



## MEMORANDUM

---

**DATE:** March 27, 2018

**To:** Tyler Bump  
BUREAU OF PLANNING AND SUSTAINABILITY

**FROM:** Jerry Johnson  
JOHNSON ECONOMICS LLC

**SUBJECT:** Economic Analysis of Proposed Changes to the Infill Development Standards

---

The City of Portland Bureau of Planning and Sustainability has been refining the Residential Infill Project, and this analysis provides an updated to previous work completed by Johnson Economics on the project from October 2016. As with the previous iteration of the proposed changes, the new standards will impact maximum height limits, building square footage, and minimum setbacks and yard areas.

The proposed change in allowed development being evaluated are as follows:

TYPE	LOT SIZE	Current Size Allowed	Proposal
Single Family Home	5,000	R5 = 6,750 sf R7 = 7,650 sf	R5 (0.5 FAR) = 2,500 sf + 750 sf structure R7 (0.4 FAR) = 2,800 sf + 1,050 sf structure
Skinny Home	2,500	R2.5 = 4,375 sf	R2.5 (0.7 FAR) = 1,750 sf + 375 sf structure

The proposed changes include changing how height is measured, as well as increasing front setbacks in R5 and R2.5 zoning. Triplexes would now be allowed on corner lots, as well as duplexes with one detached ADU. Some historically narrow lots would be rezoned from R5 to R2.5. In addition, new developments in the R2.5 zone on sites 5,000 sf and larger would be required to have at least two units.

As with the previous iteration, the proposed changes would limit the allowed size of residential development within the single dwelling zones, while modestly expanding the ability of the market to provide some additional housing types. The current allowed size of structure for the three residential codes is likely well above what would be expected in the market, as homes in these size ranges represent a minute percentage of housing stock. The revised allowable home sizes will likely restrict final home sizes below what the market may support, and we would expect new development to largely develop at the new limits.



The code increases the allowance for Accessory Dwelling Units (ADUs). While this is both expected to marginally increase the yield on redevelopment, and encourage more residential development at a lower price point, the analysis does not factor this in. While we recognize that these units have seen market acceptance to-date, we feel that projecting the utilization rate of these allowances cannot be reliably done at this time.

In summary, the proposed changes to the code largely reflect an increase in allowable density in terms of units and a reduction in the amount of allowable building area within the codes. This would be reflected in generally lower residual land values associate with redevelopment options. The anticipated impact would be a lower rate of redevelopment, with resulting housing produced at a lower price point.

## **I. PROTOTYPES**

To test the impact of the proposed changes, Johnson Economics model the economic feasibility of eight rental and eight ownership prototypical developments. The work is based on assumed market pricing and does not address the marginal impact of affordable housing provisions or incentives.

The proposed changes impact the form and financial performance of new development in two primary ways. The first of these is a marginal decrease in the allowable building square footage, reflected by a shift in the net Floor Area Ratio (FAR). This provides for less development yield on the site, expressed in square footage of saleable or leasable area. The second impact is associated with the shift in product type and associated price point. By allowing for multiple residential structures on the site, a developer is able to produce housing at a lower overall price point. This broadens the potential market for the housing, reducing market risk.

The following are summary pro formas for these development forms. The assumed pricing levels in these examples was included as an example, with actual pricing varied at based on a series of seventeen discrete pricing bands identified in the study area.



