for measuring vertical equity is the PRD (Price-Related Differential), which is calculated by dividing the mean by the weighted mean:

Mean/Weighted Mean =

Price-Related Differential

This statistic should be close to 1.00. Measures significantly above 1.00 tend to indicate appraisal regressivity; measures below 1.00 suggest appraisal progressivity. For the data in table 1, the PRD is 0.983, suggesting slight progressivity. When samples are small or the weighted mean is heavily influenced by several extreme sales prices, however, the PRD may not be a reliable measure of vertical inequities. If not representative, extreme sales prices may be excluded in calculation of the PRD. Similarly, when samples are very large, the PRD may be too insensitive to show small pockets of properties in the population where there is significant vertical inequity.

(IAAO 1999, 26.)

8.4.5 Guidelines for Evaluation of Quality

Because the development and utilization of automated valuation models are ongoing, without definitive beginning or end dates, sales ratio studies should be performed on a scheduled, periodic basis to establish the current performance status of the model. Such ratio studies should be conducted utilizing holdout samples accumulated according to Section 8.7. Model accuracy should be measured against the *Standard on Ratio Studies* (IAAO 1999) for the particular property type valued by the model. The *Standard on Ratio Studies* (IAAO 1999) suggests that the level of AVM estimate-to-sale price in each stratum (group of like properties) should be within 5 percent of the overall estimate-to-sale ratio for all strata; and the overall estimate-to-sale level should be within 10 percent of the desired level of 100 percent. For residential properties, variability, as measured by the coefficient of dispersion (average percent of error about the median estimate-to-sale price ratio), should be 15 percent or less in older, heterogeneous areas and 10 percent or less in areas of newer and fairly similar residences. Variability within strata composed of income-producing properties requires a coefficient of dispersion of 15 percent or less in larger, urban areas, and 20 percent or less in small or rural areas. Within all other types of property strata, the coefficient of dispersion should be 20 percent or less.

Table 2 is taken from the IAAO *Standard on Ratio Studies* (IAAO 1999) and provides guidelines for evaluating the quality of appraisal level and variability based on statistical measures previously discussed.

8.4.6 Importance of Sample Size

There is a general relationship, between statistical precision and the number of observations in a sample,

Table 2. Ratio Study Performance Standards

Type of property	*Measure of central tendency*	*COD*	*PRD**
Single-family residential			
Newer, more homogenous areas	*0.90–1.10*	*10.0 or less*	*0.98–1.03*
Older, heterogeneous areas	*0.90–1.10*	*15.0 or less*	*0.98–1.03*
Rural residential and seasonal	*0.90–1.10*	*20.0 or less*	*0.98–1.03*
Income-producing properties	*0.90–1.10*		
Larger, urban jurisdictions	*0.90–1.10*	*15.0 or less*	*0.98–1.03*
Smaller, rural jurisdictions	*0.90–1.10*	*20.0 or less*	*0.98–1.03*
Vacant land	*0.90–1.10*	*20.0 or less*	*0.98–1.03*
Other real and personal property	*0.90–1.10*	*Varies with local conditions*	*0.98–1.03*

**The standards for the PRD are not absolute when samples are small or when wide variations in prices exist. In such cases, appropriate tests are more useful (see table 5 of the Standard on Ratio Studies [IAAO 1999, 27]).*

drawn from a given population: the larger the sample, the greater the precision. The required sample size for any given degree of precision depends primarily on acceptable sampling error and the variability in the population. When there are insufficient sales to achieve target levels of precision, all valid sales should be used unless this results in nonrepresentativeness. If an abundance of sales is available, it is permissible to randomly include sufficient sales to obtain uniform or reasonably small margins of error.

Table 3 demonstrates the relationship between sample size requirements and variability as measured by the COV with the values in the table indicating margins of error that must be added to and subtracted from the sample mean to determine the confidence intervals. For example, a sample consisting of ten sales with a COV of 20 percent would produce a 95 percent confidence interval with a width of ±14.3 percent around the mean. Given the same COV with a sample size of 100 sales, the 95 percent confidence interval width would be reduced to ±3.9 percent around the mean, thus providing greater precision.

8.5 Property Identification

AVM developers must accurately identify property in order to produce an accurate valuation estimate for that property. The common property identification for the commercial AVM industry has become the property address. However, third party data providers use different variations of addresses. Many assessment jurisdictions have not fully standardized their addresses. Some condominium complexes have the same street address for all units. Condominium unit numbers assigned by the assessment jurisdiction may be the postal number or the lot number of the subdivision. These are just some of the variations in addresses that causes errors or misidentification of the properties requested by AVM users.

AVM developers attempt to minimize property identification errors by using address standardization software for all data to be used in the AVM system. All electronic real estate property systems should move to standardized addressing systems such as the Coding Accuracy Support System (CASS) certified by the United States Postal Service. While CASS is a way to standardize addresses across the U.S., it is primarily intended to ensure the accuracy of addresses for mail delivery purposes. This is a slightly different goal than the identification of the physical location of the property, especially in rural areas.

One precondition of address standardization is parsing the address into separate fields for the number, directional, street name/number, prefixes, and suffixes. Once this is accomplished, the correction or standardization of the address can begin. For example, Florida may be represented by the word Florida or abbreviations such as "Fla." or "FL."

Geographic information systems can be used to match AVM system property addresses to addresses in the U.S. Census Tiger files (or enhanced Tiger files provided by third parties). These GIS files have identified/located addresses by latitude and longitude at the street address segment level for most of the United States. Other countries have similar methods to geocode addresses to locational reference systems.

AVM users also have a responsibility to provide accurate addresses when requesting an AVM report. They should review the returned AVM report to confirm that the value estimate is for the property in question. Valid AVM reports are important for measuring the quality of the AVM system. This is called the hit rate, which is a measure of the number of usable AVM valuation reports compared to the total number of valuation reports requested. The hit rate will vary by several factors such as address mismatch; missing data within the property record that prevents the estimation of value; type of property is outside the scope of the AVM model; and the size or valuation of the subject property is outside the range of acceptable quality as determined by the quality assurance review of the model.

(Collateral Risk Management Consortium (CRC) 2003, 6.)

8.6 Outliers

The term "outliers" is defined in the *Glossary for Property Appraisal and Assessment* (IAAO 1997) as observations that have unusual values; that is, they differ markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors. In valuation models, outliers may include parcels with unusual characteristics as well as those with extreme estimated values per unit. Large, difficult to explain differences with respect to previous or control model runs may also identify outliers. Failure to understand and address outlier influences may result in unstable models that produce unpredictable changes in value over time. Documentation accompanying the automated valuation model must describe the methodology used to identify outliers and the procedures/trimming criteria followed once outliers are identified.

In ratio studies, outlier ratios are very low or high ratios as compared with other ratios in the sample. When the sample is small, outlier ratios may distort calculated ratio study statistics. Some statistical measures, such as the median ratio, are resistant to the influence of outliers. However, the COD and mean are sensitive to extreme ratios.

Outliers in AVM models can result from any of the following:

1. an erroneous sale price
2. a nonmarket sale
3. unusual market variability
4. a mismatch between the property sold and the property appraised
5. an error in the appraisal of an individual parcel
6. an error in the appraisals of a subgroup

(IAAO 1999, 19–20.)

One extreme outlier can have controlling influence over some statistical measures. Particular care must be taken to identify outliers if point estimates are used to make inferences about population level or variability. If, after proper verification, screening, and editing, an outlier with a nonrepresentative ratio remains in a study, statistical results will not reflect population level and variability. The potential distortion is greater when sample size is small. If outliers can be identified, trimming procedures are acceptable methods for creating a more representative sample. One outlier identification method is based on the interquartile range; however, because of the skewed distribution of ratios, this procedure may locate only extremely high ratios. If one or two high outlier ratios are trimmed from a small sample, the statistical measures of level may be shifted significantly lower. (See Tomberlin [1997] and Hoaglin, Mosteller, and Tukey [1983] on trimming small samples.)

(IAAO 1999, 20.)

Table 3. Confidence Intervals and Sample Size: 95 Percent Confidence Interval

Sample size	*COV = 10.0*	*COV = 20.0*	*COV = 30.0*
5	*±12.4*	*±24.8*	*±37.2*
10	*±7.2*	*±14.3*	*±21.5*
50	*±2.8*	*±5.5*	*±8.3*
100	*±2.0*	*±3.9*	*±5.9*
300	*±1.1*	*±2.3*	*±3.4*

8.7 Holdout Samples

Holdout samples represent groups of valid sales selected in a manner that guarantees their group characteristics match those of the population of properties covered by the automated valuation model. Such samples should be accumulated at the same time sales are collected for model calibration, but used for testing the calibrated model. Inherent in the definition of holdout samples is the premise that the sales not be used in developing the original model. Sales that occur after model calibration can also be used in testing and validating the model, and this method may be preferable when few sales are available.

8.8 Value Reconciliation

When a model is designed to produce more than one value estimate for a subject property, model documentation must contain a thorough explanation of the procedures followed to reconcile those candidate estimates into a final estimate of value. Those procedures must include analysis of the relative strengths and weaknesses of the candidate estimates, and specification of how that analysis results in a final value estimate.

In those instances in which all candidate estimates are presented to the user for their reconciliation, the system must report the quantity and quality of data supporting each of the candidate estimates. If the product of an automated valuation model is a set of value estimates derived from more than one of each of the three approaches, that product must also include sufficient information to allow the user to weigh the validity of those estimates, based on the quality and quantity of data available to support them.

When the model is designed to produce estimates of value for individual properties, those estimates must be accumulated and compared to their actual selling prices using ratio studies conducted at regular intervals. In addition, confidence intervals can be calculated around value estimates developed for individual parcels. Narrow intervals indicate greater likelihood that the estimate

reflects market value. Additionally, z scores can be calculated and show the number of standard deviations by which an AVM estimated value misses actual sales price. Properties with value misses outside of a ±3 standard deviation range should be reviewed for systematic model error.

8.9 Appraiser Assisted AVMs

When an appraiser reviews or changes an AVM report prepared by a separate AVM provider, the results are called appraiser-assisted AVMs (AAVMs). The appraiser can provide an additional opinion of the estimated value and usually will sign the report and confirm the value. All AVM reports can have their estimates of value overridden by an appraiser's opinion of value. In most cases, appraisers are limited in their ability to change an AVM report. AVM reports based on the traditional formats of the cost, sales comparison and income approaches are the easiest for appraisers to change.

8.10 Frequency of Updates

AVM estimates of value are based on formulas derived from market analysis of a specific geoeconomic area during a specified time frame. Because AVM value estimates represent trends in time as applied to a specific property with known characteristics (physical and/or economic), AVM providers must update their formulas, estimates of value, characteristics, and economic databases regularly. Movements in the market and the availability of market information should dictate the frequency of this process.

9. AVM REPORTS

There are three general types of reports that are considered part of the AVM reporting process. They are the detailed documentation report, the restricted use report, and the appraiser-assisted report. In all cases, the reports should be in compliance with the respective portions of *USPAP*.

9.1 Types of Reports

There are several report formats associated with the development of an AVM and the reporting of an individual property's estimate of value. Documentation reports, restricted use reports, and CAMA/AAVM reports each provide different reporting levels of appraisal analysis within the report.

9.1.1 Documentation Report

There are several report formats associated with the development of an AVM and the reporting of an individual property's estimate of value. The development of an AVM formula involves the analysis of the historical market place (real estate) information in order to create value estimates at a particular point in time. This market analysis should comply with *USPAP* Standard 6: Mass Appraisal, Development and Reporting (Appraisal Foundation 2003, 46–56). There should be a detailed report to document and support the market analysis process and the final valuation formula. This includes the sections of *USPAP* Standard Rule 6–7 (report format) and 6–8 (certification) (Appraisal Foundation 2003, 53–55).

9.1.2 Restricted Use Report

When requesting an AVM, the client is normally not interested in complete narrative reports as described in Standard 2: Real Property Appraisal Reporting, or Standard 6: Mass Appraisal, Development and Reporting (Appraisal Foundation 2003, 21–31, 46–56). AVM clients want quick standardized indicators of value, that may be retrieved from the AVM systems by support personnel without professional real estate training or knowledge. This includes the general public, which may be interested in an indication of value for properties that they already know, such as property owners who request an AVM to check the current market value before making various economic decisions. This requires a restricted use report that is limited to the immediate intended user (client) of the AVM report. These restricted use reports are typically limited to generally acceptable property identification such as street address, indication of value, some basic property descriptive characteristics, known additional indicators of value (such as last sale price/date and property tax assessment), and report date. There may be additional qualification and limiting conditions information as described in *USPAP* Standard 6–7 (mass appraisal report) (Appraisal Foundation 2003, 53–55) that is not of general interest to the intended user. These restricted reports are generally one to a few pages in length. These are the reports referred to in *USPAP* AO–18, Use of an Automated Valuation Model (AVM) (Appraisal Foundation 2003, 180-187), which states that the output of an AVM is not, by itself, an appraisal. These restricted use reports are simply the application of an AVM model formula to an individual property and do not contain the supporting documentation of the appraisal process performed to create the formula, which should be in the documentation report.

9.1.3 CAMA or AAVM Report

A third type of report is the combination of AVM formulas with appraisers' review and verification of valuations. These are sometimes called CAMA in government tax assessment and appraiser-assisted AVM reports, in the commercial AVM field. This type of report combines the most desirable parts of the AVM (unbiased market analysis and consistently applied model formulas) with the most desirable parts of the field appraiser (property inspection, local knowledge and

experience). The AVM provider sends the AVM report to the appraiser in electronic format. The appraiser performs a desktop review or one of various levels of inspection, as desired by the client, and corrects/confirms the AVM report and value estimate before delivery of the appraiser's final opinion of value to the client.

While all AVM reports can have their estimates of value overridden by an appraiser's opinion of value, in most cases, appraisers are limited in their ability to change the comparable selections, calculations, and variable adjustments within an AVM report. AVM reports based on the traditional formats of the cost, sales comparison, and income approaches, are the easiest for appraisers to change or adjust at the individual variable level.

9.2 Uses of AVM

AVM reports may have many uses. This standard will only list some of the typical uses.

