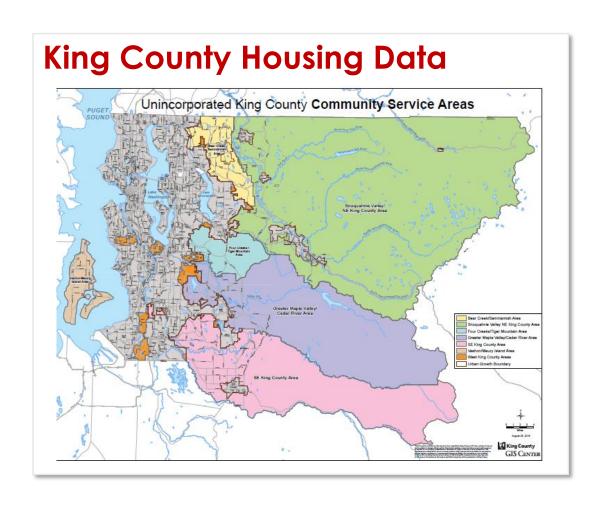
Phase 2 – Linear Regression Project



Phase 2 - Project

AGENDA

- Intro To Business & Opportunity
- Methodology
- -3 Recommendations
- Next Steps
- Extra Credit (if time permits)

The Business

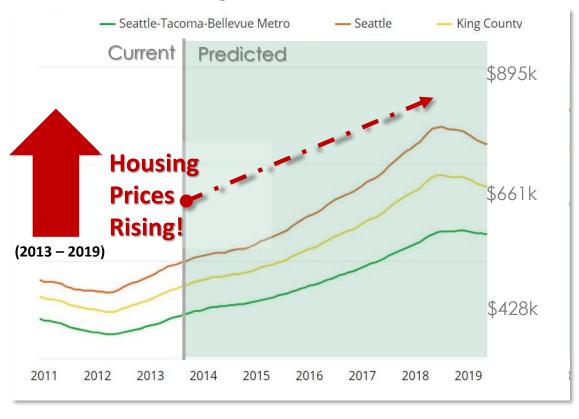
King County REALITY

Ready. Set. Sell.

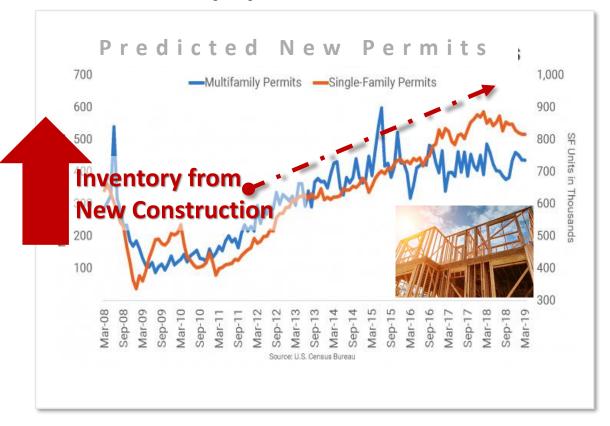


Opportunity:

Experts Predicting Sellers Market...



....But Inventory Up!



Goal: Increase Revenue From Seller Commissions (Existing Homes)

Hows

1. Help Agents Identify "Most Valuable" Home Improvements Projects, for recommendations to sellers

2. Help Agents Set "Better" Prices... augment CMA process



Business Value



"Smarter" Agents

I. Better Recommendations = Higher Prices = Commissions

II.Setting Better Prices = Getting True Market Value

Methodology Business Understanding 3 Recommendations 1 - Physical Factors - "controllable" 11 home features buver Pricing via CMA 2 - Location Factor - "influenceable" What you need to know about comps extra for 3 - Consider a new Pricing Factor **Business** Data Understanding Understanding Data Preparation Data What are comps? Modeling Deployment LOCATION! Evaluating LOCATION! Crisp DM -

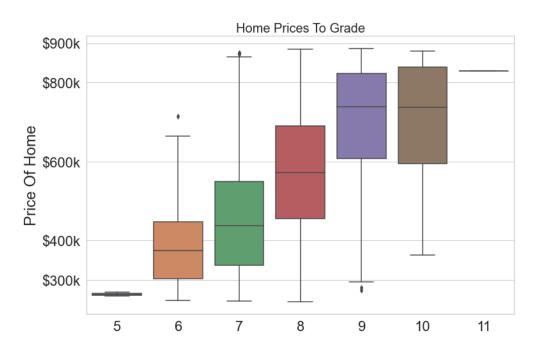
Recommendation 1: Augment Physical Features

1. # Main-Level Finished Square Feet



2. Grade "Specialness" of Home

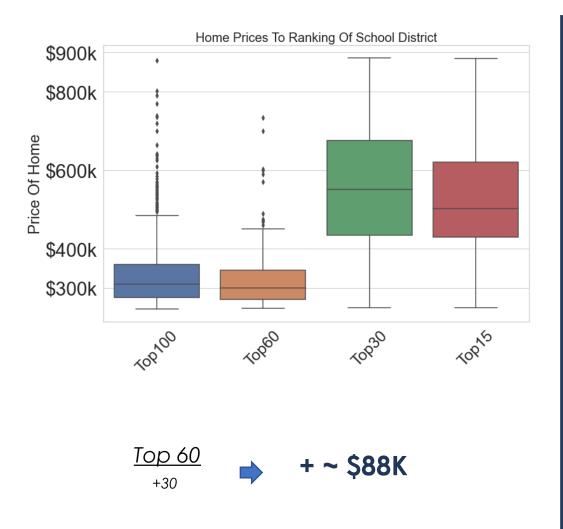
Construction and Design, 7 = Average older sub-divisions



*Grade 8+ = better materials in both the exterior and interior finish work, architectural design, solid woods, bathroom fixtures and more luxurious options.

