

Depreciation and Obsolescence (Isness and Oughtness)

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Outline

- Isness of Property Taxes.
- Theory of RCNLD.
- Oughtness of Depreciation.

2

Isness of Property Tax Assessments

- The object of valuations for tax purposes is to fairly distribute the cost of providing government services to those assessed.
- No valuation theory applicable to property tax assessments.
- Valuation techniques are used because the law has declared them to be appropriate.

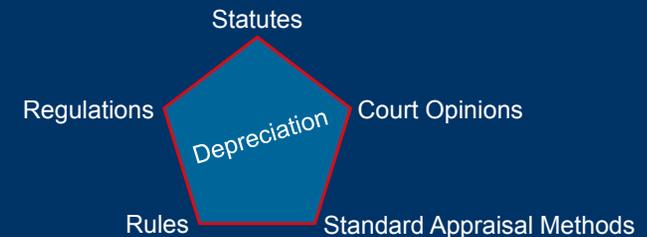
3

Isness of Valuations

- Full Cash Value = Value determined as prescribed by statute.
- If no statutory method is prescribed, Full Cash Value = Market Value.
- Replacement Cost = Trended Acquisition Cost.
- Market Value = Replacement Cost New less Depreciation (RCNLD).

4

Isness of Depreciation



5

Theory of RCNLD

Concepts of Value

Market Value

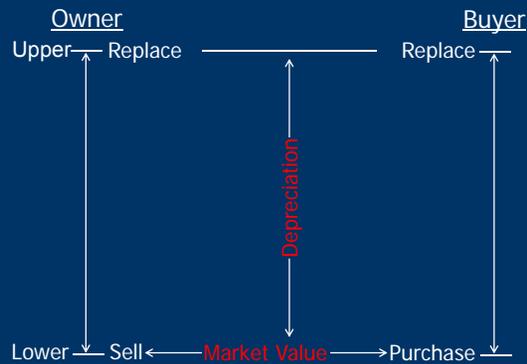
The price for which a given property could actually be sold.

Value to the Owner

The amount stated in monetary terms of the entire injury (both direct and indirect) which an owner would suffer if deprived of the property.

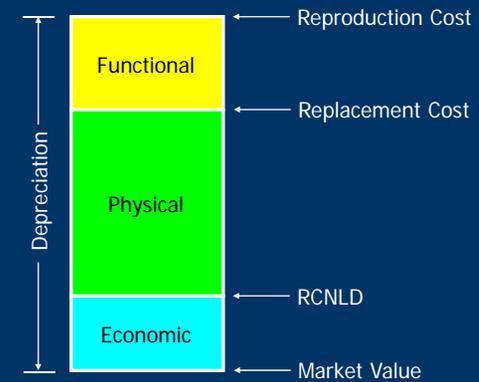
7

Valuation Theory



8

Depreciated Values



9

Axiom 1

The total capital outlay required to acquire and maintain plant and equipment is the present value of all capital expenditures — including plant replacements.

10

Axiom 2

The *market value* of existing physical property is largely determined by the amount and timing of the difference in capital expenditures required to maintain the existing equipment and the capital expenditures required to purchase and maintain comparable new equipment.

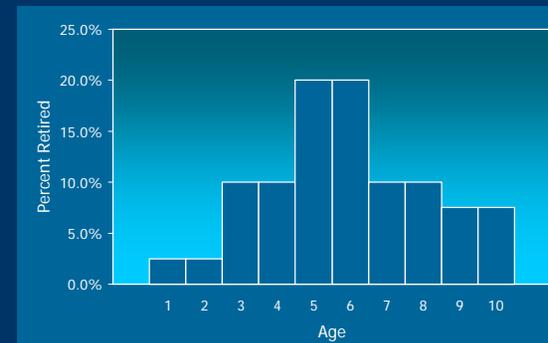
11

Retirement Frequency Distribution

EOY	Percent Retired		Percent
	Annual	Cumulative	Surviving
A	B	C	D=100-C
0			100.00
1	2.50	2.50	97.50
2	2.50	5.00	95.00
3	10.00	15.00	85.00
4	10.00	25.00	75.00
5	20.00	45.00	55.00
6	20.00	65.00	35.00
7	10.00	75.00	25.00
8	10.00	85.00	15.00
9	7.50	92.50	7.50
10	7.50	100.00	0.00