**SUMMARY OF DEVELOPMENT PROTOTYPES, RENTAL RESIDENTIAL ANALYSIS**

		Current Zoning Assumptions				New Zoning Assumptions			
		Rental_Middle_SFR	Rental_Middle_Skinny	Rental_Middle_Duplex	Rental_Middle_Triplex	Rental_Middle_SFR_2	Rental_Middle_Skinny_2	Rental_Middle_Duplex_2	Rental_Middle_Triplex_2
<b>PROGRAM</b>	<b>Property Assumptions</b>								
	Site Size (SF)	5,000	2,500	4,500	5,000	5,000	2,500	4,500	5,000
	Density	8.71	17.42	19.36	26.14	8.71	17.42	19.36	26.14
	Unit Count	1	1	2	3	1	1	2	3
	Ave Unit Size	2,750	1,850	1,700	1,100	2,500	1,500	1,250	833
	Efficiency Ratio	100%	100%	100%	100%	100%	100%	100%	100%
	Building Square Feet	2,750	1,850	3,400	3,300	2,500	1,500	2,500	2,499
	Stories	2	3	2	1.5			1.5	2.0
	Bldg Footprint	1,375	617	1,700	3,300			2,500	2,499
	FAR	0.55	0.74	0.76	0.66	0.50	0.60	0.56	0.50
	Total Parking Spaces	2	1	2	2	2	1	2	2
	Parking Spaces - Surface	-	1	-	-	-	1	-	-
	Parking Spaces - Structure	2	-	2	2	2	-	2	2
	Structured Parking %	100%	0%	100%	100%	100%	0%	100%	100%
	<b>Cost Assumptions</b>								
	Base Construction Cost/SF	\$185	\$185	\$185	\$185	\$185	\$185	\$185	\$185
	Adjustment Factor	0%	0%	0%	0%	0%	0%	0%	0%
	Construction Cost/SF	\$185	\$185	\$185	\$185	\$185	\$185	\$185	\$185
Base Parking Costs/Space	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	
Adjustment Factor	0%	0%	0%	0%	0%	0%	0%	0%	
Parking Cost/Space	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	
<b>INCOME</b>	<b>Income Assumptions</b>								
	Achievable Pricing	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00	\$2.00
	Parking Charges/Space/Mo	\$100	\$100	\$100	\$100	\$100	\$100	\$100	\$100
	<b>Expenses</b>								
	Vacancy/Collection Loss	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%	5.0%
	Operating Expenses	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%	32.0%
Reserve & Replacement	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	
<b>Valuation</b>									
Capitalization Rate	5.50%	5.50%	6.00%	6.00%	6.00%	6.00%	6.00%	6.00%	
<b>SUPPORTABLE PROPERTY VALUE</b>	<b>Cost</b>								
	Cost/Construct w/o prkg.	\$508,750	\$342,250	\$629,000	\$610,500	\$462,500	\$277,500	\$462,500	\$462,315
	Total Parking Costs	\$40,000	\$0	\$40,000	\$40,000	\$40,000	\$0	\$40,000	\$40,000
	Estimated Project Cost	\$548,750	\$342,250	\$669,000	\$650,500	\$502,500	\$277,500	\$502,500	\$502,315
	<b>Income</b>								
	Annual Base Income	\$66,000	\$44,400	\$81,600	\$79,200	\$60,000	\$36,000	\$60,000	\$59,976
	Annual Parking	\$2,400	\$0	\$2,400	\$2,400	\$2,400	\$0	\$2,400	\$2,400
	Gross Annual Income	\$68,400	\$44,400	\$84,000	\$81,600	\$62,400	\$36,000	\$62,400	\$62,376
	Less: Vacancy & CL	\$3,420	\$2,220	\$4,200	\$4,080	\$3,120	\$1,800	\$3,120	\$3,119
	Effective Gross Income	\$64,980	\$42,180	\$79,800	\$77,520	\$59,280	\$34,200	\$59,280	\$59,257
	Less Expenses:								
	Operating Expenses	\$20,794	\$13,498	\$25,536	\$24,806	\$18,970	\$10,944	\$18,970	\$18,962
	Reserve & Replacement	\$1,949	\$1,265	\$2,394	\$2,326	\$1,778	\$1,026	\$1,778	\$1,778
	Annual NOI	\$42,237	\$27,417	\$51,870	\$50,388	\$38,532	\$22,230	\$38,532	\$38,517
	<b>Property Valuation</b>								
Return on Cost	7.70%	8.01%	7.75%	7.75%	7.67%	8.01%	7.67%	7.67%	
Threshold Return on Cost	6.33%	6.33%	6.90%	6.90%	6.90%	6.90%	6.90%	6.90%	
Residual Property Value	\$119,029	\$91,220	\$82,739	\$79,761	\$55,935	\$44,674	\$55,935	\$55,905	
<b>RPV/SF</b>	<b>\$23.81</b>	<b>\$36.49</b>	<b>\$18.39</b>	<b>\$15.95</b>	<b>\$11.19</b>	<b>\$17.87</b>	<b>\$12.43</b>	<b>\$11.18</b>	