9.2.1 Real Estate Lenders

- Reduce time to approve real estate loan applications
- Provide unbiased estimate of value for loan underwriting
- Provide real estate value/scores to compliment borrower's credit scoring
- Standard estimates for annual review of individual appraiser's performance
- Quality assurance for selling pooled loans
- Review of loan portfolios
- Support for lending decisions and geographic distribution required by the Community Reinvestment Act
- Statistical support for litigation
- Updates current valuation of portfolio properties
- Support in purchase of loan portfolios or lending institutions
- Portfolio valuation reviews by secondary mortgage markets and bond rating firms
- Systematic review of mortgage loan transaction to assist in the discovery of potential fraud

9.2.2 Real Estate Professional

- Support in setting listing price
- Support in negotiation between sellers and buyers
- Central database for appraisers
- Support for appraiser's opinions of value
- Support for appraiser's review and desktop appraisal assignments
- Support for appraisal consulting assignments that involve large numbers of properties
- Statistical support for litigation

9.2.3 Government

- Planning and land use decisions
- Development of value estimates for review by assessment staff appraisers
- Standardized estimates of value to annually review field appraisers' performances
- Valuation substitutes for appraisals in ratio study reports
- Screening of sale prices for valid market sales transactions
- Audits of lenders by state and federal regulators
- Assist states with standardized values to review property assessments in school funding formulas
- Fraud identification and prevention by enforcement, taxation, customs, and oversight agencies (such as GSE, HUD, IRS, Canada Mortgage and Housing Corporation, Statistics Canada, and state and national bank regulators)
- Fraud prosecution by comparing transactions to standardized values
- Assist in valuation for right-of-way and property condemnation cases

9.2.4 General Public

- Support for various business development and economic decisions
- Assistance in determining best listing price
- Assistance in determining best offering price
- Review of local government tax assessments
- Estate estimates of real estate value by attorneys and estate administrators

AVM reports may be sufficient as stand-alone products, or they may lead to a request for a more detailed appraisal report based on the needs and usage of the intended user. This listing is only a portion of the potential uses of AVMs. When clients request AVMs for a limited and specific use, the AVM report will provide quality information to the intended user quickly and inexpensively.

10. GLOSSARY

Algorithm—Computer-oriented, precisely defined set of

steps that, if followed exactly, will produce a prespecified result (for example, the solution to a problem).

Additive Model—A model in which the dependent variable is estimated by multiplying each independent variable by its coefficient and adding each product to the constant.

Appraisal Emulation Model—The appraisal emulation model (see Section 3.2.2.1 Comparable Sales Method) follows the steps that an appraiser might follow in forming a value estimate (although not with the same insight or flexibility that a qualified appraiser brings to the assignment). The model selects "comparable sales" using some standard criteria. It then rates those comparable sales by suitability, based on the physical and sales characteristics of each comparable sale, by adjusting the varying elements (much as is done on an appraisal form); the model then calculates an estimate of value.

Automated Valuation Model—An automated valuation model (AVM) is a mathematically based computer software program that produces an estimate of market value based on market analysis of location, market conditions, and real estate characteristics from information that was previously and separately collected. The distinguishing feature of an AVM is that it is a market appraisal produced through mathematical modeling. Credibility of an AVM is dependent on the data used and the skills of the modeler producing the AVM.

Binary (Dummy) Variable—(1) Binary variables are qualitative data items that have only two possibilities—yes or no (for example, corner location). (2) A variable for which only two values are possible, such as results from a yes-or-no question; for example, does this building have any fireplaces? Used in some models to separate the influence of categorical variables. Also called a dichotomous variable or dummy variable.

Blended Model—A blended model (see Section 8.8: Value Reconciliation) is one where more than one modeling technique is used in deriving the estimate of value. Typically, the technique involves running a hedonic model and a repeat sales index. The results are then compared and evaluated. Based on each result, the blended model reports a final estimate of value. In addition to the hedonic model and repeat sales index, many blended models also include the results of a tax-assessed value model.

Calibration—The process of estimating the coefficients in a mass appraisal model.

Coefficient—(1) In a mathematical expression, a number or letter preceding and multiplying another quantity. For example, in the expression "5X", 5 is the coefficient of X, and in the expression "aY", a is the coefficient of Y. (2) A dimensional statistic, useful as a measure of change or relationship.

Cluster Analysis—A statistical technique for grouping cases (for example, properties) based on specified variables such as size, age, and construction quality. The objective of cluster analysis is to generate groupings that are internally homogeneous and highly different from one another. Various cluster algorithms can be employed.

Cost Approach—(1) One of the three approaches to value, the cost approach is based on the principle of substitution—that a rational, informed purchaser would pay no more for a property than the cost of building an acceptable substitute with like utility. The cost approach seeks to determine the replacement cost new of an improvement minus depreciation plus land value. (2) The method of estimating the value of property by: (a) estimating the cost of construction based on replacement or reproduction cost new, or trended historical cost (often adjusted by a local multiplier); (b) subtracting depreciation; and (c) adding the estimated land value. The land value is most frequently determined by the sales comparison approach.

Data Management—The human (and sometimes computer) procedures employed to ensure that no information is lost through negligent handling of records from a file, all information is properly supplemented and up-to-date, and all information is easily accessible.

Direct Market Method/Analysis—One of two formats of the sales comparison approach to value (the other being the Comparable Sales Method). In the direct market method, the market analyst specifies and calibrates a single model used to estimate market value directly using multiple regression analysis or another statistical algorithm.

Economic Area—A geographic area, typically encompassing a group of neighborhoods, defined on the basis that the properties within its boundaries are more or less equally subject to a set of one or more economic forces that largely determine the value of the properties in question.

Euclidean Distance Metric—A measure of distance between two points "as the crow flies." In property valuation, it is used to find the nearest neighbor or similar property based on an index of dissimilarity between property location or attributes. When using multivariate selection, the squared difference is divided by the standard deviation of the variable so as to normalize the differences. (Also see *Minkowski Metric*.)

Hedonic Model—Hedonic pricing attempts to take observations of the overall goods or services and obtain implicit prices for the goods and services. Prices are measured in terms of quantity and quality. When valuing real property, the spatial attributes and property-specific attributes are valued in a single model. Calibration of the attribute components is performed statistically by regressing the overall price onto the characteristics.

Heteroscedasticity—Nonconstant variance; specifically, in regression analysis, a tendency for the absolute errors to increase (fan out) as the dependent variable increases.

Holdout Sample—Part of a set of data set aside for testing the results of analysis.

Homogeneous—Possessing the quality of being alike in nature and therefore comparable with respect to the parts or elements; said of data if two or more sets of data seem drawn from the same population; also said of data if the data are of the same type (that is, if counts, ranks, and measures are not all mixed together).

Hybrid Model—Model that incorporates both additive

and multiplicative components. (See also *Additive Model, Hedonic Model,* and *Multiplicative Model.*)

Income Approach—One of the three approaches to value, based on the concept that current value is the present worth of future benefits to be derived through income production by an asset over the remainder of its economic life. The income approach uses capitalization to convert the anticipated benefits of the ownership of property into an estimate of present value.

Geographic Information System (GIS)—(1) A database management system used to store, retrieve, manipulate, analyze, and display spatial information. (2) One type of computerized mapping system capable of integrating spatial data (land information) and attribute data among different layers on a base map.

Goodness-of-Fit—A statistical estimate of the amount, and hence the importance, of errors or residuals for all the predicted and actual values of a variable. In regression analysis, for example, goodness-of-fit indicates how much of the variation between independent variables (property characteristics) and the dependent variable (sales prices) is explained by the independent variables chosen for the AVM.

Location Value Response Surface Analysis—A mass appraisal technique that involves creating value influence centers, computing variables to represent distances (or transformations thereof) from such points and using the variables in a multiple regression or other model to capture location influences. Implementation of the technique is enhanced by the use of a geographic information system. Some geographic information systems permit the value influence centers to be displayed and measured as a three-dimensional grid surface, the results of which can be likewise used in calibration techniques to arrive at the contribution of location based on the model specification.

Location Variable—A variable that seeks to measure the contribution of locational factors to the total property value, such as the distance to the nearest commercial district or the traffic count on an adjoining street.

Market—(1) The topical area of common interest in which buyers and sellers interact. (2) The collective body of buyers and sellers for a particular product.

Market Analysis—A study of real estate market conditions for a specific type of property.

Market Analyst—An appraiser who studies real estate market conditions and develops mathematical formulas that represent those market conditions.

Market Area—(See *Economic Area.*)

Market Value—Market value is the major focus of most real property appraisal assignments. Both economic and legal definitions of market value have been developed and refined. A current economic definition agreed upon by agencies that regulate federal financial institutions in the United States is:

The most probable price (in terms of money) which a property should bring in a competitive and open market under all conditions requisite to a fair sale, the buyer and seller each acting prudently and knowledgeably, and assuming the price is not affected by undue stimulus. Implicit in this definition is the consummation of a sale as of a specified date and the passing title from seller to buyer under conditions whereby:

- The buyer and seller are typically motivated;
- Both parties are well informed or well advised, and acting in what they consider to be their best interests;
- A reasonable time is allowed for exposure in the open market;
- Payment is made in terms of cash in United States Dollars or in terms of financial arrangements comparable thereto.

The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Mean—A measure of central tendency. The result of adding all the values of a variable and dividing by the number of values. For example, the mean of three, five, and ten, is their sum (eighteen) divided by three, which is six.

Median—A measure of central tendency. The value of the middle item of an uneven number of items arranged or arrayed according to size; the arithmetic average of the two central items in an even number of items similarly arranged.

Minkowski Metric—Any of a family of possible ways of measuring distance. Euclidean distance, a member of this family, computes straight-line distances (as the crow flies) by squaring differences in like coordinates, summing them, and taking the square root of the sum. In mass appraisal model building, Minkowski metric usually refers to the sum of absolute differences (not squared) in each dimension, and resembles a "taxicab" or city block pattern. Other alternatives are possible, including the distance as calculated only for the dimension of greatest difference, but the city block distance is most common.

Model—(1) A representation of how something works. (2) For purposes of appraisal, a representation (in words or an equation) that explains the relationship between value or estimated sale price and variables representing factors of supply and demand.

Model Specification—The formal development of a model in a statement or equation, based on data analysis and appraisal theory.

Model Calibration—The development of the adjustments or coefficients from market analysis of the variables to be used in an automated valuation model.

Multicollinearity—Correlation among two or more variables. In regression analysis, high multicollinearity among the independent variables complicates modeling and will compromise the reliability of the resulting coefficients.

If the multicollinearity is perfect, the multiple regression algorithms simply will not work and either an error message may result or the software may purge one or more of the problem variables.

Multiplicative Model—A mathematical model in which the coefficients of independent variables serve as powers (exponents) to which the independent variables are raised, or in which independent variables themselves serve as exponents; the results are then multiplied to estimate the value of the dependent variable.

Multiple Regression Analysis (MRA)—A particular statistical technique, similar to correlation, used to analyze data in order to predict the value of one variable (the dependent variable), such as market value, from the known values of other variables (called "independent variables"), such as lot size, number of rooms, and so on. If only one independent variable is used, the procedure is called simple regression analysis and differs from correlation analysis only in that correlation measures the strength of the relationship, whereas regression predicts the value of one variable from the value of the other. When two or more variables are used, the procedure is called multiple regression analysis.

Neighborhood—(1) The environment of a subject property that has a direct and immediate effect on value. (2) A geographic area (in which there are typically fewer than several thousand properties) defined for some useful purpose, such as to ensure for later multiple regression modeling that the properties are homogeneous and share important locational characteristics.

Neighborhood Analysis—A study of the relevant forces that influence property values within the boundaries of a homogeneous area.

Neural Network—An artificial neural network (ANN) is a collection of mathematical models that emulate some of the observed properties of biological nervous systems and draw on the analogies of adaptive biological learning. An artificial neural network has several key elements: input, processing (calibration), and output. Other names associated with neural networks include: connect-ionism, parallel distributed processing, neuro-computing, natural intelligent systems, and machine learning algorithms.

Outlier—An observation that has unusual values, that is, it differs markedly from a measure of central tendency. Some outliers occur naturally; others are due to data errors.

Ratio Study—A study of the relationship between appraised or assessed values and market values. Indicators of market values may either be sales (sales ratio study) or independent "expert" appraisals (appraisal ratio study). Of common interest in ratio studies are the level and uniformity of the appraisals and assessments.

Repeat Sales Analysis Model—Repeat sales analysis (see Section 4.4: Time Series Analysis) aggregates changes in value and statistical means for properties sold more than once during a specified period of time in a given geographic area. For example, in a zip or postal code area, estimate market-level housing price changes. If an individual property has not been substantially changed since its last sale, this analysis matches each pair of sales transactions (thus the name "repeat sales"). The amount of appreciation (or depreciation) is calculated from the time of the first sale to the second and so on, providing an estimate of the overall appreciation of that local housing market during that time period.

The larger the number of available sales pairs, the more statistically reliable the estimate of overall housing price trends will be. Because this analysis is based on identifying properties where more than one sale has occurred, the challenge is to identify enough observations to provide a meaningful index of housing values, while keeping to as small a geographic area as possible.

A repeat sales index may also overestimate market appreciation if the data contains pairs of sales in which the second sales price reflects substantial improvements (or other alterations) made to the property after the first sale. On the other hand, repeat sales indices can and do provide very useful valuation estimates in jurisdictions where the data is insufficient to support hedonic models. In addition, they may prove to be more accurate in tracking housing values for the houses that a hedonic model may struggle with (especially those subject to extreme positive or negative influences) when a prior sale is known on the property.

Sales Comparison—One of the three approaches to value, the sales comparison approach estimates a property's value (or some other characteristic, such as its depreciation) by reference to comparable sales.

Stepwise Regression—A kind of multiple regression analysis in which the independent variables enter the model, and leave it, if appropriate, one by one according to their ability to improve the equation's power to predict the value of the dependent variable.

Software—Anything that is stored electronically on a computer is software. The storage device is hardware. There are two general categories of software: (a) operating systems and the utilities that allow the computer to function, and (b) applications which are programs that allow users to work with the computer (e.g., word processing, spreadsheets, databases, AVMs).

Stratification—The division of a sample of observations into two or more subsets according to some criterion or set of criteria. Such a division may be made to analyze disparate property types, locations, or characteristics, for example.

Tax Assessed Value Model—Tax assessed value models derive an estimate of value by examining market values attributed to properties by the local taxing authorities (see Section 4.5 Tax Assessed Value Model). As a matter of local law and custom, the values reported by the taxing authorities often (but not always) vary from the current market value in some reasonably predictable manner. For example, some jurisdictions require the taxing authority to report the value at 25 percent of estimated market value. In others, values are re-

assessed only on an infrequent basis. Some jurisdictions report multiple values—assessed, appraised and market values. By examining local laws and customs with respect to how that value is derived, it is often possible to provide a general adjustment to values reported by taxing authorities to better approximate current market value.

Time Series Analysis—A family of techniques that can be used to measure the cyclical movements, random variations, seasonal variations, and secular trends observed over a period of time.

Weighted Mean—An average in which each value is adjusted by a factor reflecting its relative importance in the whole, before the values are summed and divided by their number.

Variable—An item of observation that can assume various values, such as square feet, sales prices, or sales ratios. Variables are commonly described using measures of central tendency and dispersion.

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Additional Suggested Readings

Gloudemans, R.J. 2002. Comparison of three residential regression models: Additive, multiplicative, and nonlinear. *Assessment Journal* 9 (4):25-36.

O'Connor, P.M. 2002. Comparison of three residential regression models: Additive, multiplicative, and nonlinear. *Assessment Journal* 9 (4):37-44.

Gloudemans, R.J, and O'Connor, P.M. 2002. "Comparison of three residential regression models: Additive, multiplicative, and nonlinear." Papers presented at 6th Annual Integrating GIS/CAMA Conference. Urban and Regional Information Systems Association and IAAO, April 7-10, at Reno, NV. Available on CD-ROM.