Recommendation 2: Work to Impact "Influenceable" Factors

1. School District



2. # Nearby Fortune 500's*

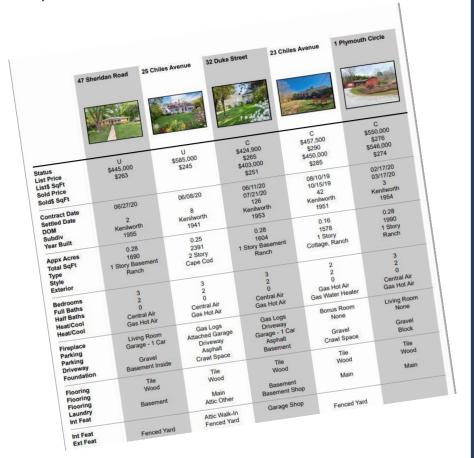




Recommendation 3: Setting "Better" Prices...Augmenting CMA

Comparative Market Analysis (CMA)

- Home Features, Condition, Location, Competition



Adding Assessor Appraisals



	ISTORY

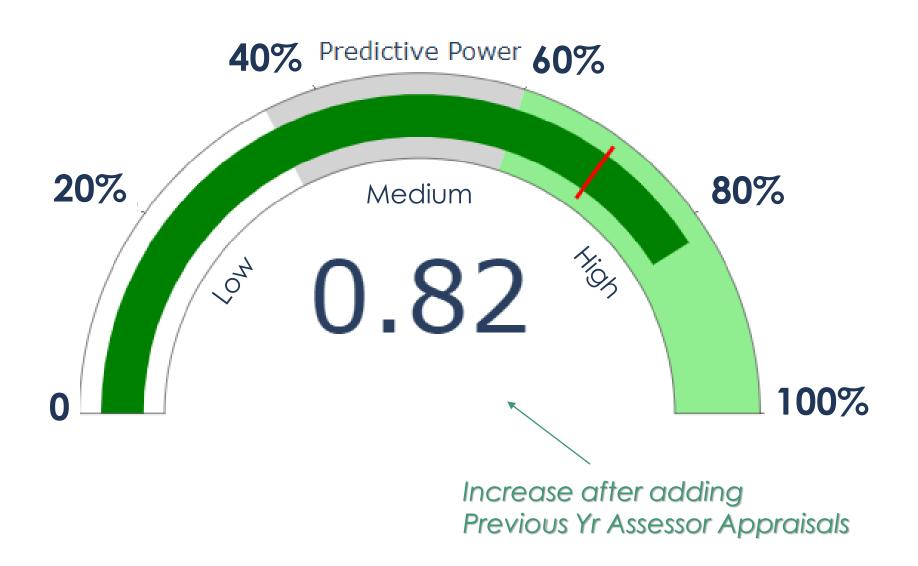
Valued Year	Tax Year	Appraised Land Value (\$)	Appraised Imps Value (\$)	Appraised Total (\$)	Appraised Imps Increase (\$)	Taxable Land Value (\$)	Taxable Imps Value (\$)	Taxable Total (\$)
2020	2021	232,000	450,000	682,000	0	232,000	450,000	682,000
2019	2020	231,000	436,000	667,000	0	231,000	436,000	667,000
2018	2019	236,000	416,000	652,000	0	236,000	416,000	652,000
2017	2018	197 000				197.000		

Assessor Appraisal Feature

2004	2005	76,000	142,000	218,000	0	76,000	142,000	218,000
	2006	88,000	148,000	236,000	0	88,000	148,000	236,000
2006	2007	101,000	100,000	261,000		101,000	160,000	261,000
2007	2008	122,000		291,000	Pa	ture	169,000	291,000
2008	2009	145,000	226,000	371,000	0	145,000	226,000	371,000
2009	2010	135,000	164,000	299,000		135,000	164,000	299,000
2010	2011	137,000	166,000	503,000		137,000	166,000	
2011	2012	126,000	154,000	28 0(126,000	154,000	280,000
2012	2013	129,000	123,000	A 07	0/	129,000	123,000	252,000
	2014	129,000	126,000	255,000	0	129,000	126,000	255,000
2014	2010	123,000		321,000		123,000		

Predictive Power

= Models ability to explain variability in the data being predicted



Summary of Recommendations

Increase Seller Commissions By Coaching Sellers To:

1. "Controllable"



- Above Sqr ft
- Grade

2. "Influenceable"



- School District
- F 500s
- Look To Non-Traditional Sources When Setting Prices

3. Tax Assessor Records





Future Work/ Next Steps

- Augment current model
 - Study homes with greatest variance between actual & predicted
 - Add additional interaction
 - # of Attractions, Inflation Factors, Other
- Develop additional models for more niche homes
 - (<\$200k, >\$900k, Waterfront, Other)
- Deployment!



EXTRA CREDIT -

- 1. How Do Assessor Establish Appraisals?
- 2 How Well Does our Model Predict Assessor Appraisals?



Thanks For Your Time and Consideration!



Appendix

Model Results:

"Does This Mean?"