## SUMMARY OF DEVELOPMENT PROTOTYPES, OWNERSHIP RESIDENTIAL ANALYSIS

		Current Zoning Assumptions				New Zoning Assumptions			
		Condo_Middle_SFR	Condo_Middle_Skinny	Condo_Middle_Duplex	Condo_Middle_Triplex	Condo_Middle_SFR_2	Condo_Middle_Skinny_2	Condo_Middle_Duplex_2	Condo_Middle_Triplex_2
<b>PROGRAM</b>	<b>Property Assumptions</b>								
	Site Size (SF)	5,000	2,500	4,500	5,000	5,000	2,500	4,500	5,000
	Density	9	17	19	26	9	17	19	26
	Unit Count	1	1	2	3	1	1	2	3
	Ave Unit Size	2,750	1,850	1,700	1,100	2,500	1,500	1,250	833
	Building Square Feet	2,750	1,850	3,400	3,300	2,500	1,500	2,500	2,499
	Stories								
	Bldg Footprint								
	FAR	0.55	0.74	0.76	0.66	0.50	0.60	0.56	0.50
	Parking Ratio/Unit	2.00	1.00	1.00	0.66	2.00	1.00	1.00	0.66
	Total Parking Spaces	2	1	2	2	2	1	2	2
	Parking Spaces - Surface	-	1	-	-	-	1	-	-
	Parking Spaces - Structure	2	-	2	2	2	-	2	2
	<b>Cost Assumptions</b>								
	Base Construction Cost/SF	\$197	\$197	\$197	\$197	\$197	\$197	\$197	\$197
Parking Cost/Space	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	\$20,000	
<b>INCOME</b>	<b>Income Assumptions</b>								
	Achievable Pricing	\$300	\$300	\$300	\$300	\$300	\$300	\$300	\$300
	Parking Charges/Space	\$21,875	\$21,875	\$21,875	\$21,875	\$21,875	\$21,875	\$21,875	\$21,875
	<b>Expenses</b>								
Sales Commission	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	
<b>SUPPORTABLE PROPERTY VALUE</b>	<b>Cost</b>								
	Cost/Construct w/o prkg.	\$541,750	\$364,450	\$669,800	\$650,100	\$492,500	\$295,500	\$492,500	\$492,303
	Total Parking Costs	\$40,000	\$0	\$40,000	\$40,000	\$40,000	\$0	\$40,000	\$40,000
	Estimated Project Cost	\$581,750	\$364,450	\$709,800	\$690,100	\$532,500	\$295,500	\$532,500	\$532,303
	<b>Income</b>								
	Gross Income - Units	\$825,000	\$555,000	\$1,020,000	\$990,000	\$750,000	\$450,000	\$750,000	\$749,700
	Gross Income - Parking	\$43,750	\$0	\$43,750	\$43,750	\$43,750	\$0	\$43,750	\$43,750
	Gross Sales Income	\$868,750	\$555,000	\$1,063,750	\$1,033,750	\$793,750	\$450,000	\$793,750	\$793,450
	Less: Commission	(\$34,750)	(\$22,200)	(\$42,550)	(\$41,350)	(\$31,750)	(\$18,000)	(\$31,750)	(\$31,738)
	Effective Gross Income	\$834,000	\$532,800	\$1,021,200	\$992,400	\$762,000	\$432,000	\$762,000	\$761,712
	<b>Property Valuation</b>								
Return on Sales	43.36%	46.19%	43.87%	43.81%	43.10%	46.19%	43.10%	43.10%	
Threshold Return on Cost	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	15.00%	
Residual Property Value	\$143,467	\$98,854	\$178,200	\$172,857	\$130,109	\$80,152	\$130,109	\$130,055	
<b>RPV/SF</b>	<b>\$28.69</b>	<b>\$39.54</b>	<b>\$39.60</b>	<b>\$34.57</b>	<b>\$26.02</b>	<b>\$32.06</b>	<b>\$28.91</b>	<b>\$26.01</b>	