Maloney, J., Ripperger, R., and O'Connor, P.M. 2001. "The first application of modern location adjustments to cost approach and its impact." Linking Our Horizons, 67th International Conference on Assessment Administration. IAAO, September 9-12, at Miami Beach, FL.

Assessment Standards of the International Association of Assessing Officers

To order any standards listed above or to check current availability and pricing, go to: *http://www.iaao.org/publication/standards.html*

Residential Valuation Detail

9/19/2014 8:10:24AM

Location

Parcel ID	99-70
Address	5 Aberdeen Rd
Class	101 1-Family

Ground Floor Area	884
Story Height	2.25
Main Living Area	1,989
Finished Attic Area	0
Addition Living Area	1,714
Total Living Area	3,703

Unit Values

	Unit Price	Units	Adjust	Value
Total Liv Area	$72.00	3,703	0.990	$263,905
Basement Area	$0.00	884	1.000	$0
Attic (Unfin)	$0.00	0	1.000	$0
Fin Bsmt	$32.00	0	1.000	$0
Rec Room	$15.00	280	1.000	$4,200
Bsmt Gar Stall	$1000.00	2	1.000	$2,000
Enc Frm Porch	$48.00	0	1.000	$0
Open Frm Porch	$26.00	172	1.000	$4,472
Wood Deck	$16.00	0	1.000	$0
Frm Util Bldg	$12.00	0	1.000	$0
Mas Utility	$10.00	0	1.000	$0
Open Mas Porch	$26.00	0	1.000	$0
Enc Mas Porch	$48.00	0	1.000	$0
Frm Garage	$38.00	0	1.000	$0
Mas/Brk Garage	$51.00	0	1.000	$0

	Unit Price	Units	Adjust	Value
Carport	$16.00	0	1.000	$0
Canopy	$12.00	0	1.000	$0
Cnc/Mas Patio	$12.00	0	1.000	$0
Stn/Tile Patio	$15.00	260	1.000	$3,900
Mas Stp/Terrace	$12.00	0	1.000	$0
Attch Grnhse	$22.00	0	1.000	$0
Bsmt Unfin	$0.00	796	1.000	$0
Enc Pool	$50.00	0	1.000	$0
Shed	$10.00	0	1.000	$0
Barn	$20.00	0	1.000	$0
Misc	$26.00	0	1.000	$0
Full Bath	$4800.00	3	0.719	$10,357
Half Bath	$4600.00	1	1.000	$4,600
Total Fixtures	$1000.00	4	1.000	$4,000
Fireplaces	$5000.00	3	0.644	$9,666
Sub-Total				$307,100

Dwelling Percentage Adjustments

Heating	Central Air		1.070
Heat System	Hot Water		1.000
Fuel	Gas		1.000
Style	Garrison		1.000
Grade	A-		1.600
Year Built/Remod	1928	0	
Condition	Good		

Percent Good		1.12500
Traffic	N5	1.000
Units	1	1.000
Exterior Walls	Frame	1.000
View	Average	1.000

Building Adjusted %	None	1.000

Dwelling Dollar Adjustments

Building Adjusted	None	- 0
Additional Features		0

Land Valuation Detail

	Unit Price	Units	Adjust	Value
Land Area	$58.00	9772.00	1.000	$566,776

Land Percentage Adjustments

Neighborhood	206	1.100
View	Average	1.000
Traffic	N5	1.000
Size Adj		1.014
Value Modifier		1.000
Schedule Adj		0.000
Quantity		1.000
Land Sub-Total		$632,000

Total Property Value

Main Building Value (Adjusted Sub-Total)	$591,000
Outbuildings	$0
Total Building Value	$591,000
Land Value	$632,000
General Adjustment	$0
Total Property Value	**$1,223,000**

From: Linda Dietz <ld0307@aol.com>
Sent: Saturday, August 13, 2016 5:00 PM
To: Mayor
Cc: Carl Finger Scarsdale Trustee
Subject: Reveal ado

Jon-
Speaking as one who felt much aggrieved by the Tyler reval and spent thousands grieving it with little empathy from much of the rest of the community who happily embraced their low valuations and reduced taxes, I sincerely hope you are not planning to overturn the Ryan results. It appears to me that the root of the objections stem from the fact that THIS time these people received higher valuations.
Linda Dietz
66 Brewster Roaf

Sent from my iPhone

Linda R. Killian
One Forest Lane
Scarsdale, NY 10583

September 1, 2016

Mayor Jonathan Mark
Scarsdale Board of Trustees
Scarsdale, NY 10583

Dear Mayor Mark:

In the weeks following the Scarsdale Assessor's certification of the 2016 revaluation in early June, there has been mounting evidence that the product provided by consultant JF Ryan was illegitimate in conception and execution and should not become the basis of future Scarsdale property taxes. Knowing this, the Village Board of Trustees would do residents of Scarsdale an irretrievable disservice by passively allowing the Assessor's initial certification to stand.

As I have communicated to you and the larger community, the integrity of the tax base is central to the legitimacy of municipal taxation and thus, to all municipal functions. Lacking that, funding all municipal endeavors, from schools to the library to even the level of municipal services, become painfully contentious.

At its upcoming September 13 meeting, I recommend that the Scarsdale Board of Trustees take the following steps:

1. Declare that the Ryan revaluation was illegitimately produced, lacking in documentation and discriminatory to sectors of the Scarsdale community, and then vote unanimously to declare it null and void ab initio.
2. Hire an independent professional investigator to produce a detailed public report of what transpired among the Assessor's Office, Village Management and Board of Trustees.

As the Village Attorney and outside counsel can attest, under Anglo-American law generally, everything that is not expressly prohibited is permitted, so the board should exercise its authority to reject the certification, basing their rejection on evidence of false representations and the numerous other irregularities and breaches of contract.

It is the duty of Trustees to look out for our and the Village's best interests. Allowing this discredited product to become the final tax roll would be a significant disservice to the community that may result in longer term damage.

Sincerely,

Linda R. Killian

Linda R. Killian
One Forest Lane
Scarsdale, NY 10583

August 12, 2016

Dear Mayor Mark and Trustees:

A number of Scarsdale taxpayers have raised compelling issues about the 2016 JF Ryan reval, producing extensive evidence showing that this very small firm has unilaterally undone the comprehensive and rigorous reval completed in 2014 by nationally recognized Tyler Technologies. Using a questionable methodology, JF Ryan shifted the tax burden from newer and larger properties to older and smaller ones. The record also indicates a troubling lack of appropriate supervision and accountability by the Village and Trustees of JF Ryan's procedures and methodology.

In the face of mounting evidence of the JF Ryan reval's lack of integrity, the Trustees have largely dismissed legitimate taxpayer concerns with platitudes and responsibility shifting. By defending the indefensible, you are inflicting substantial financial harm and inequity upon some Scarsdale taxpayers as well as undermining the Scarsdale community's confidence in the Village Board's judgment and transparency. This is very wrong but reversible.

Unlike the 2014 Tyler Technologies reval, the JF Ryan 2016 reval never had community support. It was opposed at the outset. As more facts and emails accumulate about its questionable genesis, irregular design and sloppy execution, it is highly likely that the JF Ryan reval will generate even more righteous community opposition along with unfavorable publicity. Even if the BAR corrects these massive assessment errors on a case by case basis through the grievance process, it is possible that the integrity of Scarsdale's tax base will be compromised.

Trustees, instead of digging yourselves deeper by defending JF Ryan's flawed, unvalidated and minimally supervised 2016 reval, you should consider remedies that will restore the comprehensive baseline established by Tyler. Given the copious evidence from emails, statistical analyses performed by knowledgeable Scarsdale residents, the deviations from good practices and flagrant omissions of sales data, Scarsdale taxpayers are well justified in demanding that the Trustees nullify the illegitimate JF Ryan reval and seek redress against him and his firm on their behalf. In fact, that is your duty to Scarsdale taxpayers.

Sincerely,

Linda R Killian

Donna Conkling

From: Lisa Micek <lisajmck60@gmail.com>
Sent: Wednesday, August 24, 2016 6:15 PM
To: Mayor; Attorney's Office; Steve Pappalardo; Clerk's Department; Lisa Micek
Subject: Ryan 2016 Reval

To the Scarsdale Village Staff and others it concerns, I am a long time resident of Scarsdale and was present during the town hall meeting for the 2016 Reval discussion between Mr Ryan and Ms Albanese. There were also numerous emails exchanged between the 2 of them which also need to be considered.

I was extremely impressed with the amount of time our knowledgable residents spent preparing sound, fair, and well proven charts, formulas and facts while Mr Ryan spoke nonsensical and unfair statements. "His firm"spent <3 minutes for some homes assessing only the front outside. Also some of those days were spent on his personal court problems. Mr Ryan admitted that there was not sufficient comparison with the last & recent reval and that the larger the home and property, the value started to decrease yet the small homes were valued at much higher. This makes no sense that the residents of the smaller homes are expected yet again to bear the tremendous costs of others.

Another major discrepancy is seen in the 2016 residential detail sheets. I live in a small home in Edgewood that has 1 of the most highly trafficked streets in the village (including persons parked illegally, double and triple parked), yet the detail sheet states that the traffic on the street is "light"!

Mr Ryan could not justify his decisions nor did he save documents.

I as well as our neighbors and many of the residents of the village, are requesting the Village to Not support this reval,

Thank You,

Lisa J Micek

Sent from my iPhone

From: Marcus Reidenberg <mmr47@cornell.edu>
Sent: Wednesday, August 17, 2016 10:54 PM
To: Mayor
Subject: more on tonight's meeting

Dear Mr. Mark:

I wrote you a few minutes ago about Ryan's invalid way to test his statistical model.

I have recalled a woman presenting her work at the meeting using 18 or so New Canaan sales in the Scarsdale model. I recall she said the Scarsdale model predicted the New Canaan prices pretty well. This use of other data is a good test of a model.

Someone should check the transcript of the meeting to review this woman's data about New Canaan. If my memory of what was said is correct, the the Ryan model appears quite good even if Ryan's way of testing it appears invalid.

Marcus

Donna Conkling

From: Marcus Reidenberg <mmr47@cornell.edu>
Sent: Sunday, August 21, 2016 2:40 PM
To: Clerk's Department; Nanette Albanese
Subject: reval

Friends,

I wrote the following to the mayor and think you should get it , too.

Thank you for arranging the meeting tonight and conducting it with dignity and maintaining order as best you could. I stayed as long as I could but have a question that you may be able to put to Ryan or consider by the Board or Assessor.

Ryan said that he made his model based on 395 sales in Scarsdale. He then tested his model using 220 sales from the original 395 data set. If one uses the same data to test a statistical model as was used to make the model, it will test as a perfect match. By using somewhat over half the original data set to test his model, of course the model will come out nearly perfect. Thus his evidence that his model was valid because it tested so well is false because he did not use a data set different from the one he used to develop his model.

If he wanted to do this kind of validation, he should have used 200 sales to make his model and the remaining 195 sales to test the model. I can see an issue with using only 200 sales but this is the only statistically valid way to test a model. Does it work with a data set different from the one used to make a model is the way to test a model..

I wrote you a few minutes ago about Ryan's invalid way to test his statistical model.

I have recalled a woman presenting her work at the meeting using 18 or so New Canaan sales in the Scarsdale model. I recall she said the Scarsdale model predicted the New Canaan prices pretty well. This use of other data is a good test of a model. Someone should check the transcript of the meeting to review this woman's data about New Canaan. If my memory of what was said is correct, that the Ryan model predicted the New Canaan sales, then the Ryan model appears quite good (even if Ryan's way of testing it appears invalid).

yours,

Marcus Reidenberg
39 Greenacres Ave.

From: Marcus Reidenberg <mreidenberg@optonline.net>
Sent: Wednesday, August 17, 2016 10:13 PM
To: Mayor
Subject: more from meeting Aug. 17

Dear Mr. Mark:

Thank you for arranging the meeting tonight and conducting it with dignity and maintaining order as best you could. I stayed as long as I could but have a question that you may be able to put to Ryan or consider by the Board or Assessor.

Ryan said that he made his model based on 395 sales in Scarsdale. He then tested his model using 220 sales from the original 395 data set.

If one uses the same data to test a statistical model as was used to make the model, it will test as a perfect match. By using somewhat over half the original data set to test his model, of course the model will come out nearly perfect. Thus his evidence that his model was valid because it tested so well is false because he did not use a data set different from the one he used to develop his model.

If he wanted to do this kind of validation, he should have used 200 sales to make his model and the remaining 195 sales to test the model.

I can see an issue with using only 200 sales but this is the only statistically valid way to test a model.

Does it work with a data set different from the one used to make a model is the way to test a model..

Sincerely,

Marcus Reidenberg

From: Max Grudin <mgrudin@gmail.com>
Sent: Friday, August 26, 2016 10:16 PM
To: Mayor
Subject: discussion of reval models

Dear Mayor Mark,

I have conversed with Mayra Rodriguez about various reval issues. She told me that she and a group of people have proposed that a board of quants is appointed by the village management to oversee models used for real estate valuation.

I believe that our village has tremendous resources for reviewing valuation models. I am not objecting to creating such an oversight board, but I have some concerns. We as a community seem to have many opinions how properties should be valued. I have heard conflicting opinions about how the land part of the property should be accounted for. These are fundamental issues and not just model calibration issues. We need more than just quants (I am one of them and I am interested in this stuff). Secondly, there is a question about who will be selected to join the board. Many residents are concerned about the work of our committees (such as the CNC that I have been a part of), though those concerns are unfounded.

I think it would be great to have a group of volunteers for reviewing such models. This group could be part of Forum and should be inclusive so that anyone could join - quants, real estate developers, other residents... The group does not need to achieve consensus; instead is it supposed to provide pros and cons of multiple models. Such analysis will be very useful if the group has many participants from all parts of Scarsdale - we would hear opinions from the broad community and that would allow to make an informed decision.

By the way, I have briefly discussed my idea with Lena Crandall, Bob Berg, several residents, and with the Scarsdale Inquirer.

Best regards

Max

From: Mayra Rodriguez Valladares <mrvassoc@yahoo.com>
Sent: Wednesday, August 17, 2016 10:27 PM
To: Mayor; Steve Pappalardo
Cc: Nanette Albanese; Assessor's Department; Robert Cole; Attorney's Office; Wayne Esannason; 'Marc Samwick'; 'Deborah Pekarek'; 'Carl Finger'; Bill Stern
Subject: August 17th Meeting

Dear Mayor Mark and Mr. Pappalardo,

Thank you Mayor Mark and Mr. Pappalardo for arranging the August 17th evening meeting.

It is disgraceful that Mr. Esannason yelled at me for stating facts. Gerd Semmelroggen was arrested on March 1, 2016 while acting on behalf of convicted felon Timothy Burke. Either Ryan knew and he did not bother to notify you or he did not know, because he did not vet him. Burke and Semmelroggen shared two residences. If any of you had bothered to google Ryan's staff you would have found this out. We have known this for months. You never received Semmelroggen's CV beforehand. There is no proof that Albanese interviewed Semmelroggen, Gosselin, Hayes or anyone else. There is no proof that Ryan or Albanese ever kept a log of whether Semmelroggen really reviewed homes or for how long. Neither could answer how many days he really worked and for how long.

