

# **TPP MODELING**

**Presented at the  
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# WHAT IS A MODEL?

- <http://www.visualthesaurus.com>



# WHAT IS A MODEL?

- A hypothetical description of a complex entity or process (example: the computer program was based on a model of the circulatory and respiratory systems)
- A representation of something (sometimes on a smaller scale)

# WHAT IS MODELING?

- The act of representing something (usually on a smaller scale)
- **An activity that stands as an equivalent of something or results in an equivalent**
- The act of imitating the behavior of some situation or some process by means of something suitably analogous (especially for the purpose of study or personnel training)

# RCNLD IS A MODEL

## Model

- Historical cost
- Times index or trend factor
- Times typical depreciation factor (normally age-based)
- Adjusted for special depreciation (obsolescence)
- Equals value (before level of assessment, exemptions, and other modifiers)

## Assumptions

- Historical cost represented market cost when acquired
- Product of historical cost times index/trend factor reliably represents RCN
- Application of depreciation tables and obsolescence adjustments to RCN produces values that comply with property tax statutes



## WHAT IF ...

- ... the historic cost was not the prevailing cost at the time of acquisition?
  - Special price due to buyer power
  - Promotional price influenced by temporary conditions
- ... the taxpayer did not report the historic cost in conformity with statutes and rules?
  - Item price - actual or adjusted?
  - Sales tax - include or exclude?
  - Freight/shipping - include or exclude?
  - Software - include or exclude?
- ... reproduction price and replacement price are materially different?



## WHAT IF ...

- ... the personal property is self-manufactured or refurbished?
  - Does materials plus labor represent historic cost in an equitable way?
  - Does zero basis (fully depreciated for IRS purposes) plus refurbishment cost represent historic cost in an equitable way?
- ... the personal property owner's records are incomplete or unreliable?
  - Do some owners keep bad records?
  - Do subsequent owners rebook the equipment?
- ... the personal property owner does not file?



# MODELING ELIMINATES DEPENDENCE ON REPORTED HISTORIC COST

- Improves accuracy
  - Based on current data
  - Circumvents the reproduction versus replacement problem
  - Not subject to filing irregularities
- Improves equity
  - Buyer power not considered
  - Assessments based on objective units of comparison
  - Not subject to filing irregularities
- Improves defensibility
  - No more "what if ..."
  - Appraiser can support costs with work file



# MODEL SPECIFICATION: WHAT MATTERS?

- USPAP Standards Rule 6-4(b)
  - May be specified using the cost, sales comparison, or income approaches to value
  - May be tabular, mathematical, linear, nonlinear, or any other structure suitable for representing the observable property characteristics
  - Appropriate approaches must be used in appraising a class of properties
- Bottom line: what units of comparison serve to explain value differences among individual properties (real or personal property parcels) in the mass appraisal?



# POTENTIAL UNITS OF COMPARISON: MEASUREMENTS

- Retail stores
  - Class (quality)
  - Type (convenience, grocery, big box, mom 'n pop)
  - Square feet
- Fast food restaurants
  - Class (quality)
  - Lineal feet of food preparation surfaces
- Communications towers
  - Class (quality)
  - Type (self-supporting, guyed, monopole)
  - Height



# POTENTIAL UNITS OF COMPARISON: TRADE UNITS

- Barber/beauty shops
  - Class (quality)
  - Number of chairs
- Hotels/motels
  - Class (quality, suggest star level)
  - Rooms of various types
    - 1 bedroom suite
    - Double full
    - Double queen studio
    - Single king
    - Single queen



# POTENTIAL UNITS OF COMPARISON: HYBRIDS

## ○ Billboards

- Construction

- Wood
- Steel (standard or monopole)

- Style

- Back to back, V, stacked, combinations of these
- Static, tri-visual, LED, combinations of these

- Measurement

- Square feet of each face
- Height above ground level

- Units

- Number of lights
- Number of faces



# MODEL CALIBRATION: HOW MUCH?

- USPAP Standards Rule 6-4(c)
  - Calibration is the process of analyzing sets of property and market data to determine the specific parameters of a model.
  - Examples
    - Table entries in a cost manual
    - Coefficients in a linear or nonlinear model
- Bottom line: how much do variations in the units of comparison affect the value of an individual parcel (real or personal property)?