## II. PREDICTIVE DEVELOPMENT MODELING

### Description of Model

Johnson Economics used a predictive development model, which is designed to estimate the marginal impact of changes in the development environment on the expected magnitude and character of development. The model is designed to predict the magnitude and form of likely development or redevelopment activity over an assumed time frame. The primary approach used to predict likely development patterns is the relationship between the supportable residual land value for prospective uses and the current value of the property (including land as well as improvements, if any). The underlying assumption is that when the value of a property for new development is high relative to the current value of the property, it will be more likely to see development or redevelopment over a defined time-period.

The model is designed to generate an estimated ratio between the current value of a parcel and the underlying value of the parcel under potential development scenarios. This ratio is used as the primary indicator of the likelihood of development or redevelopment. Within the model, we use Real Market Value (RMV) from the assessors' office as a proxy for the value of the site. While we understand that this is an imperfect measure, it is readily available at the parcel level and any inherent bias is expected to be largely consistent. The residual land value is determined using a series of simplified pro formas that represent potential development forms. The resulting ratio between current and residual value has proven to be a strong predictor of the likelihood of development or redevelopment at the parcel level.

The model solves for a development solution that represents the highest and best use at the parcel level under the assumptions used, as well as outputting an associated residual property value. The highest and best use of each parcel is defined as the allowable land use program that yields the greatest return to the existing property, and the residual property value reflects the maximum acquisition value supported by that program under the assumptions used. For this analysis, the model evaluated a total of 16 prototypical programs which cover the range of residential development forms allowed under the current and proposed zoning on parcels zoned R2.5, R5 and R7. An entitlement screen narrows the allowed use types to reflect existing and proposed zoning.

The probability of development/redevelopment activity is predicted by the model at the parcel level based on the ratio generated by dividing the current value (RMV) by the indicated residual land value. A shift in assumptions that increases the value of the property under a new development scenario, such as higher achievable pricing or less restrictive entitlements, will increase the denominator in this ratio as well as the likeliness of development or redevelopment. Sites with relatively high current values resulting from significant physical improvements will have a relatively high numerator and will be significantly less likely to redevelop.

The model evaluates the likelihood of development at the parcel level, although the results are expressed in aggregated geographies. What the model solves for is probabilities to redevelop as well as anticipated development forms, and the results reflect the expected value of development/redevelopment activity. The model will not indicate that a specific parcel will or won't redevelop, it will change the probability of that occurrence as well as the likely form of development.



In summary, the model uses the relationship between current value of the property and the indicated value of the property under the highest and best use development prototype as the primary predictive measure of the likelihood of development and/or redevelopment.