All emails showed that since August 2014, Albanese kept trying to get Ryan to do a revaluation even as early as 2015. There are also a lot of discussions happening before and after work and off-premises.

Also, Mr. Wesannason, you have no right to curb my freedom of speech.

Regards,
Mayra

Encl.

From: Mayra Rodriguez Valladares <mrvassoc@yahoo.com>
Sent: Friday, August 26, 2016 11:01 AM
To: Robert Cole; Steve Pappalardo; Clerk's Department; Attorney's Office; Mayor; Donna Conkling
Cc: MJC49C@gmail.com; 'Marc Samwick'; 'Marc Samwick'; 'Carl Finger'; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; Bill Stern
Subject: Today's Scarsdale Inquirer

26 August 2016

Dear Mr. Pappalardo and Mayor Mark,

I hope that you are having a good day. This morning, I have been receiving emails and calls from residents who are stunned by today's revelations on the front page of The Scarsdale Inquirer. Not only does this prove, yet again, that the Village Assessor, only wanted to give the reval business to Ryan, it also calls into question what exactly did CNC selected officials or Village personnel know about Tyler also wanting to compete for the reval business and was not given a chance?? How did only allowing Ryan to have the reval job impact taxpayers, now and in the long term?

Additionally, I have long suspected that there are emails in my FOIL that are missing, and I have told you that. I see gaps in dates. Also every time that Albanese forwarded residents' articles or letters to Ryan, even when he was no longer under contract, there is never an email response from Ryan. When Albanese or her staff write alleged field reviewer Semmelroggen, not once does he respond. Either a lot of communication is taking place by phone or emails are missing. Which is it?

Have a good day.

Best regards,
Mayra Kirkendall-Rodriguez

From: Mayra Rodriguez Valladares [mailto:mrvassoc@yahoo.com]
Sent: Wednesday, August 10, 2016 9:33 AM
To: 'mayor@scardale.com'; 'Manager's Department'; 'Clerk's Department'; 'wesannason@scarsdale.com'; 'Robert Cole'; 'Steve Pappalardo'; 'cobrien@scarsdale.com'
Cc: 'marc.samwick@verizon.net'; 'debpekarekbot@gmail.com'; 'jveron.villagetrustee@gmail.com'; 'MJC49C@gmail.com'; 'stern.bill@yahoo.com'; 'stern.bill@yahoo.com'; 'JMARK58@aol.com'
Subject: August 17th Format

Dear Mayor Mark,

Good morning. I would like to thank Village Manager Pappalardo and you for answering a few of our questions last night. I would like to address a few points made by the trustees last night.

First, Ms. Veron stated that the decision to engage Ryan was made by a previous board. She is not the first trustee to say this last night and at other Board meetings. Those of you who have stated that the decision was made by another board speak as if that previous board was comprised of people from a faraway planet. With the exception of Ms. Veron, all of you are the previous board. Some of you have been in office since 2010 and have sat not only through the Tyler revaluation but you voted for the Ryan revaluation. Many of you have been on the Board while both Messrs. Gatta and Pappalardo have allowed Ms. Albanese to be a despotic assessor who derides village personnel and who makes fun of residents. For four years, Albanese has behaved like she works for Ryan and not for Scarsdale taxpayers. Having good governance at Village Hall is the fiduciary responsibility of the Mayor and the Board.

Board of Trustees

Mayor Jonathan Mark	58 Brookby Road
1st Term (Trustee)	2010-2012
2nd Term (Trustee)	2012-2014
Mayor	2015-2017
Trustee Matthew Callaghan	49 Carman Road
1st Term	2015-2017
Trustee Carl Finger	38 Butler Road
1st Term	2015-2017
Trustee Deborah Pekarek	43 Greenacres Ave
1st Term	2014-2016
2nd Term	2016-2018
Trustee Marc Samwick	204 Mamaroneck Road
1st Term	2014-2016
2nd Term	2016-2018
Trustee William Stern	20 Rural Drive
1st Term	2013-2015
2nd Term	2015-2017

Trustee Jane Veron	20 Tompkins Rd
1st Term	2016-2018

Source: http://www.scarsdale.com/Home/BoardofTrustees.aspx

Secondly, Ms. Veron mentioned that trustees have been working very hard since the reval results were announced to get answers to questions. She also stated that the trustees have had the same questions that we the residents have had. If this is true, why did you not announce this at the June 14th meeting? Respectfully, there is absolutely no way that you have had the same question as my team and me. Most of my team works in quantitative and even modeling roles. Even Brice, Nickolai, and I did not know about the missing sales, because initially we were working with the very little information and numbers that were publicly available. It was Josh Frankel who knew where to go do the research and figured this out. If any of you had known about the missing sales as you claimed you did last night, why did you not tell us immediately? If it is true that the trustees have had a lot of questions, why did they not share those questions with residents at multiple meetings? Have you sent the questions to Ryan and Albanese? When? Where is the list?

Ms. Pekarek lectured residents that we should be civil. Which residents specifically have been uncivil? Please provide specific examples. My team and I have been professional. We have researched thoroughly what we state in our comments and what we write in articles. We have spent countless hours on the math and qualitative flaws, not only of the model design, but also in the governance of the whole process as to how you hired Ryan and his associates in a completely unvetted manner. You never interviewed Ryan or his associates. Yes, my team and I have spoken firmly and passionately. Yes, sometimes we have sounded angry, because we are in disbelief that numerous Board members and numerous village personnel have not done their job. Civil, means of the people; my team and other residents are engaging in democracy. If you had properly researched Ryan and what modeling is about, if you had compelled Ryan and Albanese to answer questions two months ago, people's emotions and tempers would not have risen to where they are now. Also, may I remind you that you live in a very diverse town. We are diverse in our ages, ethnicities, national origins, sexual orientation, gender, professions and thought. With that diversity, you need to be aware that just because you may be used to people genuflecting before you and not questioning how things really work behind the veil of opacity which enshrouds Village Hall, does not means that all residents will continue to allow that. All you have to do is look at what is happening nationally. Millions of people are sick and tired of elected and government officials not listening to their constituents and truly taking action to improve the lives of the people they serve. Moreover, changes in the world, especially in improving governance in municipalities, hardly ever happen when people behave like mild mannered accountants.

Ms. Pekarek you want residents to be civil? Have any of you considered saying to the residents 'We are sorry?' 'We are sorry that almost all of us at the dais voted for the reval. We are sorry that we never googled Ryan or his employees. We are sorry that we did not oversee the village managers and allowed them to let Albanese to inflict great damage upon the residents.

Thirdly, thank you to those who finally decided to listen to our request from two months ago that Ryan needs to answer questions before Scarsdale residents. Unfortunately, the format that you propose is not suitable. Ryan will give a presentation based on the questions that Albanese has been forwarding him. Maybe you sent him a list of questions, which we asked last night if we could see. Yet, as I explained last night, expecting that we are to write a question on a note card and then run up and give it

to the Board for the members to vet and decide if they will ask will not function. My team will decide what it wants to do. With or without microphone, I will be asking at least two questions without cards and without any intermediary.

Fourth, I reiterate my interest in receiving my remaining FOILs. Several days ago you fulfilled Mr. Parlato's FOIL on Tyler. I requested all emails related to the Tyler reval. All you have to do is hit 'forward' with the email that you sent him to me.

Lastly, I would like to thank Robert Cole for trying to get Ryan to answer questions. Albanese via email has been shockingly rude and unprofessional to him, simply because he was doing his job. Mr. Pappalardo you are cc'd on at least one email; frankly numerous residents and I are appalled that none of you have managed her well. I would like to thank Ms. Conkling and Mr. O'Brien for all their daily work and for helping us with all the FOILS.

Have a good day. I look forward to seeing you Wednesday, August 17th.

Best,
Mayra Kirkendall-Rodriguez

Hello,

Attached is my best guess regarding the methodology and software that John Ryan used.

I am obviously not 100% sure, because he has never explained what he did. I believe with this background, the Board will better understand some of the questions that I plan to ask.

Thanks,

Mike Levine
--
Michael Levine
914-725-7716
ml@mlevine.us

From: Michael Wolloch <mwolloch@att.net>
Sent: Thursday, August 11, 2016 3:35 PM
To: Mayor
Subject: 2016 Reval

Mr. Mayor,

Please rescind the 2016 Reval and please allow our fellow citizens the opportunity to verbally question Mr. Ryan and Ms. Albanese during the August 17th meeting at the Scarsdale Village Hall.

I have attended a couple of the Trustees meetings and have read many of the articles pertaining to the 2016 Reval.

Since 1964, (52 years) my family has had a presence in Scarsdale. My mother still lives in the house my parents bought in 1964. My three brothers and I matriculated through the Scarsdale school system. I am a SHS class of 1975 graduate and my family and I returned to live in Scarsdale in 1998. My oldest brother (SHS class of 1967) also resides in Scarsdale. I would say I have a pretty good feel for Scarsdale.

I am very dismayed with the tone in our community. Though we know why we all come to live in Scarsdale, boy have things changed!

I will not go into a long diatribe about all the issues. My home was re-assessed up by $200,000 in the new Reval. I would be surprised if my home were to receive the Fair Market Value of what has been valued by Mr. Ryan.

So much anger and tension exist in our community. Scarsdale is a microcosm of what is occurring today in America. Those with much more appear to gain more benefit.
Of course, the majority of us in Scarsdale are extremely fortunate but not all of us can be considered Croesus. There is a middle here and perhaps a lesser level too.

I am aware of the economic miasma that is gripping both Scarsdale and our country. I have worked in the financial community for 35 plus years and cognizant of the twisted economic environment.

Also, I am sensitive to the Board's position yet I cannot help but think why this Reval was done so discreetly and haphazardly? This is not Scarsdale's finest moment. A tarnish has enveloped our village and with it, our reputation, let alone our character.

As our Chief Executive, you have the power to make a difference.

Please re-evalute the situation.

Thank you for your time.

Michael N. Wolloch

43 Secor Rd.

From: Neil Doppelt <neil5858@yahoo.com>
Sent: Friday, August 26, 2016 11:10 PM
To: Mayor
Cc: scarscarsdalemyra@yahoo.com
Subject: Reclaiming Respect

Dear Mr. Mark -- I am one of the (over a thousand) homeowners who has been astounded at the incompetence of the process leading to -- and after -- the disaster of the Ryan re-val.

By now there can be no doubt that the Village has been hoodwinked and embarrassed-- and seemingly, ill-served by it elected and appointed leadership.

It is time to try to reclaim the respect of Scarsdale residents.

1. It appears that the Assessor, by her suspect conduct before the re-val started, her belligerence toward our residents (a long history thereof), her obvious attempts to duck responsibility, and her premature and grossly negligent certification of the flawed re-val, has completely lost the confidence of the entire Village. She must be removed immediately before she creates more havoc among us. Your action to remove her is a critical first step in recognizing that she is a big part of the problem, and not any part of the solution.

2. According to the Village attorney there is no way to nullify or reverse the

fatally-flawed Ryan re-val. I know that several lawyers in the Village might be able to come up with some path to achieve a reversal, but so far no such path seems possible. I urge you to direct the Village's attorney to get on board the effort to get to a legal answer, and to announce to the residents that you have done so.

3. In the event that the Ryan re-val, terrible as it is, is cast in stone, I believe that you can make important decisions to first, acknowledge (as you have done once before) that the re-val was an unnecessary and ill-conceived mistake, and second, to accept the Ryan re-val for one year only, during which the responsible officials (excluding the current Assessor) will revive and certify the original Tyler results for every subsequent year through 2020. During the intervening years, homeowners who had problems with the Tyler results should be given ample opportunity to present their issues to an impartial committee with (as is the case now) a further option to pursue their cases in court.

There is no reason to allow the skewed results of the Ryan re-val to stand for more than a year; the Ryan penalty on our smaller homes is unacceptable and will create hardship on hundreds or thousands of residents.

The Ryan re-val, including the circumstances leading to Ryan's selection, has made Scarsdale an example of suspect or failed leadership on many levels. This re-val cannot be allowed to poison our Village for years to come. Now is the time to step up to the problem and act to do what can be done to mitigate the damage.

These three steps will not wash away the ugly stain of the Ryan re-val, but could begin the process of restoring respect for our Village government.

Respectfully,

Neil Doppelt 63 Drake Road

From: Drnorto <drnorto@aol.com>
Sent: Monday, August 15, 2016 2:20 PM
To: Mayor
Subject: Revaluation 2016

Dear Mayor Mark:

My wife, Linda, and I have lived in Scarsdale since 1969 and in our current home since 1977. After the 2014 revaluation, the first revaluation in at least 37 years, our assessment was essentially unchanged. However, when just two years later in 2016, the revaluation increased by 38%, we were shocked! It made no sense.

We attended neighborhood meetings with the Mayor and Village Trustees; we followed the discussions in the Scarsdale Inquirer and the Scarsdale website. The Board never gave satisfactory answers to why they did what they did and often appeared aloof. The Board even attacked questioners lack of involvement in Scarsdale affairs - a classic tactic of attacking or blaming the victim. In our situation, my wife and I have been involved in various activities for many years. For example, my wife, Linda, created and directed the Recreation Department Tennis Program for 30 years.

The editorial in the August 12 issue of the Inquirer posed five questions and along with the op-ed piece by Mayra Kirkendall-Rodriguez crystallized the issues which I need not repeat here. Why has the Board not answered the five questions posed? Why has the Board not addressed the failure of Ryan to fulfill the contract and the other issues raised? These are very significant issues and raise propriety and possibly legal questions.

It is understandable to make a mistake; denying it or saying that nothing can be done is unacceptable. The perception of the Board and the Village officials by many Scarsdale residents is most unattractive at best and downright terrible at worst. It raises many questions that need answers. Was there a cover-up? Were there improper actions by Village officials? Why did the Board state that it would decide which questions Ryan would answer? Why is Ryan being paid to answer questions about what he did?

Scarsdale residents deserve better answers and a plan to resolve this mismanagement.

Sincerely,

Norton S. Rosensweig, M.D.

From: ufop77@yahoo <ufop77@yahoo.com>
Sent: Monday, August 15, 2016 12:08 PM
To: Mayor; Clerk's Department
Subject: Questions for Mr Ryan regarding the revaluation

Mr Mayor-

Please put these questions to Mr Ryan for an "on the record" response at our meeting.

1. Who was your contact, or the first person who made your introduction to Scarsdale Village?

2. Where did you obtain the data parameters for property condition / building grades?

3. Who decided the "traffic" grade / parameter for each property used in your formula and what were the standards used?

Thank you,

Sincerely,

Philip Maresco
43 Ferncliff Rd
914 574-5939

From: Mayor
Sent: Wednesday, August 24, 2016 10:55 AM
To: robertbergesq@aol.com; Steve Pappalardo
Subject: Re: Not so limited agenda meeting

Dear Mr. Berg -- The Tuesday meeting was public as all our meetings are. The agenda was limited and was completed as noticed. It is unusual for residents to attend the summer 8:30 am meetings although a few residents did so in July, but a somewhat larger number attended yesterday. Since the residents were present and had taken time out of their schedules to be there, rather than simply dismiss them, I invited their comments and discussion ensued. That was not planned, considered or anticipated, but was done as a courtesy to those residents who took the trouble to be present and in the interest in not having them feel they had wasted their time in appearing.