# POTENTIAL CALIBRATION SOURCES

- Personal property/real property database
  - Original cost (or RCN) per square foot by NAICS
  - Original cost (or RCN) per relevant unit of comparison according to business type (ex., barber/beauty chairs)
- Published cost manuals
- Primary research - survey (good for RP models)
- Secondary research - desk search, internet (good for personal property models)

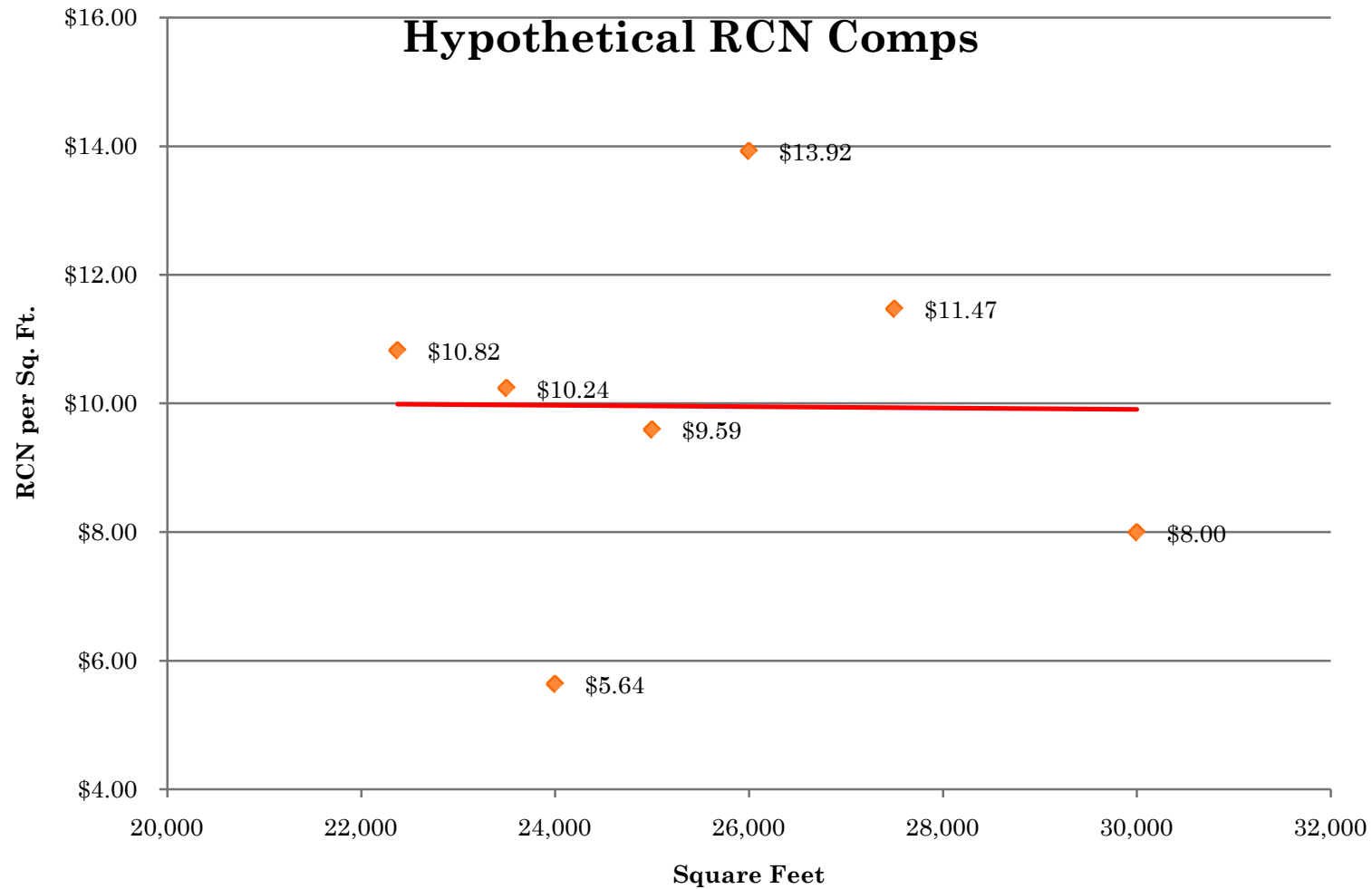


# CALIBRATION: MINING YOUR DATABASE – DATA

Cost Comp #	RCN	Sq. Ft.	RCN/Sq. Ft.
1	\$ 242,200	22,375	\$ 10.82
2	\$ 240,600	23,500	\$ 10.24
3	\$ 135,300	24,000	\$ 5.64
4	\$ 239,800	25,000	\$ 9.59
5	\$ 362,000	26,000	\$ 13.92
6	\$ 315,400	27,500	\$ 11.47
7	\$ 239,850	30,000	\$ 8.00



# CALIBRATION: MINING YOUR DATABASE – SCATTER PLOT



# CALIBRATION: MINING YOUR DATABASE – ASSET MIX

	A	B	C	D	E	F	G	H	I	J	K
1	<b>Equipment Mix Comparison Report</b>										
2											
3	Account		NAICS	72211	Full Service Restaurants			Red Flag Threshold	3.0%	Date	10/22/2009
4											
5	Code	Description	Account	NAICS	Difference		Code	Description	Account	NAICS	Difference
6	10	General Retail		0.52%			53	FCOJ Processing			
7	11	Retail 1		0.02%			54	Manufacturing			
8	12	Retail 2		0.05%			60	Utilities General			
9	13	Retail 3		0.05%			62	Electric Generation			