#### Pricing Gradients

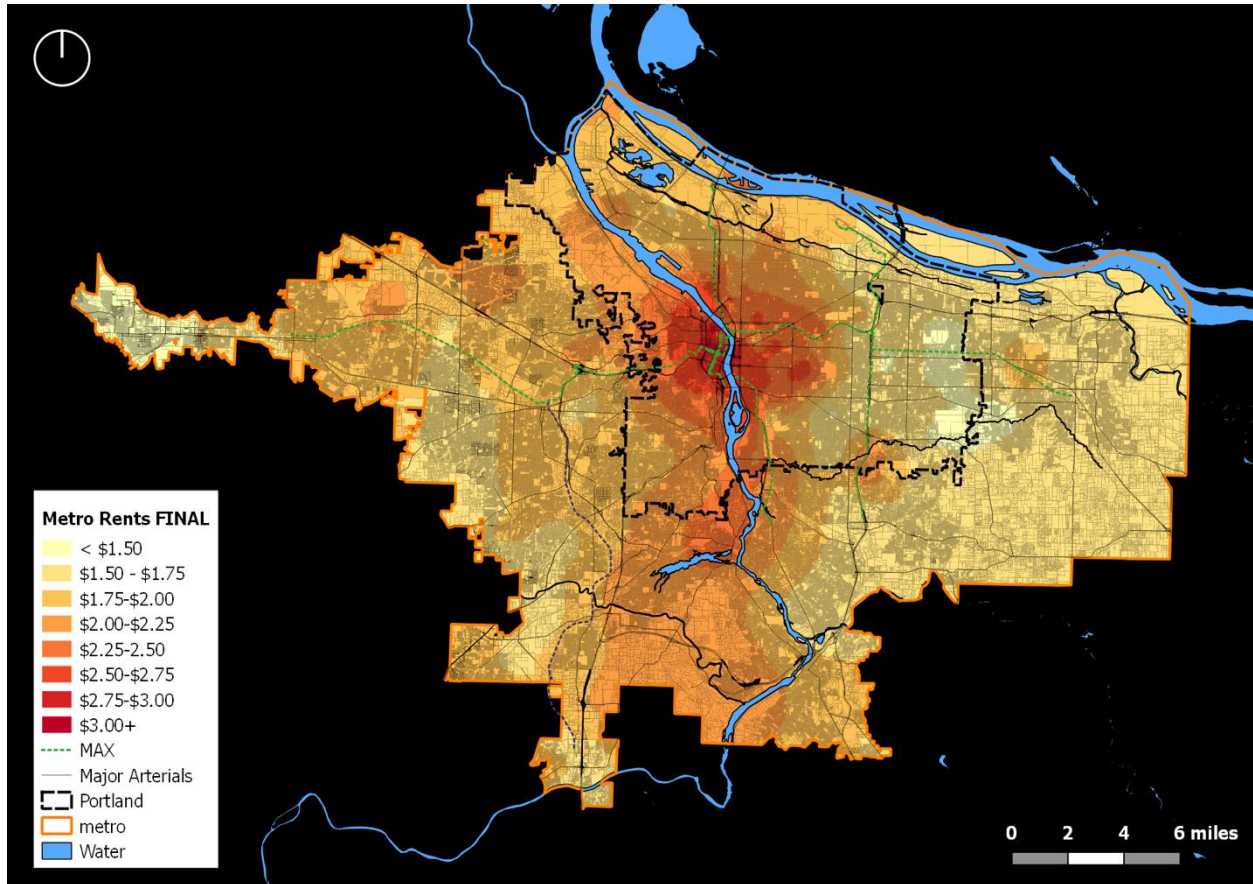
The analysis summarized in this memorandum evaluated the parcels using a more sophisticated approach than used previously, with achievable pricing estimated at the parcel level and both ownership and rental residential developments evaluated.

The data requirements at the parcel level are relatively simple, and readily available through Metro's RLIS data. This includes physical data such as square footage, net developable area, current real market value (RMV), zoning, and parcel reference numbers. The parcel database is further refined to include market information. For residential uses, the model uses parcel-specific pricing data, which has been imported to the parcel database to populate the achievable pricing field for these uses. Johnson Economics has generated a pricing gradient map to estimate achievable pricing for residential products at the parcel level. Whereas previous versions of this analysis divided the study area into areas with set rental prices, this analysis used interpolation methods in GIS software to set the rental prices at the tax lot level.

Two different rental data sets were used to establish the rental pricing assumptions: Rainmaker and Axiometrics. The following map illustrates the rent gradient produced by this process within the Metro area.



