

# ArcGIS Urban Configuration Methodology (DRAFT)

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## I. ArcGIS Urban Introduction and Purpose

ESRI's ArcGIS Urban is a planning and modeling program with an interactive 3D basemap that has allowed the City of Boulder to evaluate the performance of potential land use changes. General information regarding ArcGIS Urban is available at [Create Smart Cities and Communities with ArcGIS Urban](#). The City of Boulder staff has utilized the ArcGIS Urban Land Use Plan Module as a pilot tool for scenario planning on the East Boulder Subcommunity Plan project.

The platform, when coupled with reliable data, can project and measure future land use alternatives. ArcGIS Urban measures the performance of the changes as “capacity indicators” representing population, jobs, households, energy use, trips, carbon emissions, and water usage. As with any projection or scenario modeling tool, the results of the potential land use changes are estimates.

## II. ArcGIS Urban Configuration Methodology

While the ArcGIS comes with a default configuration loaded, the settings were not representative of the City's development code. In order to utilize the ArcGIS Urban platform to create scenarios and projections it was configured to be a close representation of the City's current land use conditions and regulations.

The configuration utilizes two types of data. The first type of data is the City's current geospatial (GIS) data which exists in the City's Open Data Catalogue. The following is a list of GIS data uploaded into the model:

1. Parcels
2. 3D buildings
3. City limits
4. East Boulder Subcommunity Plan Boundary
5. Railroad
6. Streets
7. Height Exemption Areas
8. Building footprints
9. Zoning
10. Land use
11. Park site boundaries
12. Lakes & reservoirs
13. Effective floodplains
14. OSMP properties

The second type of data came from research of various sources and was input into the “Types” categories. The types configured for the East Boulder Subcommunity Plan land

use plan module were “space use”, “land use”, and “buildings”. ArcGIS Urban allows for the creation of the existing or current types in the permanent configuration of the application along with allowing temporary, proposed types for exploration in the plan editor module. The configuration examples in the following pages do not include any temporary or proposed types as they are flexible and may be temporary in nature based on the needs of the plan development.

### Space Use Types

The space use is an activity allowed within a given area. 24 space uses were created from the Boulder Revised Code (BRC), Title 9 Land Use Code, Chapter 6 Use Standards. Spaces uses are the one type within the ArcGIS Urban Model that all the other types are built upon. To create a manageable ArcGIS Urban model and due to the numerous, highly differentiated uses in the BRC, the space uses created were representative examples of the overarching use categories. For example, residential spaces use (RES\_) were condensed into 7 residential categories from 25 listed in the BRC Use Standards.

The following is a list of all the space use types created for the ArcGIS Urban Model:

- |   |  |
|---|--|
| A. RES_Single Family Detached             | N. OMF_Medical Offices                     |
| B. RES_Single Family Attached             | O. OMF_Financial Offices                   |
| C. RES_Multi-Family                       | P. Park, Recreation and Leisure            |
| D. RES_Group Quarters                     | Q. CRI_Services                            |
| E. RES_Live-work                          | R. CRI_Retail Sales                        |
| F. RES_Mobile Home Parks                  | S. CRI_Vehicle Related Retail and Services |
| G. RES_Accessory Dwelling Units           | T. CRI_Industrial Light                    |
| H. RES_Efficiency Units                   | U. CRI_Industrial Heavy                    |
| I. DE_Dining                              | V. Agriculture and Natural Resources       |
| J. DE_Entertainment                       | W. Accessory                               |
| K. Lodging                                | X. Parking                                 |
| L. Public and Institutional               |  |
| M. OMF_Professional and Technical Offices |  |

Space use types were then populated with additional data and information. The ArcGIS Urban configuration utilizes numerical information in first and second order coefficients to generate results on the capacity indicators.

The first order coefficients included area per household in square feet (sqft) for residential spaces uses which calculated the number of dwelling units by type,

area per person (sqft) within each residential household to calculate population based on the overall residential land use changes, and area per person (sqft) per job within commercial space uses to calculate jobs by type (Table 1).