10	14	Restaurant and Lounge	93.30%	74.15%	19.15%		63	Gas Transmission			
11	20	Office General		0.13%			64	Water Works			
12	21	Computer Related	1.99%	1.33%			65	Cable TV			
13	22	Non-comp Ofc Mach	0.75%	0.22%			66	Propane Gas			
14	23	Furniture	1.81%	1.67%			67	Telecommunications			
15	24	Décor		1.47%			68	Telecommunications			
16	25	Audio/Visual Equipment	1.66%	1.30%			69	Telecommunications			
17	30	Services General					70	Industrial General			
18	31	Trades					71	Phosphate Rock Ops			
19	32	Laundry		0.04%			72	Chemical Operations			
20	33	Entertainment		0.03%			73	Cement Plant			
21	34	Banking					74	Asphalt Plant			
22	35	Personal Service					75	Refineries			
23	36	Rental Service					80	Vehicles General			
24	37	Vehicle Related					81	Heavy Equipment		0.02%	
25	38	Hotel/Motel					82	Heavy Equipment			
26	39	Funeral					83	Installed Equipment			
27	40	Medical General					84	Ag Related			
28	41	Radiology					85	Class 94			
29	42	Laboratory					90	General		2.87%	
30	43	Furniture					91	Installed		9.41%	-9.41%
31	44	Surgery					92	Clothing			
32	45	Diagnostic					93	Signs	0.33%	5.53%	-5.19%
33	46	Rehabilitation/treatment					94	Tools		0.12%	
34	50	Manufacturing General		0.04%			95	Fixed Depreciation		0.57%	
35	51	Food Production					96	Quasi Consumables	0.16%	0.46%	
36	52	Citrus Processing					97	Life Specific			