Very truly yours, Jon Mark

From: robertbergesq@aol.com <robertbergesq@aol.com>
Sent: Wednesday, August 24, 2016 12:22 AM
To: Mayor; Steve Pappalardo
Subject: Not so limited agenda meeting

Dear Mayor and Village Manager,

I understand that today's "limited agenda" meeting was not so limited. The official agenda published on the Village website suggested that this morning's meeting would not address any substantive issues and would last about 10 minutes or so. Imagine my surprise then when I learned that following the conclusion of the "official" business -- which lasted no more than a couple of minutes -- you and the Trustees spent I'm told about 90 minutes addressing the Ryan revaluation. As you obviously know, the Ryan revaluation is this year's big issue for Scarsdale residents and when such a meeting is properly publicized, Rutherford Hall overflows with residents. Yet, this topic was not on this morning's agenda. This morning's meeting was not televised. No press were in attendance -- because like everyone else, they didn't know you'd be addressing the Ryan revaluation.

I have heard that about 10 residents did attend and participated in that discussion. If the issue had been properly flagged for the public, I would have re-arranged my schedule to be present, and I'm sure dozens more interested residents would have done the same. This is not the first time that poorly or improperly noticed topics have been discussed at Village Board or Committee of the Whole meetings. At the recent July 2016 limited agenda meeting the Ryan revaluation was addressed, despite not being on the agenda. The April 2016 presentation by John Ryan was not adequately publicized, as you both have publicly acknowledged, and it was mere happenstance that Steve Rakoff wandered into Village Hall and found out about Ryan's appearance.

This is simply bad practice. It makes no sense. If you were considering discussing the Ryan revaluation this morning, the topic should have been publicly noticed when the agenda was posted. Since it was not, you should not have held the discussion. Now the public and the press have only hearsay reports of what transpired. Please don't do this again. Thanks. Best regards, Bob.

Robert J. Berg, Esq.
Law Office of Robert J. Berg
Robert J. Berg PLLC
32 Tisdale Road
Scarsdale, New York 10583
(914) 722-0579
(914) 522-9455 (cell)

From: proscars@aol.com <proscars@aol.com>
Sent: Friday, August 26, 2016 5:33 PM
To: Mayor
Subject: Re: Town Assessment Review Board Grievance Meeting Reviews

Jon, Thanks for your detailed response. I would remind you that you are on the public record several times with the date of 9/1/2016 for appraisal submissions. If Mr. Berg changed your mind, you should have publicly rescinded your statements . A simple call to the Chair of TARB , with a suggestion that the Board receive appraisals until 9/1/2016 would not be out of order with ALL the problems that the 2016 Reval has created for our Scarsdale residents .

Bob Harrison

-----Original Message-----
From: Mayor <mayor@scarsdale.com>
To: proscars <proscars@aol.com>; jmark58 <jmark58@aol.com>
Sent: Fri, Aug 26, 2016 5:14 pm
Subject: Re: Town Assessment Review Board Grievance Meeting Reviews

Dear Mr. Harrison -- As was pointed out to me several weeks ago at a public meeting by Mr. Berg, a member of the Assessment Review Board, by statute the Assessment Review Board operates independently from the Village Board. Mr. Berg also reminded me that I was not in a position to dictate when they would or would not accept materials, though my statement was simply based on my understanding of what was feasible. It is therefore not within my power to dictate when the Assessment Review Board meets or does not meet -- or what materials they accept or when they accept them.

Having said that, from the one meeting of the Assessment Review Board I did attend months ago, at Mr. Berg's urging, the Assessment Review Board appeared to be diligent in conducting their work and solicitous of the residents who were then appearing before them. Based on that observation I am confident that they will perform their work with like diligence and give residents such consideration as the Assessment Review Board members deem appropriate in the exercise of their reasonable good judgment with respect to the grievance filings that remain to be processed.

Very truly yours, Jon Mark

From: proscars@aol.com <proscars@aol.com>
Sent: Friday, August 26, 2016 4:49 PM
To: Mayor; jmark58@aol.com
Subject: Town Assessment Review Board Grievance Meeting Reviews

Mayor Mark,

It has been indicated to me that the TARB will hold its final review meeting of grievances this Monday, August 29, 2016.

This conflicts with your public statements that grievance appraisals will be accepted until September 1, 2016 . I would urge you to inform the Chairman of the TARB that his Board should allow the acceptance of appraisals until 5 PM on 9/1/2016 and then have their final meeting.

I know for a fact that appraisers are still finalizing their appraisals for Scarsdale residents.

Thank you for your follow up in the above matter.

Robert H. Harrison
65 Fox Meadow Road
Scarsdale, NY 10583

914 725-0962

From: proscars@aol.com <proscars@aol.com>
Sent: Wednesday, August 17, 2016 5:31 PM
To: Mayor; jmark58@aol.com; bill.stern@yahoo.com; dpekarek@verizon.net; carlfingerscarsdaletrustee@gmail.com; marc.samwick@verizon.net; MJC49C@gmail.com; jveron.villagetrustee@gmail.com; Steve Pappalardo; Wayne Esannason; Clerk's Department
Subject: Questions for Meeting 8/17 with J.F. Ryan and Assessor Albanese

To Mayor Mark and Scarsdale Village Board :

A number of the questions below have asked in previous public comment periods without answers.

We would the following questions answered by J. F. Ryan and Assessor Albanese in detail.

1. The assessor's FINAL Copy of the Sales Report initialed and dated by the assessor 7/20/16 shows 506 Sales with 396 valid sales and 110 invalid sales. Where are the written detailed explanations for the invalid sales /

2. Did JF Ryan and the assessor have access and examine the MLS sales report for the Scarsdale School District from 7/1/2014 to 9/25/2015 ? The report indicates that there were 338 bona fide sales through real estate brokers.

3. Why did JF Ryan and the assessor use only 220 sales during the sales base period ? Why and for what detailed reasons were each of the 118 sales from the MLS sales report deleted from the Ryan and assessor sales report of only 220 sales .

4. The MLS Sales Report shows 81 of the 338 sales were under $ 1,000,000 or about 24 % of the total sales. The 220 Sales Base shows only 31 sales under $ 1,000,000 of 17.7 % of the total . Therefore lower valued houses were under represented in the 220 Sales Base Sales list . Why and who decided to under represent lower valued houses in the 220 sales Base ?

5. What is the exact number of the 5,298 Scarsdale Homes that had their June 1, 2016 tentative assessments increased , how many stayed the same and how were decreased by actual numbers not percentages ?

We may present further questions at the Ryan presentation.

Bob Harrison, Chairman
Scarsdale Taxpayer Alert

914 725-0962
914 646-4054 (cell)

From: Robert Neidig <robertneidig@gmail.com>
Sent: Thursday, August 18, 2016 2:27 PM
To: Mayor; Attorney's Office; susan.savage@tax.ny.gov; orpts.southern@tax.ny.gov
Cc: editor@scarsdalenews.com; scarsdalemayra@yahoo.com; Ellen Pocost
Subject: August 17 Meeting with J.F. Ryan

I watched (at times in disbelief) last night's meeting with J.F. Ryan on my laptop

I would like to offer some comments and observations. Please feel free to forward this to the other members of the BOT, and you might also tell them they were on camera and did not need to whisper to one another or use their cell phones so frequently.

We really did not need to sit through a very poorly done PPT presentation by Mr. Ryan on his modeling theory, with nothing but 'generalities' and 'standard business practices' being verbalized, but rather would have really liked to see his actual output and his reports, and 'any' documentation, which we paid for. How could you Mr Mark, and you Mr. Essanason, allow
this to happen? Were you not paying attention to him?

Mr. Ryan tried to defend the timing of his reval after only two years since the last one. Did not the state (Mr. Wolham) recommend NOT doing another one? Why did Ms. Albanese ignore his recommendation? If in fact this was a mere 'tweaking' of the 2014 evaluation, why did this 2016 reval result in more than a 10% change in valuation for ~49% of Scarsdale homeowners?

I won't even get into the issue of the 220 sales out of 499 sales used for the model. Ms. Albanese claimed there were invalidation codes, but conveniently could not provide any data. Should she not have brought that documentation to the meeting?

I am somewhat surprised that no one appeared to have properly checked Mr. Ryan's credentials, his body of work, his staff, and his relationship with Ms. Albanese. Given the trail of e-mails that has been publicized over the last several weeks, I sense a complete lack of professionalism on both their parts and also incompetence. I would suggest Ms Albanese voluntarily resiqn.

I find this whole thing a total disgrace and a 'black eye' on The Village of Scarsdale, and everyone of you should be quite embarrassed. If any of you worked at my company, you would have already been placed on a 90 day performance improvement plan

Robert M. Neidig

From: rocco170@verizon.net <rocco170@verizon.net>
Sent: Tuesday, August 16, 2016 10:05 PM
To: Mayor
Subject: Second Property Revaluation, J.F. Ryan Associates

Dear Mayor Mark and the Board of Trustees,

I attended the August 9thBoard of Trustees meeting in Rutherford Hall last week and I was interested tohear at that meeting that the Board as a whole recognized the 2016 reassessmentproject was not without its mistakes. Ialso agree, as one Board member stated on August 9th, that there is no "hiddenagenda" at play in the second reval.

However, while it was encouragingto hear that the Board intends to "learn from its mistakes", I hope that goingforward the Board (and the Village Manager's office) will very carefullymonitor all actions and decisions taken by the Assessor's office that have adirect impact on residents. I had assumed that this was always the case inVillage government affairs but after listening to the findings from the FOILrequest read aloud by Ms. Kirkendall-Rodriguez - apparently the public wasmisinformed on this issue.

I was also interested to learn afew days after the meeting that Village residents will be permitted to ask Mr.Ryan and Village Assessor Albanese questions concerning the 2016 revaluation. Iapplaud this decision as the citizenry of Scarsdale should have the right toask Mr. Ryan questions without any unreasonable restrictions such as writingquestions in advance on note cards.

The Village government and thefull-time salaried Village staff members at the Village Hall will likelysurvive this episode in the Village. But at what cost? Will the Board ofTrustees take action to prevent this controversy from ever happening again? Orwill the Village government take the path of least resistance? Hopefully, thelegacy of this Board will be as community leaders and not mere bystanders.

Sincerely,

Rocco Alfano

-----Original Message-----
From: Roger Neustadt <rknatty@aol.com>
To: mayor <mayor@scardale.com>; Manager'sDepartmen' <Manager'sDepartmen'@scarsdale.com>; wesannason <wesannason@scarsdale.com>; RobertCole <RobertCole@scarsdale.com>; StevePappalardo <StevePappalardo@scarsdale.com>; cobrien <cobrien@scarsdale.com>
Cc: mrvassoc <mrvassoc@yahoo.com>; jgbell75 <jgbell75@gmail.com>; marc.samwick <marc.samwick@verizon.net>; debpekarekbot <debpekarekbot@gmail.com>; jveron.villagetrustee <jveron.villagetrustee@gmail.com>; MJC49C <MJC49C@gmail.com>; stern.bill <stern.bill@yahoo.com>; stern.bill <stern.bill@yahoo.com>; jmark58 <jmark58@aol.com>
Sent: Wed, Aug 10, 2016 10:57 AM
Subject: Revaluation

Although I have not commented previously about the Ryan revaluation, I feel as though I must now let all of you know that I have received comments from numerous residents in West Quaker Ridge, for which I am currently the SNAP President. Without getting into the details of such comments or making judgment thereon, it would certainly be helpful to have an open forum when Mr. Ryan appears. Questions should not be vetted or reviewed prior to the meeting. There is simply no justification for limiting discussion, or the subject of questions asked, short of rude behavior on the part of the questioner. It in only in this way can we be assured that difficult questions will be asked (and hopefully answered) and that follow-up questions may be posed. Without the ability to pose follow-up questions, I fear that this meeting will seem like a Presidential Debate, necessary answers will not be obtained and we will all be right back where we started. I am concerned that a failure to obtain necessary information or a lack of forthrightness on the part of Mr. Ryan will only magnify the concern of residents in the reliability of the Ryan revaluation. Greater transparency in government is essential and would go a long way toward easing the animosity that has developed with respect to this issue.

Sincerely,

Roger Neustadt

From: sherry berkowitz <sherryberkowitz@gmail.com>
Sent: Wednesday, September 7, 2016 11:50 AM
To: Mayor
Cc: marc.samwick@verizon.net; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; MJC49C@gmail.com; Robert Cole; Steve Pappalardo; Bill Stern; Wayne Esannason
Subject: 2016 Ryan Reval Comparable Sales Data Question

Dear Mr. Mayor,
Below is an excerpt of a letter I sent you on August 10th questioning the comparable sales data used in the Ryan reval. I questioned Nanette about this in the beginning of June, and wrote down this question on an index card during the 8/17 Ryan meeting hoping to finally get an answer from John Ryan.

On June 2nd I read Nanette Albanese's 8/20/15 press release with the "Important Things to Know about the 2016
Reassessment". http://scarsdale.com/Portals/0/Assessor/2016%20PRESS%20RELEASE.PDF
The third bullet point reads "The sales used to value all properties for the June 1, 2016 tentative assessment roll will include valid transactions that transpired over the 2 year period. July 1, 2013 through June 30, 2015.", however, Ryan's final report states they used comparable sales data from 7/1/14-9/25/15.

Why did Ryan use a different sales base then originally noted in the Village press release? I'm sure you would agree there's a big difference between using sales data for a 15 month period vs a 24 month period, not to mention the fact that Ryan used only a "subset" of the 15 month period.

As of today, I have still not received a clear answer to this question from anyone.