OLS Regression Results

Dep. Variable	:	log_	price		R-eq	uared:	0.829	
Model	:		OLS	Adj.	R-eq	uared:	0.825	
Method	:	Least Squ	uares		F-sta	itletic:	254.4	
Date	: Tue	e, 24 Nov	2020 F	rob (F-eta	tistic):	0.00	
Time	:	05:4	19:22	Log-	Likeli	lhood:	663.58	
No. Observations	:		1288			AIC:	-1277.	
Df Residuals	:		1263			BIC:	-1148.	
Df Model	:		24					
Covariance Type	:	nonro	obust					
			-44		t	Do 16	m 005	0.0753
_		coef	atd err		-	P> t	[0.025	0.975]
	onet	12.3818	0.021		.995	0.000	12.340	12.424
AssesorAppraisa	-	1.2368	0.041		.371	0.000	1.157	1.317
Sch_d_To	•	0.2257	0.012		.274	0.000	0.202	0.250
Sch_d_To	•	0.2060	0.014		.620	0.000	0.178	0.234
Unde		0.1524	0.033		.577	0.000	0.087	0.218
	er20	-0.3516	0.049		.149	0.000	-0.448	-0.255
	w_1	0.0598	0.026		.301	0.022	0.009	0.111
	W_2	0.0538	0.018		.009	0.003	0.019	0.089
	w_4	0.1124	0.056		.000	0.046	0.002	0.223
conditio	-	0.0350	0.009		.778	0.000	0.017	0.053
conditio	-	0.1143	0.014		.205	0.000	0.087	0.142
grad	-	-0.0682	0.020		.442	0.001	-0.107	-0.029
grad	_	0.0483	0.010		.942	0.000	0.029	0.067
ele_mnf	_	0.0449	0.019		.326	0.020	0.007	0.083
ele_mnf	_	0.0665	0.018		.647	0.000	0.031	0.102
ala_mnf	-	0.0690	0.018		.843	0.000	0.034	0.104
ele_mnt	_	0.0859	0.018		.679	0.000	0.050	0.122
ele_mnf	-	0.0672	0.019		.529	0.000	0.030	0.105
ele_mnf	-	0.0724	0.019		.815	0.000	0.035	0.110
ala_mnf	-	0.0508	0.020		.573	0.010	0.012	0.090
ele_mnth	_	0.0649	0.019		.413	0.001	0.028	0.102
ele_mntr	-	0.0658	0.020		.261	0.001	0.026	0.105
ele_mnth	-	0.0620	0.020		.053	0.002	0.022	0.102
eqft_basen		0.1204	0.029		.149	0.000	0.063	0.177
eqft_ab	ove	0.3468	0.038	9	.209	0.000	0.273	0.421
Omnibus:	15.82	8 Dur	rbin-Wat	eon:	2	2.014		
Prob(Omnibus):	0.00	0 Jarqu	ie-Bera	(JB):	21	.376		
Skew:	-0.14	2	Prob	(JB):	2.28	le-05		
Kurtosis:	3.56	3	Cond	No.		20.1		

Adj. R-squared: 0.828

Measures - goodness-of-fit
- 82% of our predicted price
can be explained by our
model features, 18% may be
cause by random error



Model Progression

	Model	1		Model	2		Model3	
	Measure	Value		Measure	Value		Measure	Value
0	train_R2	0.401	0	train_R2	0.684	0	train_R2	0.830
1	test_R2	0.372	1	test_R2	0.678	- 1	test_R2	0.800
2	train_mse	0.0689523	2	train_mse	0.0363533	2	train_mse	0.0207198
3	test_mse	0.0712373	3	test_mse	0.0365513	3	test_mse	0.023869
4	intercept	12.7574	4	intercept	12.5296	4	intercept	12.4181
5	waterfront_1	0.191622	5	Sch_d_Top15	0.359512	5	AssesorAppraisals_x	1.19366
6	view_1	0.125222	6	Sch_d_Top30	0.357542	6	Sch_d_Top15	0.224482
7	view_2	0.0629582	7	Sch_d_Top60	-0.070847	7	Sch_d_Top30	0.197072
8	view_3	0.0328921	8	Under10	0.160892	8	Sch_d_Top60	-0.0203361
9	view_4	0.173902	9	Over20	-0.703032	9	Under10	0.132568
10	condition_4	0.0960266	10	sqft_lot	-0.102805	10	Over20	-0.378409
11	condition_5	0.154242	11	sqft_basement	0.105728	- 11	view_1	0.0593785
12	grade_6	-0.165765	12	sqft_above	0.584546	12	view_2	0.0561976
13	grade_8	0.200531	13	view_1	0.086734	13	view_3	0.0182722
14	grade_9	0.317696	14	view_2	0.0941699	14	view_4	0.106432
15	grade_10	0.272693	15	view_3	0.0934741	15	condition_4	0.0389325
16	grade_11	-5.55112e-17	16	view_4	0.264415	16	condition_5	0.116402
17	ZipFirst3_981	0.141611	17	condition_4	0.087975	17	grade_6	-0.0749406
18	sls_mnth_2	0.0156561	18	condition_5	0.140688	18	grade_8	0.0605497
19	sls_mnth_3	0.0961082	19	grade_6	-0.157626	19	grade_9	0.0363376
20	sls_mnth_4	0.0803946	20	grade_8	0.154334	20	grade_10	0.0929671
21	sls_mnth_5	0.0535677	21	grade_9	0.261723	21	sls_mnth_2	0.0119643
22	sls_mnth_6	0.0242366	22	grade_10	0.252175	22	sls_mnth_3	0.0529574
23	sls_mnth_7	0.0422843	23	sls_mnth_2	0.0128365	23	sls_mnth_4	0.0754875
24	sls_mnth_8	0.0632581	24	sls_mnth_3	0.0678127	24	sls_mnth_5	0.0737535
25	sls_mnth_9	0.0374608	25	sls_mnth_4	0.063692	25	sls_mnth_6	0.0897722
26	sls_mnth_10	0.0439298	26	sls_mnth_5	0.030454	26	sls_mnth_7	0.0730218
27	sls_mnth_11	0.0139689	27	sls_mnth_6	-0.00721413	27	sls_mnth_8	0.0778737
28	sls_mnth_12	0.027499	28	sls_mnth_7	0.00466603	28	sls_mnth_9	0.0564489
29	If_renovated_1	0.121325	29	sls_mnth_8	0.00364861	29	sls_mnth_10	0.0698463
30	sqft_lot	-0.248111	30	sls_mnth_9	0.00401947	30	sls_mnth_11	0.0694779
31	sqft_basement	0.123596	31	sls_mnth_10	-0.00177026	31	sls_mnth_12	0.0666932
32	sqft_above	0.523408	32	sls_mnth_11	-0.010404	32	If_renovated_1	0.0213801
			33	sls_mnth_12	-0.00733327	33	sqft_lot	-0.0401348
			34	If_renovated_1	0.106718	34	sqft_basement	0.120024
						95	and above	0.240424