# CALIBRATION: MINING YOUR DATABASE – ASSET MIX

Equipment Mix Comparison Report										
Account	NAICS	44111	New Car Dealers	Red Flag Threshold	3.0%	Date	10/22/2009			
Code	Description	Account	NAICS	Difference	Code	Description	Account	NAICS	Difference	
10	General Retail		0.13%		53	FCOJ Processing				
11	Retail 1		0.57%		54	Manufacturing				
12	Retail 2		0.54%		60	Utilities General				
13	Retail 3		0.15%		62	Electric Generation				
14	Restaurant and Lounge		0.22%		63	Gas Transmission				
20	Office General		0.32%		64	Water Works				
21	Computer Related		4.29%	-4.29%	65	Cable TV				
22	Non-comp Ofc Mach	0.32%	4.94%	-4.62%	66	Propane Gas		0.01%		
23	Furniture	0.83%	14.84%	-14.01%	67	Telecommunications				
24	Décor		0.40%		68	Telecommunications		0.14%		
25	Audio/Visual Equipment		0.34%		69	Telecommunications				
30	Services General		2.47%		70	Industrial General				
31	Trades		0.14%		71	Phosphate Rock Ops				
32	Laundry				72	Chemical Operations				
33	Entertainment				73	Cement Plant				
34	Banking		0.07%		74	Asphalt Plant				
35	Personal Service		0.01%		75	Refineries				
36	Rental Service				80	Vehicles General		0.41%		
37	Vehicle Related	96.28%	52.96%	43.32%	81	Heavy Equipment		1.15%		
38	Hotel/Motel				82	Heavy Equipment		0.03%		
39	Funeral				83	Installed Equipment		0.03%		
40	Medical General				84	Ag Related				
41	Radiology				85	Class 94				
42	Laboratory				90	General	1.72%	0.89%		
43	Furniture				91	Installed		5.72%	-5.72%	
44	Surgery		0.02%		92	Clothing				
45	Diagnostic				93	Signs		3.58%	-3.58%	
46	Rehabilitation/treatment				94	Tools		4.69%	-4.69%	
50	Manufacturing General		0.25%		95	Fixed Depreciation				
51	Food Production				96	Quasi Consumables	0.86%	0.59%		
52	Citrus Processing				97	Life Specific		0.10%		



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## Billboard Valuation Details

[Your County Name] Property Appraiser

2005 Tax Roll

Account #		Name	
Tax District		Tax #	
Year Constructed		Real Estate Parcel ID #	
<b>TYPE</b> 1 = wooden pole 2 = metal pole 3 = monopole	3	monopole	Comments:  Data used in these calculations may have been gathered through field inspections or taken from the Department of Transportation database. Calibration of the value model was confirmed in consultation with a local contractor in 2005.
Sign size (sq. ft.)	720	square feet	
Height Above Ground Level	16	feet	
<b>Platform Type</b> 0 = none 1 = wooden 2 = metal	3	metal	
Platform Size (feet)	66	feet	
<b>Apron Type</b> 0 = none 1 = wooden 2 = metal	2	metal	
Apron Size (feet)	66	feet	
<b>Illustration</b> (# of fixtures)	6	fixtures	
<b>Style</b> 0 = single face only 1 = back to back 2 = side by side 3 = "V" 4 = stacked 5 = stacked back to back 6 = triangular 7 = combo static / triangular	3	"V"	
Calculated 2005 Cost		\$	48,014



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# SAMPLE MODEL: HOTEL/MOTEL CLASSES AND ROOM TYPES

Class	Description	Factor (hypothetical)
A	1 star	
B	2 star	
C	3 star	
D	4 star	
E	5 star	

Room Type	Description	Unit Cost (hypothetical)
B1	1 BR Suite	
DF	Double Full	
DQS	Dbl Queen Studio	
SK	Single King	
SQ	Single Queen	



# SAMPLE MODEL: HOTEL/MOTEL

## MODEL COMPONENT COSTS

Item Type	Item Description	Item Cost (example)
AR	Armoire	\$ 300
BF	Full Bed	\$ 600
BK	King Bed	\$ 1,200
BQ	Queen Bed	\$ 900
DC	Desk and Chair	\$ 200
DR	Dresser	\$ 200
GO	General Operations	\$ 1,000
NS	Night stand	\$ 100
OT	Other items	\$ 200
SC	Stuffed Chair	\$ 200
SF	Sofa	\$ 400
TV	Television	\$ 300