Second order coefficients populated in each space use included required parking, daily trips, energy use, carbon emissions, internal water use, external water use, waste water and solid waste generation (Table 2 -

Table 3)

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Table 1 Space Use Type Configuration Summary – Part A

ArcGIS Urban Space Use Type Configuration 1st & 2nd Order Coefficients Tabular Data		Population Statistics <sup>1</sup> <i>residential uses</i>	Housing Unit Statistics <sup>2,3</sup> <i>square feet (SF)</i>	Area Per Person	Job Statistics <sup>4</sup> <i>square feet (SF)</i>
Space Use	Notes:	Persons/household	Mean Home SF	SF Allocated PP	SF per Job
1 RES_Single Family Detached	Typical Single-Family Detached Homes	2.26	2279	1008	
2 RES_Single Family Attached	Townhomes, Duplex, Triplex and Other attached Single-Family with dedicated private garages	2.26	2279	1008	
3 RES_Multi-Family	Mean Apt 2-4, Apt +5	2.26	1002	443	
4 RES_Group Quarters	Mean nursing home, assisted living, dorm	2.26	250	111	
5 RES_Live-work	Use SFA other non-res use less than 25%	2.26	2279	1008	
6 RES_Mobile Home Parks		2.26	1002	443	
7 RES_Accessory Dwelling Units	SFD	2.26	500	221	
8 RES_Efficiency Units	Buildings consisting of 5+ Units	2.26	350	155	
9 DE_Dining	Mean restaurant, fast food & other food service				303
10 DE_Entertainment					303
11 Lodging	Hotel				303
12 Public and Institutional	Mean Library, Public Assembly, Colleges, Schools, Daycares, other public office/safety				303
13 OMF_Professional and Technical Offices	Mean Admin/prof office, govt office, MU office, other office				285
14 OMF_Medical Offices	Mean non-diag and diag, clinic, hosp				285
15 OMF_Financial Offices					285
16 Park, Recreation and Leisure					600
17 CRI_Services	Mean strip mall, other service, other retail, other outpatient health				303
18 CRI_Retail Sales	Mean retail, other retail, strip shopping, enclosed mall, convenience stores, grocery, other food sales				303
19 CRI_Vehicle Related Retail and Services	Mean vehicle dealership, service, storage				600
20 CRI_Industrial Light	Mean refridge/non refridge warehouse, dist ctr, lab, other office				600
21 CRI_Industrial Heavy	Mean refridge/non refridge warehouse, dist ctr, lab, other office				600
22 Agriculture and Natural Resources	Utilize non-refridge warehouse similar to non-conditioned storage				600
23 Accessory					
24 Parking					

<sup>1</sup> US Census Bureau, Quick Facts City of Boulder, 2019, <https://www.census.gov/quickfacts/bouldercitycolorado>

<sup>2</sup> US Census Bureau, Number of Multifamily Units Completed by Square Feet per Unit, 2019, <https://www.census.gov/construction/charts/>

<sup>3</sup> US Census Bureau, Median and Average Square Feet of Floor Area in New Single-Family Houses Completed, 2019, <https://www.census.gov/construction/charts/>

<sup>4</sup> The job by square foot estimates by space use were correlated to the City of Boulder Boulder Valley Comprehensive Plan 2010 job projections by zone and use category.