sqft_above 0.310434

Model 4 Optimized Using #Backward Elimination

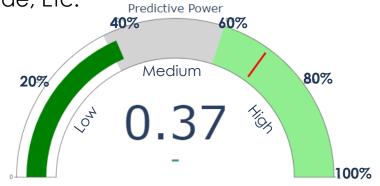
Durbin-Watson 1.970781

> 1.986095 2.025427

conet 12.3818 0.021 576.995 0.000 12.340 12.44 AssesorAppraisale_x 1.2368 0.041 30.371 0.000 1.157 1.3 Sch_d_Top30 0.2257 0.012 18.274 0.000 0.202 0.2 Sch_d_Top30 0.2660 0.014 14.620 0.000 0.087 0.2 Under10 0.1524 0.033 4.577 0.000 -0.448 -0.3 view_1 0.0598 0.026 2.301 0.022 0.009 0. view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 grade_6 0.0682 0.020 -3.442 0.001 -0.177 0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 grade_6 0.0682 0.020 -3.442 0.001 0.070 0.0 <th< th=""><th>OLS Regression Re</th><th>sults</th><th></th><th></th><th></th><th></th><th></th><th></th></th<>	OLS Regression Re	sults						
Method: Least Squares F-statistic: 254.4 Date: Tue, 24 Nov 2020 Prob (F-statistic): 0.00 Time: 05:49:22 Log-Likelihood: 683.58 No. Observations: 1283 AIC: -1277. Df Model: 24	Dep. Variable	c	log_	price	R-80	uared:	0.829	
Date: Tue, 24 Nov 2020 Prob (F-statistic): 0.00	Model	1:		OLS	Adj. R-sq	uared:	0.825	
Time: 05:49:22 Log-Likelihood: 683.58 No. Observations: 1288 AIC: -1277. Df Residuals: 1283 BIC: -1148. Df Model: 24 Covariance Type: nonrobust	Method	1:	Least Sq	uares	F-at	atletic:	254.4	
No. Observations: 1288	Date	: Tue	e, 24 Nov	2020 P	rob (F-sta	itietic):	0.00	
Df Residuals: 1263 BIC: -1148. Df Model: 24 Covariance Type: nonrobust conet std err t P- t [0.025] 0.9 conet 12.3818 0.021 578.995 0.000 12.340 12.4 AsseeorAppralsals_x 1.2368 0.041 30.371 0.000 0.1567 1.3 Sch_d_Top30 0.2260 0.014 14.620 0.000 0.077 0.2 Under10 0.1524 0.033 4.577 0.000 0.087 0.3 View_1 0.0598 0.026 2.301 0.022 0.009 0. View_2 0.0538 0.018 3.009 0.003 0.019 0. view_4 0.1124 0.056 2.000 0.046 0.002 0.0 condition_5 0.1143 0.014 8.205 0.000 0.017 0.0 grade_6 0.0882 0.020 3.442 0.001 0.017	Time	C	05:4	19:22	Log-Like	llhood:	663.58	
Df Model: 24 Covariance Type: nonrobust Coef std err t P- t [0.025 0.3 Conet 12.3818 0.021 576.995 0.000 12.340 12.4 Covariance Type: 12.3818 0.021 576.995 0.000 12.340 12.4 Covariance Type: 12.3818 0.021 576.995 0.000 12.340 12.4 Covariance Type: Covariance Type: Covariance T	No. Observations	:		1288		AIC:	-1277.	
Covariance Type: nonrobust cone etd err t P-it [0.025] 0.3 conet 12.3818 0.021 576.995 0.000 12.340 12.4 AsseeorAppralsale_x 1.2368 0.041 30.371 0.000 0.157 1.3 Sch_d_Top30 0.2060 0.014 14.620 0.000 0.178 0.2 Under10 0.1524 0.033 4.577 0.000 0.067 0.2 View_1 0.0598 0.026 2.301 0.022 0.009 0. View_2 0.0538 0.018 3.009 0.003 0.019 0. View_4 0.1124 0.056 2.000 0.046 0.002 0. condition_4 0.0350 0.009 3.778 0.000 0.017 0. grade_6 -0.082 0.020 -3.442 0.001 -0.107 -0. grade_6 -0.082 0.020 -3.442 0.001 -0.107 <th>Df Residuals</th> <th>:</th> <th></th> <th>1263</th> <th></th> <th>BIC:</th> <th>-1148.</th> <th></th>	Df Residuals	:		1263		BIC:	-1148.	
Coef std err t P- t [0.025 0.5	Df Model	1:		24				
conet 12.3818 0.021 576.995 0.000 12.340 12.44 AsseeorAppralsale_x 1.2368 0.041 30.371 0.000 1.157 1.3 Sch_d_Top15 0.2257 0.012 18.274 0.000 0.202 0.3 Sch_d_Top30 0.2060 0.014 14.620 0.000 0.087 0.3 Under10 0.1524 0.033 4.577 0.000 0.087 0.3 View_1 0.0598 0.026 2.301 0.022 0.099 0. view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.4 condition_5 0.1143 0.014 8.205 0.000 0.087 0.0 grade_6 0.0882 0.020 -3.442 0.001 0.070 0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 <th< th=""><th>Covariance Type</th><th>0</th><th>nonn</th><th>obust</th><th></th><th></th><th></th><th></th></th<>	Covariance Type	0	nonn	obust				