Sincerely,
Sherry Berkowitz

> From: sherry berkowitz <sherryberkowitz@gmail.com>
> Sent: Wednesday, August 10, 2016 5:19 PM
> To: Mayor
> Cc: marc.samwick@verizon.net; debpekarekbot@gmail.com; jveron.villagetrustee@gmail.com; MJC49C@gmail.com; Bill Stern; Wayne Esannason
> Subject: Comparable Sales Data from 2016 Reval and 8/17 Ryan meeting
>
> Dear Mr. Mayor,
> I am writing to you regarding the 2016 Ryan reval, specifically regarding the comparable sales data, and the format of the upcoming 8/17 meeting.
>
> Comparable Sales Data
>
> After I attended the 6/1 FMNA meeting I began compiling information about the value of my house in order to either prepare to meet with Nanette before 6/21, or for my grievance application. On 6/2 I emailed Nanette letting her know that I had been on the Scarsdale.com<http://Scarsdale.com> website and read Nanette Albanese's 8/20/15 press release with the "important things to know about the 2016 reassessment". http://scarsdale.com/Portals/0/Assessor/2016%20PRESS%20RELEASE.PDF
> The third bullet point reads "The sales used to value all properties for the June 1, 2016 tentative assessment roll will include valid transactions that transpired over the 2 year period. July 1, 2013 through June 30, 2015."
>
> Since Ryan's final report states they used sales from 7/1/14-9/25/15 I was confused. I went back and forth with Nanette a few times via email in early June to no avail, but to be perfectly honest I stopped asking for clarification since she didn't have the time to discuss my home assessment before the grievance app file date of 6/21.
>
> In preparing my grievance application I met with a local real estate agent to review sales comps in the area. Since we were both unclear as to the exact sales comp dates we should use, we covered our bases and looked at dates that included the press release and Ryan's final report: 7/1/13-9/25/15. All of this was done before the 2016 Revaluation Sales Base report was posted to the Scarsdale.com<http://scarsdale.com> website. Once I saw that report was posted I cross checked the comps we pulled against the 2016 Reval Sales Base report and immediately noticed the following sales were missing:
>
> Press Release Dates 7/1/13-6/30/15
>
>
> * 42 Tompkins Road sold 4/15/14 $925,000
> * 1108 Post Road sold 2/2/14 $820,000
>
> Ryan's final sales base report 7/1/14-9/25/15
>
>
> * 26 Ridgecrest East sold 9/8/15 $825,000
> * 142 Boulevard sold 7/20/15 $780,000
>
> * 10 Dobbs Terrace sold 3/6/15 $720,000

>
> I don't think you have to review models for a living or have statistical background to know something seems very wrong here.
>
>
> August 17th Ryan Meeting
>
> I appreciate you and the trustees in your effort to have Ryan and Associates come to Scarsdale and answer resident questions. I understand that you want to be able to streamline the meeting for efficiencies, and avoid repetitive questions. However I do think it's unreasonable to expect us to write questions on a note card, and then have Board members vet them especially during the meeting and/or if we have follow up questions. I think it would be helpful for everyone if we could receive Ryan's response to all of the questions that have been asked over the course of the last 2 months prior to our meeting. That would probably be one good way to avoid repetitive questions. The meeting with Ryan is in a week, so I trust the residents will be given plenty of time to review Ryan's answers to residents questions in the next couple of days, giving all of us plenty of time to review and prepare for the meeting.
>
> Best,
> Sherry Berkowitz

From: Sunil Subbakrishna <sunil.subbakrishna@gmail.com>
Sent: Wednesday, August 17, 2016 10:47 PM
To: Mayor
Subject: Revaluation meeting

Dear Jon,

Geetha and I left around 10 as we needed to move on to other things. We'd like to thank you for setting up the meeting and making an honest attempt to press Mr. Ryan for answers. We appreciate your efforts.

Frankly, we found him utterly unconvincing. His numbers didn't make sense nor did his explanation of why he chose to do things the way he did. If it was up to me, I would never hire him again nor would I recommend his work to anyone else.

Since periodic revaluations will be a permanent feature of our landscape here, more thought needs to be given to how to run this process more effectively. Having 20% of the population extremely unhappy with their elected officials and municipal employees is not a healthy state of affairs. While no process will eliminate dissatisfaction, what we are going through right now almost seems calculated to maximize it.

Happy to share specific thoughts with you if it would be helpful.

Best of luck resolving this and best regards.

Sent from my iPhone
Sunil Subbakrishna

From: Bal1998 <bal1998@aol.com>
Sent: Thursday, August 18, 2016 2:08 PM
To: Mayor
Subject: From Resident Susan Levine...

Dear Mayor Mark....

I found last night's meeting with J Ryan and Ms Albanese to be
largely unsatisfying.and discomforting....
although I appreciate all that you tried to do
to make it otherwise.

I do not think that Mr Ryan or the Assessor was convinced
of how Unfair so many residents feel about the Ryan Reval.
I think that is the main feeling...a feeling of having something
done to us that is so very Unfair..that makes no sense.

Statistics notwithstanding..nor unrelated issues that were
raised last night...
the issue we have with Ryan is that his Tweak of the
Tyler Reval is viewed as simply Not Fair..making no sense
in hundreds and hundreds of cases...

<<For instance..on my One Block street...the 7 old Stucco Cottages
all built around 1928..with the Smallest square footage... were All
Increased in Assessment a great deal....

while the other 10 Homes...all much newer Colonials..with Much
greater Square Footage...all Went Down in Assessed Value>>>...

The Newer Colonials would sell for Much More than their assessed value..
while the Smaller 1928 Cottages would sell for Much Less...
This does not make sense..since the actual sales vale is Not reflected
in the Assessments...That was supposed to be the aim of the Reval.
Fair Market Value.
It did not work on my block at all.

Only some of the Overassessed Homeowners are grieving..
Those whose Assessments went Down inexplicably
are dancing in the street...

Last night was a good idea...but it answered

no questions and solved nothing regarding the
unfairness that is the perception among those who
feel that they have been Overassessed without
reason...
Wrapping our heads around the 150 Sales that were
discarded remains difficult...How were the discarded
sales chosen and where is the documentation
for those..?

There was not even One House in my neighborhood
that was Similar to mine in Age or Size during the period when
Ryan did the Reval...
that was listed among the 220 homes
used for the "model"...

<<I did search on my own..and found one House that was Very Similar..
2 blocks away....but Not listed among the 220 homes...that Sold for
Much Less than my Ryan Reval Assessment...It was on a Bigger piece of
Land and with
More Square Footage..and some upgrades...
I used that as the basis for my Grievance...>>

Thanks very much for doing your best to satisfy
our need to hear and speak to Ryan...
As you could see...the natives are still restless...

Susan Levine

Donna Conkling

From: Ran's Gmail <liuran26@gmail.com>
Sent: Monday, August 15, 2016 7:48 AM
To: mayor@scardale.com
Cc: Clerk's Department
Subject: Fwd: Request for speaking directly to Ryan

>>> Dear Mark,
>>>
>>> We need to speak to Ryan associates directly about questions we have on their evaluation. We came to this country because it is supposed to be best country in the world with democracy; We moved to Scarsdale because it is supposed to be a friendly community with dedicated village staff. Sadly, we are seeing both hopes are at danger. It is our right to be able to speak to Ryan as we are directly impacted by the outcome of their work and we paid Ryan through our tax money. You and your staff are also paid through our tax money and so please pave the way for us rather than set road blocks for us.
>>>
>>> The Wu family on 4 kathy lane
>>>
>>>
>>>
>>> Sent from my iPhone

Friends of the Scarsdale Parks, Inc.
P.O. BOX 53
SCARSDALE, NEW YORK 10583

August 14, 2016

Via Email
Terri Simon, President
Scarsdale Public Library Board of Directors
54 Olmsted Road
Scarsdale, New York 10583

Dear Terri,

The directors of the Friends of the Scarsdale Parks, Inc. wish to share with you some practical ideas that might provide additional economies in the Library's July 2016 Option A-1 "modifications to landscaping and hardscape plan."[1]

FOSP's suggestions are based on: a) the cost saving recommendations of a landscape design professional that were adopted by the Village and its project engineers in connection with the South Fox Meadow Brook Stormwater mitigation project at George Field Park and Cooper Green,[2] and (b) our experience working with the Village on collaborative landscape projects in Village parks.

Option A-1 modifications as currently proposed would "retain the watercourse buffer plantings [a segment of the South Fox Meadow Brook, a tributary of the Bronx River], rain gardens and basic ground cover, but reduce the scope of landscaping overall and change permeable concrete pavers on the entrance plaza to less-expensive concrete." This modification plan purportedly represents $155,000 in estimated savings, but does not explain what is meant by reductions in "scope of landscaping overall" nor break out the cost of pavers separate from the proposed changes in landscaping.

FOSP offers the following observations and our top 10 recommendations that might not only achieve additional cost savings but would represent more environmentally appropriate best practices, by:

1. Retaining during construction as many valuable foundation plantings as can be safely protected in place or transplanted and maintained in adjacent parkland, until such time as construction is completed and plants can be safely re-established in the library gardens. Our understanding is that the current foundation design was created by a well-known local landscape design professional. We recommend that the design should continue to be followed and recreated as much as possible utilizing existing plant material;

[1] FOSP, a 501(c)(3) organization operating in the Village since 1957, has been involved in helping to design, plant and maintain the adjacent Library Pond buffer, Japanese Friendship border and wildflower meadow gardens over the past 25 years, and organized dedication of the Dawn Redwoods at the Pond as Village Heritage Trees in 2014.

[2] B. Isis, Report, November 9, 2011 (copy attached) (consultant retained by FOSP and supported by the Village's Conservation Advisory Council).

2. Requiring that any new landscaping will comprise only native plants, which would require modification of the Dattner Architects/Divney Tung Schwalbe landscape consultants' Proposed Plant List.[3] Dattner/Divney (page 55) calls for a number of non-native plants that are also invasive or otherwise problematic, such as Boxwood, which is currently subject to widespread fungal diseases in the Northeast, and Japanese *Pachysandra terminalis*, which is not only invasive but non-native and can easily be replaced by native groundcovers such as *Pachysandra procumbens* (Allegheny spurge);

3. Using wherever possible landscape plugs from a reputable source, such as North Creek Nursery, instead of gallon or quart size plants, and using native deciduous bareroot shrubs from the Department of Environmental Conservation's Saratoga Nursery, which typically cost a mere dollar apiece. The use of these readily available plants to the trade and/or to the public would be consistent with the recommendations of the attached B. Isis Report ("enormous cost savings, and successful ease of establishment") and the success FOSP and the Village have had planting such materials in the parks;

4. Adding sufficient numbers of native, canopy trees of at least 4 inches DBH (balled and burlapped) to replace any trees removed from the Library grounds, consistent with FOSP's recent recommendations submitted to the Village Board for the purpose of amending the Village Tree Code;

5. Identifying the 6 trees designated for removal in the Dattner/Toscano Clements Taylor consultant's cost estimates, which appears for the first time in the 148 page report on page 108.[4] Assuming the 2 additional trees slated for "arborist evaluation" are (2 of the 4) Locust trees closest to the building on the entry plaza, the other 6 trees and their location should be identified. Consideration should be given to preserving not only these trees but also the valuable ornamental evergreens and deciduous trees on the south side of the building, many of which were donated by a resident who curated these unique specimens;

6. Rectifying the omission of equivalent replacement trees. Inexplicably, the Dattner/Toscano cost estimate (page 108) does not include the 3-3 ½" caliper Sweetgum listed on the Dattner/Divney Proposed Plant List (page 55), nor any other deciduous canopy tree to replace the 8 trees proposed for removal (at a labor cost for removal of almost $3,000);

7. Similarly, the Dattner/Toscano cost estimate (page 108) lists only one, not 2 understory Redbud trees as originally proposed (Dattner/Divney plant list, page 55), at an exorbitant cost of $850 for just one tree. Redbuds are relatively short-lived small trees that need sufficient sunlight. A better ecological choice of an understory tree to support birds and pollinators, and to provide attractive spring blooms is the Hawthorn;

8. Supplying adequate information on the budget allocated to "landscaping." It is challenging to determine from any of the cost estimate sheets (Dattner/Toscano, pages 101-141) how much of the $155,000 of estimated savings in Option A-1 are derived from costs allocated for pavers and how much for landscaping. This information should be provided to make the landscape plan more transparent;

9. Adjusting actual landscape cost projections. The $25,000 "Landscaping" cost estimate in the P. Zaicek "15 Year Estimated Capital Expenditures" summary appears to be superfluous. If so it should be eliminated to reduce the total project landscaping costs even further; and

[3] Dattner/Divney, pages 54-56 (copy attached).
[4] Dattner/Toscano page 108, copy attached.

10. Reimaging the scope of the project: a more compact footprint should be considered in order to limit the expansion of the building onto the wetland and parkland.

Option A-1 still appears to include hundreds of unnecessarily expensive, containerized riparian buffer shrubs and grasses (250 at an estimated cost of $3,000 for shrubs and $12,000 for grasses), groundcovers and perennials, which require irrigation (non-existent outside of the rain gardens), are inappropriate for the mostly shady conditions, and/or are redundant since the rain gardens already contain numerous flowering perennials and grasses. This cost is hard to justify when a smaller number of bareroot plants would suffice and have a better chance for survival, as demonstrated for example by a recent FOSP buffer planting at Hyatt Field Park.

Paring back the Option A-1 plan also makes sense from the perspective of upkeep. Maintaining the sheer number of proposed plants is unlikely to be performed with any consistency or reliability, a pragmatic assessment based on the neglected condition and failure to maintain the existing rain gardens.

FOSP would be happy to provide additional information in support of these recommendations.

Respectfully,

Madelaine Eppenstein

FOSP Board of Directors
Dotty Bruni
Betsy Bush
Kay Eisenman
Madelaine Eppenstein, Secretary
Bart Hamlin
Dan Hochvert, Treasurer
Susanne Jones, Co-President
Michelle Kaplan
Dorothy Kroenlein, Vice President
Diane Morrison, Co-President
Helen Oja
Rick Reuter
Cynthia Roberts
Loren Levine Schwartz
Tara Smith Tyberg
Todd Wolleman
Julia Zimbalist

Cc via email:
Elizabeth Bermel, Director
Scarsdale Village Board
Scarsdale Village Manager
Superintendents of Parks, Recreation and Conservation, and Public Works

BEVERLY ISIS LANDSCAPES AND GARDENS: A NATURAL SYSTEMS APPROACH
55 PAYSON AVE.NY, NY 10034 917.841.2794 BISISNY@EARTHLINK.NET

The following notes and recommendations are based on review of landscape plans included in the **Fox Meadow Brook Detention Improvements- Westchester County Flood Action Program** plans prepared by **Dvirka & Bartilucci Consulting Engineers** for the Village of Scarsdale, May 2011.

Location: All locations

- **RFP and Installation**

The Friends of Scarsdale Parks, and the Village of Scarsdale Conservation Advisory Council Joint Stormwater Committee (hereafter referred to as We), recommend a separate RFP for the landscape installations. This approach will be more likely to secure a landscape professional with experience in low impact development methodologies, bio-remediation techniques, and natural areas management.

- **Size of plant material**

In lieu of the recommended planting sizes for forbs and grasses of 2 gallon to 3 qt., we strongly urge the use of plug material, both for its enormous cost savings, and successful ease of establishment. A combination of wetland plugs and native seed mixes provides the opportunity to achieve the optimum establishment rate at an effective cost. Some sources in the North Eastern U.S. for such material include Pinelands Nursery and Supply, North Creek Nurseries, New Moon Nursery, and New England Wetland Plants.

- **Seeding**

Following initial seeding, we advise an application of Certified Weed Free grain straw at the rate of 2 tons per acre.

- **Establishment and Maintenance of Native Plants**

Ensuring that the bio-remediation landscape practices (such as constructed wetlands and rain gardens) are attractive, and are perceived by the commmunity as adding value to the neighborhood, is a key factor in the acceptance and success of these techniques in a residential setting.

We suggest an approach to the maintenance of these natural areas that would:

Create a maintenance bond, to be held by the Village of Scarsdale's Planning Division, for a 2-year period following initial approval of the installation of the project plantings. It would be equivalent to 25% of the vegetation and installation cost, and would be collected to ensure sufficient establishment of the native plants. The project sponsor would provide a written cost estimate or actual contract amount as a basis for the bond amount.

A pre-installation meeting between the landscaping contractor and the Planning and Public Works Dept. of the Village would be held prior to commencement of the landscape work.