## RENTAL RESIDENTIAL ACHIEVABLE RENT GRADIENT, 2017



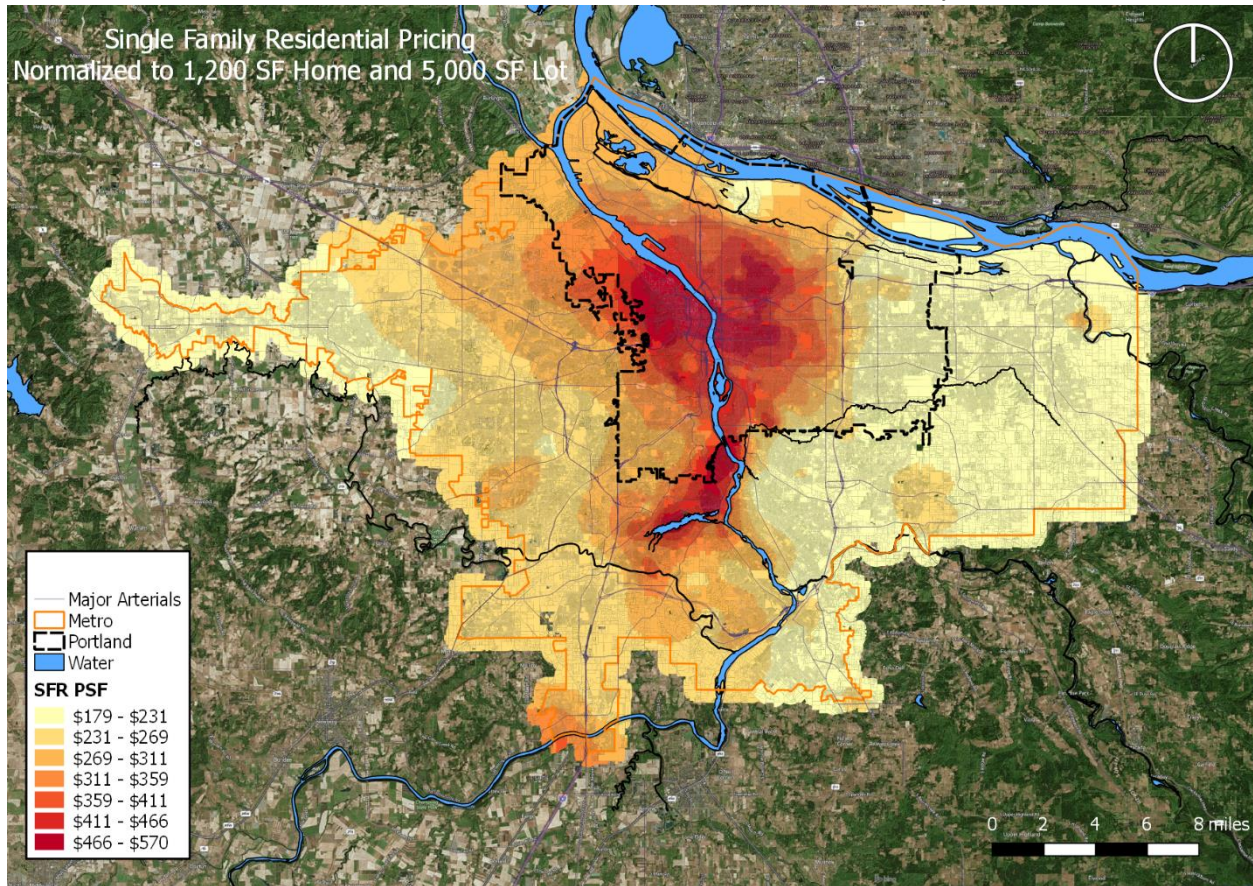
Johnson Economics created a similar surface for ownership residential sales. As home sales (and rents) can vary from neighborhood-to-neighborhood and, even, street to street, it is important to work towards this type of mapping to give a more accurate look at potential future redevelopment.