conet 12.3818 0.021 576.995 0.000 12.340 12.44 AsseeorAppralsale_x 1.2368 0.041 30.371 0.000 1.157 1.3 Sch_d_Top15 0.2257 0.012 18.274 0.000 0.202 0.3 Sch_d_Top30 0.2060 0.014 14.620 0.000 0.087 0.3 Under10 0.1524 0.033 4.577 0.000 0.087 0.3 View_1 0.0598 0.026 2.301 0.022 0.099 0. view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.4 condition_5 0.1143 0.014 8.205 0.000 0.087 0.0 grade_6 0.0882 0.020 -3.442 0.001 0.070 0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 <th< th=""><th></th><th></th><th>coef</th><th>P≻iti</th><th>TO.025</th><th>0.975]</th></th<>			coef	P≻iti	TO.025	0.975]		
AssesorAppraisale_x 1.2368 0.041 30.371 0.000 1.157 1.15 Sch_d_Top15 0.2257 0.012 18.274 0.000 0.202 0.3	c	onst			-		•	12,424
Sch_d_Top15 0.2257 0.012 18.274 0.000 0.202 0.2 Sch_d_Top30 0.2060 0.014 14.620 0.000 0.178 0.2 Under10 0.1524 0.033 4.577 0.000 0.087 0.2 View_1 0.0598 0.028 2.301 0.022 0.009 0.0 View_2 0.0538 0.018 3.009 0.003 0.019 0.0 view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 grade_6 -0.0822 0.020 -3.442 0.001 -0.107 -0.0 grade_6 -0.0882 0.020 -3.442 0.001 -0.107 -0.0 grade_6 -0.0882 0.020 -3.442 0.001 -0.07 -0.0 grade_8 0.0483 0.010 4.942 0.000 0.027 0.0 sle_mnth_5								1.317
Sch_d_Top30 0.2060 0.014 14.620 0.000 0.178 0.25 Under10 0.1524 0.033 4.577 0.000 0.087 0.25 Over20 -0.3516 0.049 -7.149 0.000 -0.448 -0.25 view_1 0.0598 0.026 2.301 0.022 0.009 0.03 view_4 0.1124 0.056 2.000 0.046 0.002 0.25 condition_5 0.1143 0.014 8.205 0.000 0.017 0.0 grade_6 -0.082 0.020 -3.442 0.001 -0.107 -0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 sle_mnth_3 0.0449 0.019 2.326 0.020 0.007 0.0 sle_mnth_5 0.0685 0.018 3.843 0.000 0.034 0.0 sle_mnth_5 0.0690 0.018 3.843 0.000 0.050 0.0 sle_m		-		0.012	18.274	0.000		0.250
Under10 0.1524 0.033 4.577 0.000 0.087 0.3 Over20 -0.3516 0.049 -7.149 0.000 -0.448 -0.3 view_1 0.0598 0.026 2.301 0.022 0.009 0.3 view_2 0.0538 0.018 3.009 0.003 0.019 0.4 view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.4 condition_5 0.1143 0.014 8.205 0.000 0.087 0.3 grade_6 -0.0682 0.020 -3.442 0.001 -0.107 -0.4 grade_8 0.0483 0.010 4.942 0.000 0.029 0.4 els_mnth_3 0.0449 0.019 2.326 0.020 0.007 0.4 els_mnth_5 0.0665 0.018 3.647 0.000 0.031 0.3 els_mnth_6 0.0859 0.018 3.843 0.000 0.034 0.3 els_mnth_7 0.0672 0.019 3.529 0.000 0.030 0.3 els_mnth_8 0.0724 0.019 3.815 0.000 0.035 0.3 els_mnth_1 0.0689 0.019 3.413 0.001 0.012 0.4 els_mnth_1 0.0689 0.019 3.413 0.001 0.028 0.3 els_mnth_1 0.0689 0.020 3.261 0.001 0.026 0.3 els_mnth_1 0.0689 0.020 3.261 0.001 0.026 0.3 els_mnth_1 0.0689 0.020 3.261 0.001 0.026 0.3 els_mnth_1 0.0688 0.020 3.261 0.001 0.026 0.3 els_mnth_1 0.0689 0.019 3.413 0.001 0.026 0.3 els_mnth_1 0.0689 0.020 3.261 0.001 0.026 0.3 els_mnth_1 0.0689 0.038 9.209 0.000 0.073 0.4 Omnibus: 15.828 Durbin-Wetson: 2.014 Prob(Omnibus): 15.828 Durbin-Wetson: 2.014								0.234
view_1 0.0598 0.028 2.301 0.022 0.009 0.001 view_2 0.0538 0.018 3.009 0.003 0.019 0.0 view_4 0.1124 0.056 2.000 0.046 0.002 0.3 condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 condition_5 0.1143 0.014 8.205 0.000 0.087 0.1 grade_6 0.0882 0.020 -3.442 0.001 -0.107 -0.1 grade_8 0.0483 0.010 4.942 0.000 0.029 0.1 sla_mnth_3 0.0449 0.019 2.326 0.020 0.007 0.0 sla_mnth_5 0.0665 0.018 3.843 0.000 0.031 0.0 sla_mnth_6 0.0859 0.018 4.679 0.000 0.050 0.0 sle_mnth_7 0.0672 0.019 3.815 0.000 0.035 0. sle_mnth_10	Und	er10	0.1524	0.033	4.577	0.000	0.087	0.218