During the first two growing seasons, all areas planted with native seed mixes should be mowed 3 times, at a height of 6-8", in order to control weeds. Beginning in the third year, a mowing regimen should be instituted, mowing once in spring.

Use of fertilizers along the side slopes or within the detention basin would be prohibited.

- **Permeable Paving**

  We urge the use of permeable paving- porous asphalt, porous concrete or porous pavers - for all paths and maintenance access roads.

Location: George Field Park Constructed Wetland and Detention Basin

- **Increase aesthetic qualities of the detention basin**

Since the "Highly-Visible" detention basin will continue to function as a natural landscape feature, we suggest the creation of a more irregular and naturalistic shape, accomplished through shaping the banks of the basin in a somewhat undulating outline, rather than a straight line running parallel to the street; this will greatly enhance the space visually. As well, slope transitions at the edge could be somewhat varied. Together, these measures would also create interesting opportunities to stage a circuit-type nature trail through the entire perimeter area.

- **Landscape treatment for detention basin banks/side slopes**

In lieu of the Seed Mix C: Fescue Turf Mix, plantings could include a variety of native wetland and wildflower species, such as those included in the current specified Seed Mix B: Rain Garden Mix, or Seed Mix E: Riparian Buffer. This would provide a number of benefits including habitat for waterfowl, songbirds and other wildlife, seasonal color, and visual interest. These plantings can withstand periods of inundation and drought, and would function to stabilize side slopes. Maintenance would be reduced in these areas to a 1 x per year event in early spring.

- **Upland Zone/ top of bank elevation**

    - As little or no regular inundation by storm water may occur in this area, we are concerned about the viability of the Iris versicolor plantings at the corner of Oxford and Greendale Rd.

    - Using a rule of thumb of one (1) deciduous shade or evergreen tree and ten (10) shrubs for every fifty (50) lineal feet of perimeter as measured, we suggest the inclusion of additional trees on the perimeter between Eton Rd. and the fore-bay, placement of which is not limited to the top of the bank. Suggested species include Red Maple, Sweetgum, American Sycamore, Pin Oak, and Amelanchier leavis.

Cooper Green Rain Garden and Detention Pond

Although the plant palette for the Cooper Green Rain Garden would undoubtedly create an attractive and colorful planting, we do have a few concerns.

Two plants which are not native, Rosa 'Knockout', and Cornus mas/Cornelian Cherry are on the proposed plant list; we would prefer to use only natives. Suggested substitutes for the rose are Rosa palustris or Rosa carolina; substitutes for the Cornus mas: Amorpha fruticosa/False Indigo, Hamamelis vernalis/Vernal Witch Hazel, Lindera benzoin/ Spicebush, or Nannyberry Viburnum/Viburnum lentago.

Many of the grasses and forbs listed lack a Federal wetland indicator status, while the majority of the others are FacU (Facultative Upland) or UPL (Upland) status, usually occurring in dry upland short-grass prairie settings.

The concern here would be their ability to sustain or thrive in the spectrum of moisture of the rain garden, tolerating the periodic inundation and/or regular moist conditions in this bottom of a hill location, particularly in winter. These plants do not like wet roots and rarely occur in this setting. Some suggested alternates and/or substitutions are listed in the right hand column.

Those without a Federal wetland indicator status include:

Current List	Possible Substitutions
Agastache 'Purple Haze'	Lobelia siphilitica, Vernonia glauca
Asclepias tuberosa	Asclepias incarnata
Dennstaedtia puctiloba	Athyrium filix-femina
Echinacea purpurea	Helenium flexuosum, H. autumnale
Eragrostis spectabilis	Acorus americana, Carex radiata
Geum triflorum	Coreopsis rosea 'American Dream'
Liatris scariosa	Liatris pycnostachya, L. spicata
Magnolia acuminata	Mag. tripetala,.virginiana
Sporobolus heterolepsis	Juncus effusus
Quercus coccinea	Quercus rubra, lyrata, muehlenbergii
Verbena simplex	Verbena hastata

Those with Federal FACU (Facultative Upland) or UPL (Upland) status which are intolerant of flooding and/or most often do not like wet roots:

Current List	Possible Substitutions
Achillea millefolium	Phlox paniculata 'Jeana'
Juniperus virginiana	Alt.: Ilex opaca/American Holly
Lonicera sempervirens	Wisteria macrostachya 'Blue Moon'
Muhlenbergia capillaris	Carex lurida, Carex vulpinoidea
Schizachryium scoparium	Andropogon virginicus
Vaccinium angustifolium	Leucothoe axillaris 'Nana'

- **Tree planting**

We propose the development of a forested wetland in the detention basin, to be installed in stages over a 5 yr. period through annual student community service and adult volunteer projects.

- **Wetland Bench**

We suggest the inclusion of a safety wetland bench in the detention basin, given an established pedestrian short-cut through the area, close proximity to a busy public road, and a nearby bus stop.

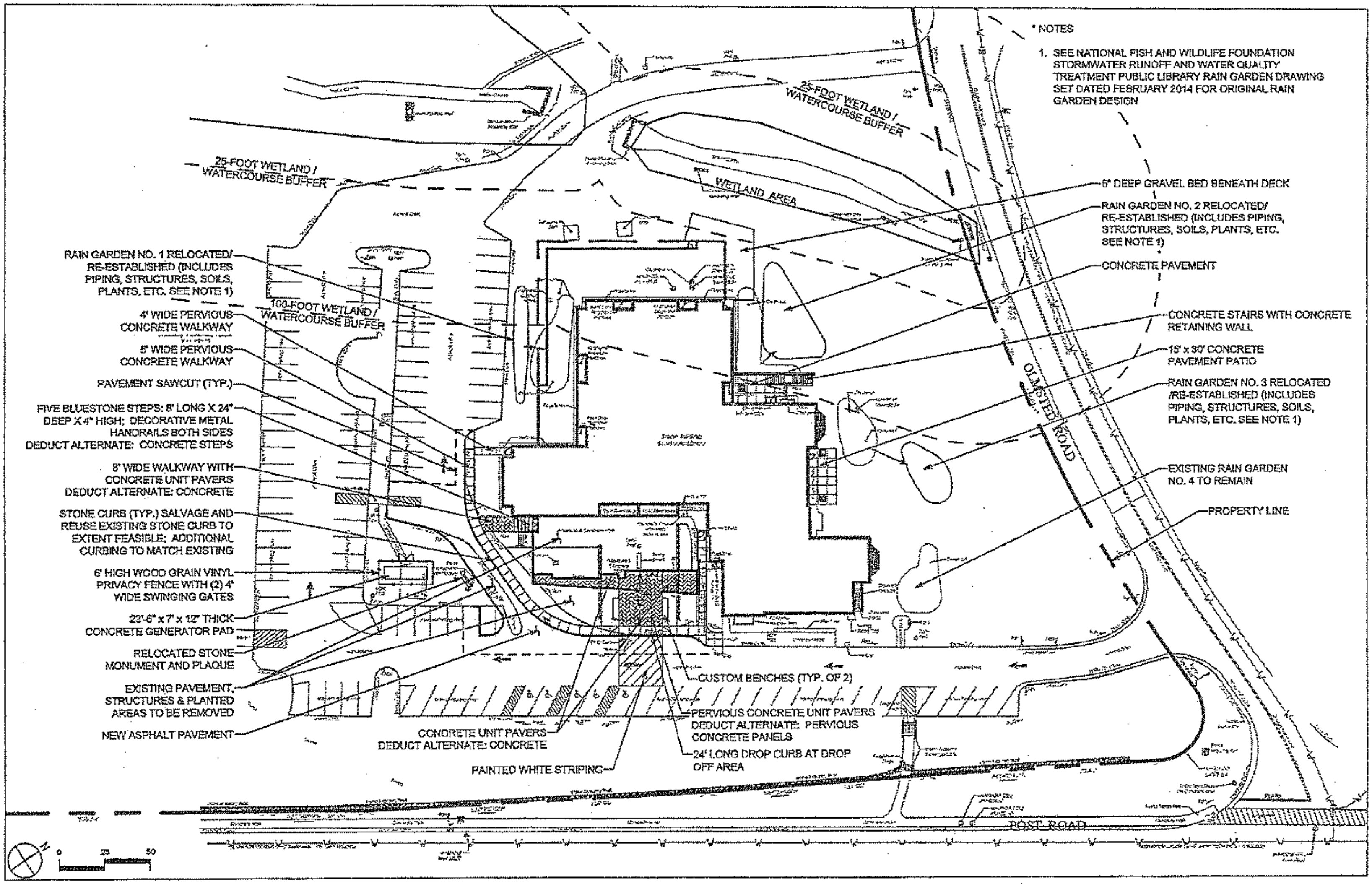
- **Combining the maintenance access road with the pedestrian path**

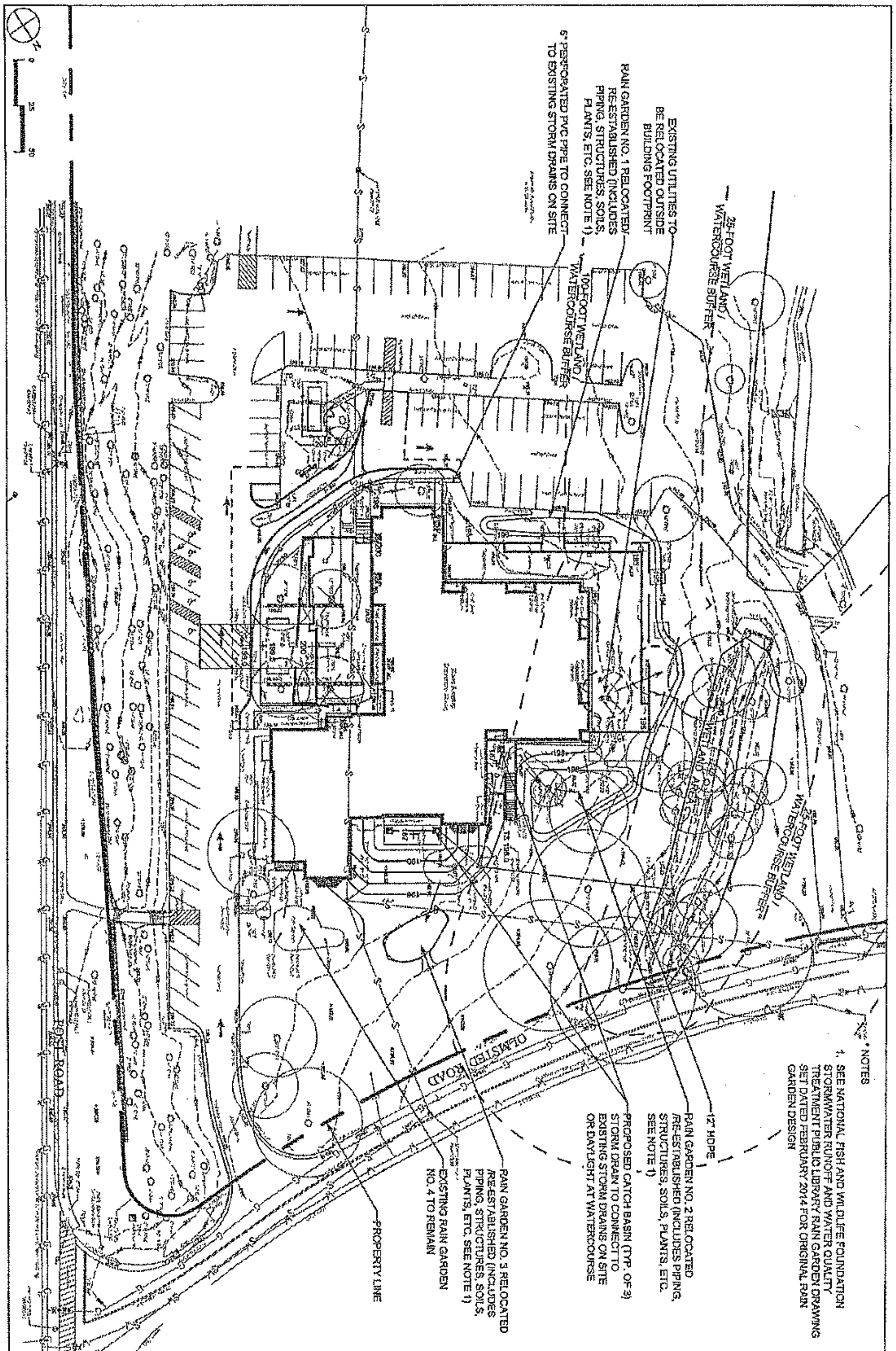
To reduce the amount of paved surface and disturbance through the area, we suggest re-routing the pedestrian path with the goal of incorporating it into the maintenance access for approximately 2/3 of the total distance. Additionally, this would locate pedestrians further from the Post Rd., increasing their safety, and minimizing exposure to salt and road splash.

Respectfully submitted by Beverly Isis, 4 November 2011.

Proposed Plant List

SCHEMATIC DESIGN PLANT LIST			
BOTANICAL NAME	COMMON NAME	SIZE	QUANTITY
SHADE TREES		3-3 1/2" cal.	1
Liquidamber styraciflua 'Rotundiloba'	Rotundiloba Sweetgum		
ORNAMENTAL TREES		8'-10' hgt.	2
Cercis canadensis 'Ace of Hearts'	Ace of Hearts Eastern Redbud		
EVERGREEN TREES		5'-6' hgt.	3
		10'-12' hgt.	1
Ilex spp.	Columnar Holly species		
Juniperus spp.	Columnar Juniper species		
Picea spp.	Spruce species		
DECIDUOUS & EVERGREEN SHRUBS AND GROUNDCOVERS		4'-5' hgt.	10
		36"-48"	10
		30"-36"	50
		24"-30"	50
Buxus spp.	Boxwood species		
Clethra alnifolia spp.	Summersweet species		
Cornus spp.	Dogwood species		
Hydrangea spp.	Hydrangea species		
Ilex glabra spp.	Inkberry species		
Ilex verticillata 'Red Sprite'	Red Sprite Winterberry		
Juniperus spp.	Juniper species		
Potentilla fruticosa spp.	Bush Cinquefoil species		
Viburnum dentatum spp.	Arrowwood Viburnum species		
PERENNIALS AND ORNAMENTAL GRASSES		1 gal. cont.	250
Achillea spp.	Yarrow species		
Coreopsis spp.	Tickseed species		
Echinacea spp.	Coneflower species		
Hosta spp.	Hosta species		
Pachysandra	Japanese spurge		
Panicum virgatum spp.	Switchgrass species		
Pennisetum alopecuroides spp.	Fountain Grass species		
Salvia spp.	Sage species		
WATERCOURSE BUFFER PLANTING - SHRUBS		24"-30"	50
Clethra alnifolia spp.	Summersweet species		
Myrica pensylvanica	Bayberry		
Viburnum dentatum spp.	Arrowwood Viburnum species		
WATERCOURSE BUFFER PLANTING - GRASSES		1 gal. cont.	200
Andropogon scoparium	Little Bluestem		
Carex appalachia	Appalachian Sedge		
Carex pennsylvanica	Pennsylvania Sedge Grass		
Panicum virgatum spp.	Switchgrass species		
SEED MIXES			(SF)
Lawn Grass: Sun/Shade seed mix with 50% Sonata Perennial Rye, 30% Creeping Red Fescue, 10% Chewings Fescue, 10% Kentucky Bluegrass			
RAIN GARDENS			
See Sheet C4 Landscape Plan of Public Library Rain Garden drawing set. Reconstructed rain gardens include gardens 1, 2 and 3.			
NOTES			
1. All new and disturbed lawn areas to receive Lawn Grass seed mix.			
2. Quantities listed in plant list are for reference only. Contractor shall verify all quantities shown on list and shall be responsible for furnishing all plants indicated on plan.			
3. All plant beds shall receive 3" double shredded hardwood mulch unless otherwise noted on plans, specifications or details.			
4. No recycled soil to be utilized in landscaped beds or other planting areas.			