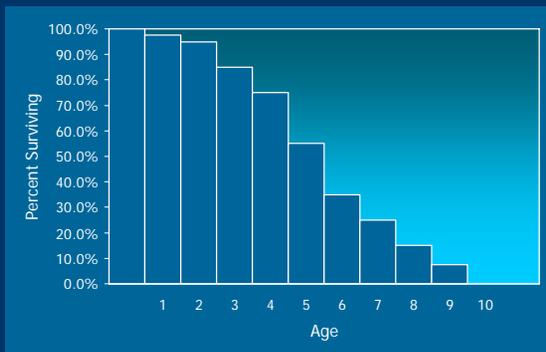
12

Retirement Curve



13

Survivor Curve



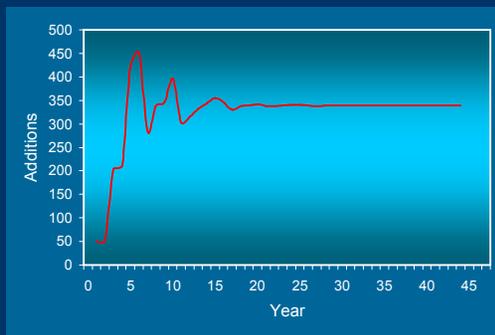
14

Renewals Table (Original Cost)

	f(x)	2.50%	2.50%	10.00%	...	7.50%		
EOY	Additions	1	2	3	...	10	11	12
0	1,000.00	25.00	25.00	100.00	...	75.00		
1	25.00	25.00	0.63	0.63	...	1.88	1.88	
2	25.63		25.63	0.64	...	2.56	1.92	1.92
3	101.27			101.27	...	10.13	10.13	7.59
4	105.67				...	21.13	10.57	10.57
5	210.24				...	42.05	42.05	21.02
6	225.59				...	22.56	45.12	45.12
7	141.71				...	14.17	14.17	28.34
8	168.65				...	4.22	16.87	16.87
9	172.79				...	4.32	4.32	17.28
10	198.01				...	198.01	4.95	4.95
11	151.96				...		151.96	3.80

15

Renewal Function



16

Age Distribution (End of Year 4)

Age	Additions	Percent Surviving	Age Distribution
A	B	C	D=B*C
0	105.67	100.00	105.67
1	101.27	97.50	98.74
2	25.63	95.00	24.35
3	25.00	85.00	21.25
4	1,000.00	75.00	750.00
Total			1,000.00

17

Renewals Table (Replacement Cost)

EOY	f(x)	2.50%	2.50%	10.00%	...	7.50%		
	Additions	1	2	3	...	10	11	12
0	2,000.00	50.00	50.00	200.00	...	150.00		
1	50.00	50.00	1.25	1.25	...	3.75	3.75	
2	51.25		51.25	1.28	...	5.13	3.84	3.84
3	202.53			202.53	...	20.25	20.25	15.19
4	211.34				...	42.27	21.13	21.13
5	420.47				...	84.09	84.09	42.05
6	451.17				...	45.12	90.23	90.23
7	283.43				...	28.34	28.34	56.69
8	337.30				...	8.43	33.73	33.73
9	345.58				...	8.64	8.64	34.56
10	396.02				...	396.02	9.90	9.90
11	303.92				...		303.92	7.60

18

Market Value without Sale

End of Period	Owner		Buyer		Market Value
	Capital Additions	Present Value	Capital Additions	Present Value	
A	B	C	D	E	F=E-C
0			2,000.00	2,000.00	2,000.00
1	420.47	382.25	50.00	45.45	-336.79
2	451.17	372.87	51.25	42.36	-330.52
3	283.43	212.94	202.53	152.16	-60.78
:	:	:	:	:	:
30	339.06	19.43	339.22	19.44	0.01
31	339.01	17.66	338.95	17.66	0.00
Total		3,347.67		4,614.85	1,267.18

19

Cash Outlay to Seller

$$\begin{aligned} \text{Cash Outlay} &= \text{Replacement Cost} - \text{Market Value} \\ &= \$2,000.00 - \$1,267.18 \\ &= \$732.82 \end{aligned}$$