# SAMPLE MODEL: HOTEL/MOTEL

## MODEL COMPONENT COMBINATIONS

Room Type	Item Type	Units	Cost	Room Type	Item Type	Units	Cost
B1	BK	1	\$ 1,200	DQS	BQ	2	\$ 1,800
B1	AR	1	\$ 300	DQS	DR	1	\$ 200
B1	DR	1	\$ 200	DQS	NS	2	\$ 200
B1	NS	2	\$ 200	DQS	TV	1	\$ 300
B1	TV	2	\$ 600	DQS	DC	1	\$ 200
B1	SC	1	\$ 200	DQS	OT	3	\$ 600
B1	SF	1	\$ 400	DQS	GO	1	\$ 1,000
B1	DC	1	\$ 200	SK	BK	1	\$ 1,200
B1	OT	2	\$ 400	SK	AR	1	\$ 300
B1	GO	1	\$ 1,000	SK	NS	1	\$ 100
DF	BF	2	\$ 1,200	SK	TV	1	\$ 300
DF	DR	1	\$ 200	SK	DC	1	\$ 200
DF	NS	2	\$ 200	SK	OT	1	\$ 200
DF	TV	1	\$ 300	SK	GO	1	\$ 1,000
DF	OT	1	\$ 200	SQ	BQ	1	\$ 900
DF	GO	1	\$ 1,000	SQ	AR	1	\$ 300
				SQ	NS	1	\$ 100
				SQ	TV	1	\$ 300
				SQ	DC	1	\$ 200
				SQ	OT	1	\$ 200
				SQ	GO	1	\$ 1,000



# SAMPLE MODEL: HOTEL/MOTEL CLASSES AND ROOM TYPES (CLASS C)

Class	Description	Factor (hypothetical)
A	1 star	0.50
B	2 star	0.75
<i>C</i>	<i>3 star</i>	<i>1.00</i>
D	4 star	1.50
E	5 star	2.00

Room Type	Description	Unit Cost (hypothetical)
B1	1 BR Suite	\$ 4,700
DF	Double Full	\$ 3,100
DQS	Dbl Queen Studio	\$ 4,300
SK	Single King	\$ 3,300
SQ	Single Queen	\$ 3,000



# SAMPLE MODEL: HOTEL/MOTEL CLASSES AND ROOM TYPES (CLASS D)

Class	Description	Factor (hypothetical)
A	1 star	0.50
B	2 star	0.75
C	3 star	1.00
<b>D</b>	<b>4 star</b>	<b>1.50</b>
E	5 star	2.00

Room Type	Description	Unit Cost (hypothetical)
B1	1 BR Suite	\$ 7,050
DF	Double Full	\$ 4,650
DQS	Dbl Queen Studio	\$ 6,450
SK	Single King	\$ 4,950
SQ	Single Queen	\$ 4,500



# SAMPLE MODEL: HOTEL/MOTEL ACCOUNT SUMMARY

## RCN Model: Hotels and Motels

Your Home County, Florida

Name \_\_\_\_\_ Tax Year 2009  
 Location \_\_\_\_\_ Star Rating 4

Room Type	Units	Unit Cost	RCN
1 BR Suite	25	\$ 7,050	\$ 176,250
Double Full	45	\$ 4,650	\$ 209,250
Dbl Queen Studio	10	\$ 6,450	\$ 64,500
Single King	10	\$ 4,950	\$ 49,500
Single Queen	15	\$ 4,500	\$ 67,500
			Sum of Modeled Equipment \$ 567,000

## Additional Equipment

Description	Units	Unit Cost	RCN
Billboard	1	\$ 40,000	\$ 40,000

Sum of Additional Equipment \$ 40,000

Sum of All Equipment \$ 607,000



## CLOSING THOUGHT ...

Even if you're on the right track,  
you'll get run over if you just sit  
there - Will Rogers



- This presentation will be available on the FCIAAO website.
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