view_2 0.0538 0.018 3.009 0.003 0.019 0.0 view_4 0.1124 0.056 2.000 0.046 0.002 0.0 condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 grade_6 0.0682 0.020 -3.442 0.001 -0.107 -0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 sle_mnth_3 0.0449 0.019 2.326 0.020 0.001 0.01 0.0 sle_mnth_4 0.0685 0.018 3.647 0.000 0.031 0.0 sle_mnth_5 0.0690 0.018 3.643 0.000 0.050 0.0 sle_mnth_7 0.0672 0.019 3.529 0.000 0.050 0.0 sle_mnth_5 0.0508 0.020 2.573 0.010 0.012 0.0 sle_mnth_10 0.0649 0.019 3.413 0.001 0.028 0.0 <tr< th=""><th>Ov</th><th>er20</th><th>-0.3516</th><th>0.049</th><th>-7.149</th><th>0.000</th><th>-0.448</th><th>-0.255</th></tr<>	Ov	er20	-0.3516	0.049	-7.149	0.000	-0.448	-0.255
view_4 0.1124 0.056 2.000 0.046 0.002 0.01 condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 grade_6 -0.0862 0.020 -3.442 0.001 -0.107 -0.0 grade_6 -0.0862 0.020 -3.442 0.001 -0.107 -0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 sle_mnth_3 0.0449 0.019 2.328 0.020 0.001 0.031 0.0 sle_mnth_5 0.0865 0.018 3.843 0.000 0.034 0.0 sle_mnth_6 0.0859 0.018 4.679 0.000 0.050 0.0 sle_mnth_7 0.0672 0.019 3.815 0.000 0.035 0.0 sle_mnth_5 0.0508 0.020 2.573 0.010 0.012 0.3 sle_mnth_10 0.0649 0.019 3.413 0.001 0.028 0.0	vle	w_1	0.0598	0.026	2.301	0.022	0.009	0.111
condition_4 0.0350 0.009 3.778 0.000 0.017 0.0 condition_5 0.1143 0.014 8.205 0.000 0.087 0.0 grade_6 -0.0882 0.020 -3.442 0.001 -0.107 -0.0 grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 els_mnth_3 0.0449 0.019 2.326 0.020 0.007 0.0 els_mnth_4 0.0865 0.018 3.847 0.000 0.031 0.0 els_mnth_5 0.0890 0.018 3.843 0.000 0.034 0.0 els_mnth_6 0.0859 0.018 4.679 0.000 0.050 0.0 els_mnth_7 0.0672 0.019 3.529 0.000 0.030 0.0 els_mnth_8 0.0724 0.019 3.815 0.000 0.035 0.0 els_mnth_9 0.0688 0.020 2.573 0.010 0.012 0.0 els_mnth_10 0.0849 0.019 3.413 0.001 0.028 0.0 els_mnth_11 0.0858 0.020 3.261 0.001 0.026 0.0 els_mnth_12 0.0620 0.020 3.261 0.001 0.026 0.0 els_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.0 els_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.0 els_mnth_12 0.0868 0.038 9.209 0.000 0.033 0.0 els_mnth_12 0.0868 0.038 9.209 0.000 0.073 0.0 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bers (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05	vie	w_2	0.0538	0.018	3.009	0.003	0.019	0.089
condition_5	vie	w_4	0.1124	0.056	2.000	0.046	0.002	0.223
grade_6 -0.0682	condition	on_4	0.0350	0.009	3.778	0.000	0.017	0.053
grade_8 0.0483 0.010 4.942 0.000 0.029 0.0 sle_mntb_3 0.0449 0.019 2.328 0.020 0.007 0.0 sle_mntb_4 0.0865 0.018 3.843 0.000 0.034 0.0 sle_mntb_5 0.0890 0.018 3.843 0.000 0.034 0.0 sle_mntb_6 0.0859 0.018 4.679 0.000 0.050 0.0 sle_mntb_7 0.0872 0.019 3.529 0.000 0.030 0.0 sle_mntb_8 0.0724 0.019 3.815 0.000 0.035 0.0 sle_mntb_9 0.0508 0.020 2.573 0.010 0.012 0.0 sle_mntb_1 0.0869 0.019 3.413 0.001 0.028 0.0 sle_mntb_1 0.0858 0.020 3.281 0.001 0.028 0.0 sle_mntb_1 0.0858 0.020 3.053 0.002 0.002 0.002 0.000 0.003 0.000 0	condition	on_5	0.1143	0.014	8.205	0.000	0.087	0.142
ela_mnth_3 0.0449 0.019 2.326 0.020 0.007 0.0 ela_mnth_4 0.0665 0.018 3.647 0.000 0.031 0.0 ela_mnth_5 0.0890 0.018 3.643 0.000 0.050 0.0 ela_mnth_6 0.0859 0.018 4.679 0.000 0.050 0.0 ela_mnth_7 0.0672 0.019 3.815 0.000 0.035 0.0 ela_mnth_8 0.0724 0.019 3.815 0.000 0.012 0.0 ela_mnth_9 0.0508 0.020 2.573 0.010 0.012 0.0 ela_mnth_10 0.0649 0.019 3.413 0.001 0.028 0.0 ela_mnth_11 0.0658 0.020 3.261 0.001 0.026 0.0 ela_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.0 eqt_basement 0.1204 0.029 4.149 0.000 0.063 0.0	gra	de_6	-0.0682	0.020	-3.442	0.001	-0.107	-0.029