20

Market Value with Sale

End of Period	Seller		Buyer		Market Value
	Capital Additions	Present Value	Capital Additions	Present Value	
A	B	C	D	E	F=E-C
0	732.82	732.82	1,267.18	1,267.18	534.36
1	50.00	45.45	420.47	382.25	336.79
2	51.25	42.36	451.17	372.87	330.52
3	202.53	152.16	283.43	212.94	60.78
:	:	:	:	:	:
30	339.22	19.44	339.06	19.43	-0.01
31	339.95	17.66	338.01	17.66	0.00
Total		3,347.67		4,614.85	1,267.18

21

Expectancy Life Factors (10%)

EOY	Proportion Surviving	Present Value Col. B	Reverse Sum Col. C	D _i /D ₀	ELF
A	B	C	D	E	F=E/C
0	1.0000	1.00000	4.59151	1.00000	1.00000
1	0.9750	0.88636	3.59151	0.78221	0.88249
2	0.9500	0.78512	2.70515	0.58916	0.75041
3	0.8500	0.63862	1.92002	0.41817	0.65480
4	0.7500	0.51226	1.28141	0.27908	0.54480
5	0.5500	0.34151	0.76915	0.16751	0.49052
6	0.3500	0.19757	0.42764	0.09314	0.47142
7	0.2500	0.12829	0.23007	0.05011	0.39059
8	0.1500	0.06998	0.10178	0.02217	0.31679
9	0.0750	0.03181	0.03181	0.00693	0.21779
10	0.0000	0.00000			

22

Condition Percent

$$\text{Condition Percent} = [S_f + (1.0 - S_a)ELF]$$

Where

S_f = Future Net Salvage Rate

S_a = Average Net Salvage Rate

ELF = Expectancy Life Factor

23

Depreciated Value (RCNLD)

Age	Expectancy Life Factor	Additions	Percent Surviving	Age Distribution	RCNLD
A	B	C	D	E=C*D	F=D*B
0	1.00000	211.34	100.00	211.34	211.34
1	0.88249	202.53	97.50	197.47	174.26
2	0.75041	51.25	95.00	48.69	36.54
3	0.65480	50.00	85.00	42.50	27.83
4	0.54480	2,000.00	75.00	1,500.00	817.21
Total				2,000.00	1,267.18

24

Expectancy Life Factors (0%)

EOY	Proportion Surviving	Present Value Col. B	Reverse Sum Col. C	D _i /D ₀	ELF
A	B	C	D	E	F=E/C
0	1.0000	1.00000	5.90000	1.00000	1.00000
1	0.9750	0.97500	4.90000	0.83051	0.85180
2	0.9500	0.95000	3.92500	0.66525	0.70027
3	0.8500	0.85000	2.97500	0.50424	0.59322
4	0.7500	0.75000	2.12500	0.36017	0.48023
5	0.5500	0.55000	1.37500	0.23305	0.42373
6	0.3500	0.35000	0.82500	0.13983	0.39952
7	0.2500	0.25000	0.47500	0.08051	0.32203
8	0.1500	0.15000	0.22500	0.03814	0.25424
9	0.0750	0.07500	0.07500	0.01271	.016949
10	0.0000	0.00000			

25

Depreciated Value (Straight-Line)

Age	Expectancy Life Factor	Additions	Percent Surviving	Age Distribution	RCNLD
A	B	C	D	E=C*D	F=D*B
0	1.00000	211.34	100.00	211.34	211.34
1	0.85180	202.53	97.50	197.47	168.20
2	0.70027	51.25	95.00	48.69	34.10
3	0.59322	50.00	85.00	42.50	25.21
4	0.48023	2,000.00	75.00	1,500.00	720.35
Total				2,000.00	1,159.20

26

Economic Obsolescence

Economic Obsolescence = RCNLD – PV Net Revenue.

Market Value = RCNLD – Economic Obsolescence
 = RCNLD – RCNLD + PV Net Revenue
 = PV Net Revenue.

27

Key Points

- Market value = Difference in present value of capital expenditures.
- Market Value = RCNLD.
- Market Value = (RCN)(Condition Percent).
- Depreciation is compound interest.
- Economic Obsolescence = RCNLD – PV Net Revenue.
- Market Value = PV Net Revenue.

28