* NOTES
1. SEE NATIONAL FISH AND WILDLIFE FOUNDATION STORMWATER RUNOFF AND WATER QUALITY TREATMENT PUBLIC LIBRARY RAIN GARDEN DRAWING SET DATED FEBRUARY 2014 FOR ORIGINAL RAIN GARDEN DESIGN
25-FOOT WETLAND / WATERCOURSE BUFFER
25-FOOT WETLAND / WATERCOURSE BUFFER
WETLAND AREA
100-FOOT WETLAND / WATERCOURSE BUFFER
OLMSTED ROAD
POST ROAD
RAIN GARDEN NO. 1 RELOCATED/ RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
4' WIDE PERVIOUS CONCRETE WALKWAY
5' WIDE PERVIOUS CONCRETE WALKWAY
PAVEMENT SAWCUT (TYP.)
FIVE BLUESTONE STEPS: 8' LONG X 24" DEEP X 4" HIGH; DECORATIVE METAL HANDRAILS BOTH SIDES
DEDUCT ALTERNATE: CONCRETE STEPS
8' WIDE WALKWAY WITH CONCRETE UNIT PAVERS
DEDUCT ALTERNATE: CONCRETE
STONE CURB (TYP.) SALVAGE AND REUSE EXISTING STONE CURB TO EXTENT FEASIBLE; ADDITIONAL CURBING TO MATCH EXISTING
6' HIGH WOOD GRAIN VINYL PRIVACY FENCE WITH (2) 4' WIDE SWINGING GATES
23'-6" x 7' x 12" THICK CONCRETE GENERATOR PAD
RELOCATED STONE MONUMENT AND PLAQUE
EXISTING PAVEMENT, STRUCTURES & PLANTED AREAS TO BE REMOVED
NEW ASPHALT PAVEMENT
CONCRETE UNIT PAVERS
DEDUCT ALTERNATE: CONCRETE
PAINTED WHITE STRIPING
CUSTOM BENCHES (TYP. OF 2)
PERVIOUS CONCRETE UNIT PAVERS
DEDUCT ALTERNATE: PERVIOUS CONCRETE PANELS
24' LONG DROP CURB AT DROP OFF AREA
6" DEEP GRAVEL BED BENEATH DECK
RAIN GARDEN NO. 2 RELOCATED/ RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
CONCRETE PAVEMENT
CONCRETE STAIRS WITH CONCRETE RETAINING WALL
15' x 30' CONCRETE PAVEMENT PATIO
RAIN GARDEN NO. 3 RELOCATED /RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
EXISTING RAIN GARDEN NO. 4 TO REMAIN
PROPERTY LINE
0
25
50


* NOTES
1. SEE NATIONAL FISH AND WILDLIFE FOUNDATION STORMWATER RUNOFF AND WATER QUALITY TREATMENT PUBLIC LIBRARY RAIN GARDEN DRAWING SET DATED FEBRUARY 2014 FOR ORIGINAL RAIN GARDEN DESIGN
12" HDPE
RAIN GARDEN NO. 2 RELOCATED /RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
PROPOSED CATCH BASIN (TYP. OF 3) STORM DRAIN TO CONNECT TO EXISTING STORM DRAINS ON SITE OR DAYLIGHT AT WATERCOURSE
RAIN GARDEN NO. 3 RELOCATED /RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
EXISTING RAIN GARDEN NO. 4 TO REMAIN
PROPERTY LINE
OLMSTED ROAD
POST ROAD
25-FOOT WETLAND / WATERCOURSE BUFFER
WETLAND AREA
EXISTING UTILITIES TO BE RELOCATED OUTSIDE BUILDING FOOTPRINT
RAIN GARDEN NO. 1 RELOCATED/ RE-ESTABLISHED (INCLUDES PIPING, STRUCTURES, SOILS, PLANTS, ETC. SEE NOTE 1)
100-FOOT WETLAND / WATERCOURSE BUFFER
6" PERFORATED PVC PIPE TO CONNECT TO EXISTING STORM DRAINS ON SITE
0
25
50

SCHEMATIC DESIGN COST ESTIMATE
SCARSDALE PUBLIC LIBRARY RENOVATION & EXPANSION
54 Olmstead Rd, Scarsdale, NY

DETAILED ESTIMATE - Option A

DESCRIPTION	QUANTITY	UNIT	MATERIAL UNIT RATE	MATERIAL AMOUNT	LABOR UNIT RATE	LABOR AMOUNT	UNIT PRICE (5-Aug-15)	TOTAL AMOUNT (5-Aug-15)
Hardscape				$0		$0	$0.00	$0
Asphalt Pavement	4,133	SF	$3.00	$12,399	$0.93	$3,844	$3.93	$16,243
Concrete pavement	906	SF	$1.35	$1,676	$4.00	$3,624	$5.35	$5,300
Concrete Pavers	2,324	SF	$5.00	$11,620	$22.00	$51,128	$27.00	$62,748
5' Previous Concrete walkway, steps and reuse stone curb	1,165	SF	$5.00	$5,825	$4.00	$4,660	$9.00	$10,485
4' wide Previous Concrete Walkway	324	SF	$1.00	$616	$4.00	$1,296	$5.00	$1,912
12" Equipment pad	161	SF	$3.50	$564	$7.00	$1,127	$10.50	$1,691
5 bluestone steps 8'x 15" deep and 4" high steps	1	EA	$600.00	$600	$800.00	$800	$1,400.00	$1,400
6" deep gravel bed	900	SF	$2.00	$1,800	$3.50	$3,150	$5.50	$4,950
Allowance for additional Landscaping to option B	0	LS		$0		$0	$0.00	$0
Site Furnishing				$0		$0	$0.00	$0
Relocate stone monument and plaque	1	EA	$800.00	$800	$2,200.00	$2,200	$3,000.00	$3,000
Large Site Sign with footing	1	EA	$3,000.00	$3,000	$2,200.00	$2,200	$5,200.00	$5,200
6' Vinyl fence	75	LF	$18.00	$1,350	$12.00	$900	$30.00	$2,250
6' Vinyl fence double gates	1	EA	$500.00	$500	$400.00	$400	$900.00	$900
Custom Benches Entry area benches: Two custom benches – 10' L	2	EA	$3,500.00	$7,000	$1,500.00	$3,000	$5,000.00	$10,000
				$0		$0	$0.00	$0
				$0		$0	$0.00	$0
				$0		$0	$0.00	$0
Remove trees	8	EA		$0	$250.00	$1,600	$250.00	$1,600
allowance to evaluate the two existing trees	2	EA		$0	$600.00	$1,200	$600.00	$1,200
Stone curb alongside driveway – salvage and reuse existing stone curb; if additional curb is required, it shall match existing				$0		$0	$0.00	$0
Gravel base beneath proposed northeast deck: 6" deep gravel bed beneath deck				$0		$0	$0.00	$0
				$0		$0	$0.00	$0
Landscaping				$0		$0	$0.00	$0
Ornamental Trees				$0		$0	$0.00	$0
Cercis canadensis 'Ace of Hearts' (Ace of Hearts Eastern Redbud)	1	EA	$500.00	$500	$350.00	$350	$850.00	$850
Evergreen Trees	3	EA	$450.00	$1,350	$350.00	$1,050	$800.00	$2,400
Ilex spp. Columnar Holly species				$0		$0	$0.00	$0
Juniperus spp. Columnar Juniper species				$0		$0	$0.00	$0
Deciduous & evergreen shrubs and groundcovers	50	EA	$400.00	$20,000	$350.00	$17,500	$750.00	$37,500
Perennials and ornamental grasses	250	EA	$45.00	$11,250	$35.00	$8,750	$80.00	$20,000
Watercourse buffer planting ? shrubs	50	EA	$35.00	$1,750	$25.00	$1,250	$60.00	$3,000
Watercourse buffer planting ? grasses	200	EA	$35.00	$7,000	$25.00	$5,000	$60.00	$12,000
Seed Mixs	1	LS	$5,000.00	$5,000	$5,000.00	$5,000	$10,000.00	$10,000
Rain Gardens	1	LS	$10,000.00	$10,000	$15,000.00	$15,000	$25,000.00	$25,000
				$0		$0	$0.00	$0
				$0		$0	$0.00	$0
Total				$159,232		$658,933	$0.00	$817,325

DETAILED ESTIMATE - Option B

QUANTITY	UNIT	MATERIAL UNIT RATE	MATERIAL AMOUNT	LABOR UNIT RATE	LABOR AMOUNT	UNIT PRICE (5-Aug-15)	TOTAL AMOUNT (5-Aug-15)	Delta Amount
		$0.00	$0	$0.00	$0	$0.00	$0	$0
4,133	SF	$3.00	$12,399	$0.93	$3,844	$3.93	$16,243	$0
906	SF	$1.35	$1,676	$4.00	$3,624	$5.35	$5,300	$0
2,324	SF	$5.00	$11,620	$22.00	$51,128	$27.00	$62,748	$0
1,165	SF	$5.00	$5,825	$4.00	$4,660	$9.00	$10,485	$0
324	SF	$1.00	$616	$4.00	$1,296	$5.90	$1,912	$0
161	SF	$3.50	$564	$7.00	$1,127	$10.50	$1,691	$0
1	EA	$600.00	$600	$800.00	$800	$1,400.00	$1,400	$0
900	SF	$2.00	$1,800	$3.50	$3,150	$5.50	$4,950	$0
1	LS	$5,000.00	$5,000	$6,000.00	$6,000	$11,000.00	$11,000	$11,000
		$0.00	$0	$0.00	$0	$0.00	$0	$0
1	EA	$800.00	$800	$2,200.00	$2,200	$3,000.00	$3,000	$0
1	EA	$3,000.00	$3,000	$2,200.00	$2,200	$5,200.00	$5,200	$0
75	LF	$18.00	$1,350	$12.00	$900	$30.00	$2,250	$0
1	EA	$500.00	$500	$400.00	$400	$900.00	$900	$0
2	EA	$3,500.00	$7,000	$1,500.00	$3,000	$5,000.00	$10,000	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
6	EA	$0.00	$0	$250.00	$1,500	$250.00	$1,500	$0
2	EA	$0.00	$0	$600.00	$1,200	$600.00	$1,200	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
1	EA	$500.00	$500	$350.00	$350	$850.00	$850	$0
3	EA	$450.00	$1,350	$350.00	$1,050	$800.00	$2,400	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
50	EA	$400.00	$20,000	$350.00	$17,500	$750.00	$37,500	$0
250	EA	$45.00	$11,250	$35.00	$8,750	$80.00	$20,000	$0
50	EA	$35.00	$1,750	$25.00	$1,250	$60.00	$3,000	$0
200	EA	$35.00	$7,000	$25.00	$5,000	$60.00	$12,000	$0
1	LS	$5,000.00	$5,000	$5,000	$5,000	$10,000.00	$10,000	$0
1	LS	$10,000.00	$10,000	$15,000.00	$15,000	$25,000.00	$25,000	$0
		$0.00	$0	$0.00	$0	$0.00	$0	$0
		$0.00	$0	$0.00	$0	$0.00	$0	($0)
		$0	$162,073	$0.00	$588,868	$0.00	$750,946	($66,379)

From: Lika L. Levi <likallevi@aol.com>
Sent: Tuesday, September 6, 2016 6:45 PM
To: Mayor
Subject: More demolitions less and less green space...

Dear Mayor Mark and Village Trustees,

You know my position on this, I have been on the sidelines for a while hoping you would address this issue. To date I have not seen a thing.

This article on the scarsdale10583.com site is further proof that this http://scarsdale10583.com/about-joomla/letters-to-the-editor/5659-teardowns-abound-in-fox-meadow matter needs to be addressed. Will you, please ?

Thank you very much,
Lika L. Levi
21 Lockwood Road

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Thank you very much,
Lika L. Levi
21 Lockwood Road

Donna Conkling

From: Tama Seife <tkseife@aol.com>
Sent: Wednesday, September 07, 2016 10:02 AM
To: Clerk's Department
Subject: Letter to Mayor Mark and Board of Trustees

TO: Mayor Mark, Board of Trustees

FROM: Tama Seife, 21 Circle Road

DATE: Sept. 7, 2016

Approximately three years ago the 1925 Colonial situated on 2/3 of an acre of wooded property next door to me was torn down. I attended all meetings including the Historical Preservation committee, Planning Board meetings and the Board of Architectural Review regarding the property and the subsequent approvals.

Attending all these meetings was an education in how much paper work, review, and time it takes to get approval for a new project. It was also a lesson in how little coordination there is and how little thought to the consequences of these individual approvals are to the ambience and value of the neighborhood. Clearly the Planning Board was interested in what was possible to do with the property. They addressed whether they could raise the level of the property (yes they could), whether they could cover a culvert (no problem), could they erect a wall made out of concrete building material in the middle of the property (sure!), raise the storm water sewer pipe (not difficult). Did all the trees need to be removed? Yes, they were "sick" anyhow and interfered with the plans. No one thought to imagine what the aesthetics might be as the plans progressed.

After all that, there has been no construction activity on the property. It sits covered in weeds, piled with rocks and concrete blocks as an eyesore smack in the middle of Circle road. It served for 6 months as an overnight parking lot for construction trucks working on other projects, as a receptacle for rocks trucked in from elsewhere, and as a dump for some tree trunks imported from remote properties made treeless.

The Village building department has been helpful in getting rid of the trucks and in getting the property mowed. They too want the property maintained. They are, however, limited in what they can do. It is time for the Village to amend the code to prevent long term blight by making it increasingly costly for speculators who buy property and then let it sit untended and unimproved.

Tama Seife

21 Circle Road

TIMOTHY B. KING
17 PADDINGTON ROAD
SCARSDALE, NY 10583

(914) 723-8424

Benedict A. Salanitro, P. E.
Superintendent of Public Works
Public Works Department
Village of Scarsdale
1001 Post Road
Scarsdale, NY 10583

August 21, 2016

Re: Curbing Installation, 17 Paddington Road

Dear Mr. Salanitro,
Further to your letter of January 13 and mine of January 19, very belatedly we would like to thank you for the installation of the curbing at the end of June. We greatly appreciated the punctuality of the installation, and are very glad to have it. No longer are cars for nearby events parked on, and gouging, the verge in front of our house!

Many thanks,

Sincerely,

Timothy and Heidemarie King