ele_mnth_4 0.0665 0.018 3.647 0.000 0.031 0. ele_mnth_5 0.0890 0.018 3.843 0.000 0.034 0. ele_mnth_6 0.0859 0.018 4.679 0.000 0.050 0. ele_mnth_7 0.0672 0.019 3.529 0.000 0.035 0. ele_mnth_8 0.0724 0.019 3.815 0.000 0.035 0. ele_mnth_9 0.0508 0.020 2.573 0.010 0.012 0. ele_mnth_11 0.0649 0.019 3.413 0.001 0.026 0. ele_mnth_12 0.0620 0.020 3.261 0.001 0.026 0. ele_mnth_12 0.0820 0.020 3.053 0.002 0.022 0. eqft_basement 0.1204 0.029 4.149 0.000 0.063 0. eqft_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnilbus): 0.	grad	de_8	0.0483	0.010	4.942	0.000	0.029	0.067
sels_mnth_5	ele_mn	th_3	0.0449	0.019	2.326	0.020	0.007	0.083
sla_mnth_6 0.0859 0.018 4.679 0.000 0.050 0. sla_mnth_7 0.0672 0.019 3.529 0.000 0.030 0. sla_mnth_8 0.0724 0.019 3.815 0.000 0.035 0. sla_mnth_5 0.0508 0.020 2.573 0.010 0.012 0.01 sla_mnth_10 0.0649 0.019 3.413 0.001 0.028 0. sla_mnth_11 0.0658 0.020 3.261 0.001 0.026 0. sla_mnth_12 0.0620 0.020 3.053 0.002 0.022 0. sqtt_basement 0.1204 0.029 4.149 0.000 0.063 0. eqtt_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bers (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05	ele_mn	th_4	0.0665	0.018	3.647	0.000	0.031	0.102
ele_mnth_7 0.0872 0.019 3.529 0.000 0.030 0.03 ele_mnth_8 0.0724 0.019 3.815 0.000 0.035 0.000 ele_mnth_9 0.0508 0.020 2.573 0.010 0.012 0.000 ele_mnth_10 0.0849 0.019 3.413 0.001 0.028 0.000 ele_mnth_11 0.0658 0.020 3.261 0.001 0.026 0.000 els_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.000 eqt_basement 0.1204 0.029 4.149 0.000 0.063 0.000 eqt_above 0.3468 0.038 9.209 0.000 0.273 0.000 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05	ele_mn	th_5	0.0690	0.018	3.843	0.000	0.034	0.104
ela_mnth_8 0.0724 0.019 3.815 0.000 0.035 0. els_mnth_5 0.0508 0.020 2.573 0.010 0.012 0.4 els_mnth_10 0.0849 0.019 3.413 0.001 0.028 0.2 els_mnth_11 0.0658 0.020 3.261 0.001 0.026 0.2 els_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.2 sqt_basement 0.1204 0.029 4.149 0.000 0.063 0.2 eqt_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 \$kew: -0.142 Prob(JB): 2.28e-05	ele_mn	th_6	0.0859	0.018	4.679	0.000	0.050	0.122
sle_mnth_5 0.0508 0.020 2.573 0.010 0.012 0.0 sle_mnth_10 0.0649 0.019 3.413 0.001 0.028 0.0 sle_mnth_11 0.0658 0.020 3.261 0.001 0.026 0.0 sle_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.0 sqtf_basement 0.1204 0.029 4.149 0.000 0.063 0.0 aqtf_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05	ele_mn	th_7	0.0672	0.019	3.529	0.000	0.030	0.105
els_mnth_10	ala_mn	th_8	0.0724	0.019	3.815	0.000	0.035	0.110
els_mnth_11	ele_mn	th_9	0.0508	0.020	2.573	0.010	0.012	0.090
els_mnth_12 0.0620 0.020 3.053 0.002 0.022 0.2 eqtt_basement 0.1204 0.029 4.149 0.000 0.063 0.2 eqtt_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 \$kew: -0.142 Prob(JB): 2.28e-05	ala_mnti	h_10	0.0649	0.019	3.413	0.001	0.028	0.102
eqft_basement 0.1204 0.029 4.149 0.000 0.063 0.0 eqft_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bers (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05	ele_mnt	h_11	0.0658	0.020	3.261	0.001	0.026	0.105
eqtt_above 0.3468 0.038 9.209 0.000 0.273 0.4 Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05		-						0.102
Omnibus: 15.828 Durbin-Watson: 2.014 Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.376 Skew: -0.142 Prob(JB): 2.28e-05								0.177
Prob(Omnibus): 0.000 Jarque-Bera (JB): 21.378 Skew: -0.142 Prob(JB): 2.28e-05	aqft_al	0.273	0.421					
Skew: -0.142 Prob(JB): 2.28e-05	Omnibus:	15.82	8 Dui	rbin-Wat	eon:	2.014		
	Prob(Omnibus):	0.00	0 Jarqu	ie-Bera (JB): 2	1.376		
	Skew:	-0.14	2	Prob(JB): 2.2	Be-05		
Kurtosis: 3.563 Cond. No. 20.1	Kurtosis:	3.56	3	Cond	No.	20.1		