There are a limited number of ways to obtain sales data, and each has their plusses and minuses. For the use in these iterations of the interpolated sales surface, Johnson Economics obtained sales data by way of county assessor records. These obtained records went back to 1996 and consisted of sales records in Clackamas, Multnomah, and Washington Counties. This data was supplemented with data from RMLS.





### SINGLE-FAMILY RESIDENTIAL ACHIEVABLE SALES PSF GRADIENT, 2017



The model as constructed cannot address parcel level pricing at this time, so the study was broken down into seventeen separate pricing districts, which have similar achievable price points. The table to the right shows the seventeen pricing bins, the number of parcels in that bin, as well as the average residential rent per square foot and the average sales price per square foot in that bin. Just over 100,000 parcels were evaluated, which represented all parcels zoned either R7, R5, or R2.5 in the study area.

Bin	# of Parcels	Residential Rent/SF	Sales Price/SF
1	632	\$1.25	\$178
2	3,915	\$1.39	\$199
3	6,073	\$1.52	\$217
4	7,702	\$1.69	\$241
5	12,716	\$1.83	\$261
6	20,729	\$2.00	\$286
7	17,476	\$2.20	\$314
8	7,514	\$2.35	\$335
9	9,805	\$2.47	\$353
10	6,236	\$2.62	\$374
11	3,866	\$2.76	\$394
12	2,081	\$2.91	\$416
13	953	\$3.07	\$438
14	373	\$3.21	\$458
15	226	\$3.35	\$479
16	262	\$3.69	\$526
17	102	\$4.37	\$625
Total	100,661	\$2.12	\$302





### Model Output

Our predictive development model was run for two scenarios, reflecting current and proposed development standards. The model evaluated marginal shifts in entitlement that allowed for the development of triplexes on corner lots in R5 and R7 sites, as well as duplexes on interior lots. In addition, it adjusted the assumed square footage of structures associated with the proposed FAR restrictions, as well as the alternative entitlements for corner lots.

The results showed an expected aggregate reduction in the level of construction investment but a modestly higher number of predicted new residential units in the study area. As with the previous proposed code language, the reduced allowable building area had a larger negative impact on residual land values than the offsetting increase in allowable units. Despite a lower number of predicted redevelopment occurrences, the higher allowable unit yield translates into a higher number of expected units, particularly net new units (after deducting for units lost during redevelopment). The output reflects a lower aggregate level of redevelopment, but a greater unit density, expected net unit yield, and lower price point per unit on properties that do redevelop.

The output of the model differs from the previous version as it evaluated both rental residential as well as ownership residential programs. As developers tend to work within either one or the other tenure options, we evaluated them separately.

The predicted development yield from residential development/redevelopment in the study area was 12,266 units over the next twenty years under the current zoning, increasing to 12,481 units under the proposed new zoning. The construction of these units will entail the loss of existing residential capacity, which is reflected in the net unit estimates. The impact on rental residential pricing was highly significant, with average rents dropping by over a third. This reflects a change in unit size as opposed to reduced rents per square foot, which would be expected to be higher.

## SUMMARY OF PREDICTED DEVELOPMENT ACTIVITY WITH PROPOSED MODIFICATIONS IN ZONING CODES 20 Year Study Period , No Pricing Changes

	Predicted Development Yield				
	Construction Investment	New Units	Replaced Units	Net Units	Average Rent
<b>BASELINE</b>					
New Construction	\$5,049,417,244	12,266	(6,684)	5,582	\$4,597
<b>NEW ZONING</b>					
New Construction	\$3,369,470,704	12,481	(5,187)	7,294	\$2,997
<b>NET IMPACT</b>					
Total	<b>(\$1,536,994,762)</b>	<b>215</b>	<b>1,498</b>	<b>1,713</b>	<b>-\$1,600</b>
% Change	-30%	2%	-22%	31%	-35%

When output is broken down by pricing bin, we see the greatest impact on pricing to be in lower priced areas, where higher-priced single-family homes are replaced with smaller and higher density programs. The lowest priced neighborhoods have no predicted redevelopment under either the baseline or new zoning scenario.



**SUMMARY OF RENTAL ANALYSIS RESULTS AT THE PRICING BIN LEVEL**

Pricing Bin	# of Parcels	Residential Rent/SF	Sales Price/SF	Baseline		New Zoning		Net Change		
				Units	Avg. Rent	Units	Avg. Rent	Units	Avg. Price	% Price
1	632	\$1.25	\$178	0	\$0	0	\$0	0	\$0	0%
2	3,915	\$1.39	\$199	0	\$0	0	\$0	0	\$0	0%
3	6,073	\$1.52	\$217	0	\$0	0	\$0	0	\$0	0%
4	7,702	\$1.69	\$241	1,212	\$3,873	1	\$4,648	(1,211)	\$774	20%
5	12,716	\$1.83	\$261	1,127	\$3,974	1,228	\$2,137	101	(\$1,838)	-46%
6	20,729	\$2.00	\$286	2,259	\$4,817	3,168	\$2,710	909	(\$2,108)	-44%
7	17,476	\$2.20	\$314	1,874	\$5,467	2,918	\$2,907	1,044	(\$2,559)	-47%
8	7,514	\$2.35	\$335	2,071	\$4,142	1,892	\$3,105	(179)	(\$1,037)	-25%
9	9,805	\$2.47	\$353	2,642	\$4,478	2,365	\$3,415	(277)	(\$1,063)	-24%
10	6,236	\$2.62	\$374	628	\$4,834	516	\$3,721	(112)	(\$1,113)	-23%
11	3,866	\$2.76	\$394	299	\$5,131	263	\$3,996	(36)	(\$1,135)	-22%
12	2,081	\$2.91	\$416	35	\$6,369	23	\$5,504	(12)	(\$865)	-14%
13	953	\$3.07	\$438	20	\$6,508	14	\$5,701	(6)	(\$807)	-12%
14	373	\$3.21	\$458	13	\$6,161	10	\$5,136	(3)	(\$1,025)	-17%
15	226	\$3.35	\$479	6	\$7,203	5	\$6,365	(1)	(\$838)	-12%
16	262	\$3.69	\$526	17	\$6,989	16	\$5,708	(1)	(\$1,281)	-18%
17	102	\$4.37	\$625	63	\$8,085	62	\$6,555	(1)	(\$1,530)	-19%
Total	100,661	\$2.12	\$302	12,266	\$4,597	12,481	\$2,997	215	(\$1,600)	-35%

The same analysis was completed for ownership residential programs, which also yielded an expected reduction in units developed, while average price points declined by just over 24%. As with the rental market, the reduction in pricing reflects smaller average unit sizes delivered.

Under the assumptions used, rental residential largely outbid ownership residential solutions in the current pricing environment. Over the study period, the relationship between rental and ownership residential units will likely change, with ownership units shifting to the highest and best use solution. We would expect the dynamics to remain consistent though, with the marginal shift in development generating significantly smaller and thus more affordable units. The overall rate of redevelopment and residential investment would be lower, but the unit yield would likely be higher.

### III. SUMMARY

As with the previous study, our analysis indicates that the proposed changes in entitlements would likely result in a lower rate of development and redevelopment in the study area, yielding less in terms of residential investment but likely a similar number of new units. The modest increase in allowable units is offset by the lower allowed square footage of new development, which generally reduces the supportable land value for new development. The lower supportable land value decreases the likelihood of redevelopment on a significant number of parcels.

Sites that do redevelop under the proposed modifications would be expected to deliver units at a generally lower price point and higher unit density. When adjusted to reflect net new units (deducting units lost during redevelopment), the net unit yield is significantly higher.