Assessor Appraisals Have Strong Predictive Strength

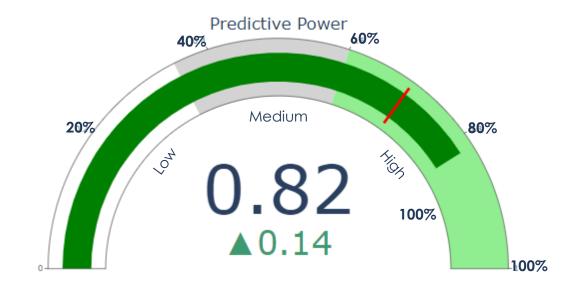
M1. Using physical "features"...Sqr Footage, Grade, Etc.



M2. Adding influenceable "features"... School Districts, Fortune 500's



M3. Adding Previous Yr Assessor Appraisals



Influence = 1.3

200% Higher Than Next Factor*

Assessor Model

_	Measure	Value
0	train_R2	0.737
1	test_R2	0.733
2	train_mse	0.0374024
3	test_mse	0.0386394
4	intercept	12.3369
5	Sch_d_Top15	0.313072
6	Sch_d_Top30	0.439637
7	Sch_d_Top60	-0.0320625
8	Under10	-0.153349
9	Over20	-0.845506
10	sqft_lot	-0.0787835
11	sqft_basement	0.0470247
12	sqft_above	0.841512
13	view_1	0.119014
14	view_2	0.1136
15	view_3	0.168162
16	view_4	0.167149
17	condition_4	0.102763
18	condition_5	0.0617159
19	grade_6	-0.21732
20	grade_8	0.188465
21	grade_9	0.306399
22	grade_10	0.371521
23	sls_mnth_2	-0.00452489
24	sls_mnth_3	0.0324349
25	sls_mnth_4	0.0378942
26	sls_mnth_5	-0.0442387
27	sls_mnth_6	-0.134375
28	sls_mnth_7	-0.118092
29	sls_mnth_8	-0.126045
30	sls_mnth_9	-0.157024
31	sls_mnth_10	-0.151455
32	sls_mnth_11	-0.141337
33	sls_mnth_12	-0.162813
34	If_renovated_1	0.0527851

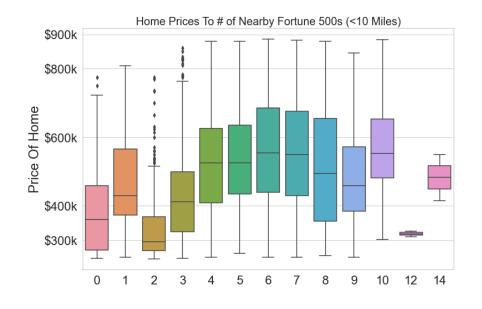
Average
Home - Exact
Numbers
Used For
Calculations

Main-Level Finished Square Feet



Grade "Specialness" of Home





Definition of Average Home

8_1	bedro	ome	a_bathroo	ma a_a	qft_livin	g a_s	qft_lot	a_eqft_ba	sement	a_eqf	t_living1	15 8_8	qft_lot15	a_floors	a_eqft_	above	a_AgeOf	Home a	a_tti_roon	na
0	3.558	5344	2.0820	061 209	99.08178	8 6932.4	400218	716	.332879	18	51.63631	14 702	7.358779	1.16753	1382.7	748909	60.8	65867	7.6894	77
erfront	_1 a	_vlew_	1 a_vlew	_2 a_vl	ew_3	a_vlew_4	a_cor	ndition_4 a	_conditi	lon_5	a_grade	_6 a_	grade_8	a_grade_9	a_grad	1e_10 a_	_grade_1	1 a_Zip		
	0		0	0	0	0		0		0		0	0	0		0		0		0
e_mnti	h_2 .	a_e	le_mnth_6	a_8 8_r	nnth_7	a_ele_mr	nth_8	a_ele_mnth	_9 a_el	e_mnth	_10 a_6	ele_mnt	h_11 a_	ele_mnth_12	a_lf_n	enovated	_1 a_ec	_bedroor	пе а_ес	
	0 .		0		0		0		0		0		0	0			0	0.3194	18	
8_8	c_bati	hroome	a_ec_ec	qft_living	a_ec_	eqft_lot	a_ec_6	eqft_baseme	ent a_e	c_eqft_	_living15	a_ec	_eqft_lot1	15 a_ec_flo	ore a_	ec_eqft_s	above a	i_ec_Age	OfHome	a_ec
	0.	270515	5	0.342204	0	.488733		0.3301	07	(0.346178		0.21369	0.083	765	0.3	22911		0.48579	
a_8	c_eqf	t_abov	e a_ec_ <i>A</i>	∖geOfHo	me a_s	ec_ttl_roo	me a	_Sch_d_Top	o15 a_	Sch_d_	Тор30	a_Sch_	_d_Top60	a_ec_Und	ier10 a	ı_ac_Ove	r20 a_s	C_A8896	eorAppral	eale_)
		0.2291	1	0.485	79	0.1693	354		0		0		1	0.3	7204	0.0684	402		0.1	180597

BUILDING GRADE

Represents the construction quality of improvements. Grades run from grade 1 to 13. Generally defined as:

- 1-3 Falls short of minimum building standards. Normally cabin or inferior structure.
- 4 Generally older, low quality construction. Does not meet code.
- 5 Low construction costs and workmanship. Small, simple design.
- 6 Lowest grade currently meeting building code. Low quality materials and simple designs.
- 7 Average grade of construction and design. Commonly seen in plats and older sub-divisions.
- 8 Just above average in construction and design. Usually better materials in both the exterior and interior finish work.
- 9 Better architectural design with extra interior and exterior design and quality.
- 10 Homes of this quality generally have high quality features. Finish work is better and more design quality is seen in the floor plans. Generally have a larger square footage.
- 11 Custom design and higher quality finish work with added amenities of solid woods, bathroom fixtures and more luxurious options.
- 12 Custom design and excellent builders. All materials are of the highest quality and all conveniences are present.
- 13 Generally custom designed and built. Mansion level. Large amount of highest quality cabinet work, wood trim, marble, entry ways etc.

BUILDING CONDITION

Relative to age and grade. Coded 1-5.

- 1 = Poor- Worn out. Repair and overhaul needed on painted surfaces, roofing, plumbing, heating and numerous functional inadequacies. Excessive deferred maintenance and abuse, limited value-in-use, approaching abandonment or major reconstruction; reuse or change in occupancy is imminent. Effective age is near the end of the scale regardless of the actual chronological age.
- 2 = Fair- Badly worn. Much repair needed. Many items need refinishing or overhauling, deferred maintenance obvious, inadequate building utility and systems all shortening the life expectancy and increasing the effective age.
- 3 = Average- Some evidence of deferred maintenance and normal obsolescence with age in that a few minor repairs are needed, along with some refinishing. All major components still functional and contributing toward an extended life expectancy. Effective age and utility is standard for like properties of its class and usage.
- 4 = Good- No obvious maintenance required but neither is everything new. Appearance and utility are above the standard and the overall effective age will be lower than the typical property.
- 5= Very Good- All items well maintained, many having been overhauled and repaired as they have shown signs of wear, increasing the life expectancy and lowering the effective age with little deterioration or obsolescence evident with a high degree of utility.