Table 2 Space Use Type Configuration Summary – Part B

ArcGIS Urban Space Use Type Configuration 1st & 2nd Order Coefficients Tabular Data		Parking Spots <sup>5</sup> by Dwelling Unit (DU) or Job			Trips <sup>6</sup> single occupancy vehicle trips			Energy Use <sup>7,8</sup> Kilowatt hours					CO2 Emissions <sup>9</sup> tons	
Space Use	Notes:	space/DU	SF	space/job	Per HH(du)	per KSF	Per Job	KBTU/SF/yr (I-P Units)	kWH/SF/yr	kwh/sf/day	SF per Person (2.26 P/HH)	kwh/hh	khw/job	t/d/pp
1 RES_Single Family Detached	Typical Single-Family Detached Homes	2.00			9.44			20	5.86	0.0161	1008.4	16.2		0.02
2 RES_Single Family Attached	Townhomes, Duplex, Triplex and Other attached Single-Family with dedicated private garages	1.50			7.32			23	6.74	0.0185	1008.4	18.6		0.02
3 RES_Multi-Family	Mean Apt 2-4, Apt +5	1.25			5.44			25.5	7.47	0.0205	443.4	9.1		0.02
4 RES_Group Quarters	Mean nursing home, assisted living, dorm	0.50			4			37.5	10.99	0.0301	250.0	7.5		0.02
5 RES_Live-work	Use SFA other non-res use less than 25%	2.00			6.83			23	6.74	0.0185	1008.4	18.6		0.02
6 RES_Mobile Home Parks		2.00			5			27	7.91	0.0217	443.4	9.6		0.02
7 RES_Accessory Dwelling Units	SFD	1.00			5.44			20	5.86	0.0161	221.2	3.6		0.02
8 RES_Efficiency Units	Buildings consisting of 5+ Units	1.00			5.44			23	6.74	0.0185	154.9	2.9		0.02
9 DE_Dining	Mean restaurant, fast food & other food service		175	1.73		25	7.575	95	27.84	0.0763	303		23.1	0.05
10 DE_Entertainment			175	1.73		25	7.575	13	3.81	0.0104	303		3.2	0.05
11 Lodging	Hotel		300	1.01		4.5	1.3635	28	8.21	0.0225	303		6.8	0.05
12 Public and Institutional	Mean Library, Public Assembly, Colleges, Schools, Daycares, other public office/safety		300	1.01		11	3.333	25	7.33	0.0201	303		6.1	0.05
13 OMF_Professional and Technical Offices	Mean Admin/prof office, govt office, MU office, other office		300	0.95		20	5.7	23.75	6.96	0.0191	285		5.4	0.05
14 OMF_Medical Offices	Mean non-diag and diag, clinic, hosp		300	0.95		20	5.7	30.5	8.94	0.0245	285		7.0	0.05
15 OMF_Financial Offices			300	0.95		20	5.7	31	9.09	0.0249	285		7.1	0.05
16 Park, Recreation and Leisure			300	2.00		10	6	14	4.10	0.0112	600		6.7	0.05
17 CRI_Services	Mean strip mall, other service, other retail, other outpatient health		300	1.01		20	6.06	30.5	8.94	0.0245	303		7.4	0.05
18 CRI_Retail Sales	Mean retail, other retail, strip shopping, enclosed mall, convenience stores, grocery, other food sales		300	1.01		20	6.06	45.12	13.22	0.0362	303		11.0	0.05
19 CRI_Vehicle Related Retail and Services	Mean vehicle dealership, service, storage		1000	0.60		20	12	18.5	5.42	0.0149	600		8.9	0.05
20 CRI_Industrial Light	Mean refridge/non refridge warehouse, dist ctr, lab, other office		1000	0.60		8	4.8	34	9.96	0.0273	600		16.4	0.05
21 CRI_Industrial Heavy	Mean refridge/non refridge warehouse, dist ctr, lab, other office		1000	0.60		4	2.4	34	9.96	0.0273	600		16.4	0.05
22 Agriculture and Natural Resources	Utilize non-refridge warehouse similar to non-conditioned storage		300	2.00		2.15	1.29	8	2.34	0.0064	600		3.9	0.05
23 Accessory													0.00	
24 Parking													0.00	

5 Parking estimations taken from City of Boulder Municipal Code [https://library.municode.com/co/boulder/codes/municipal\\_code?nodeid=TIT9LAUSCO\\_CH9DEST\\_9-9-6PAST](https://library.municode.com/co/boulder/codes/municipal_code?nodeid=TIT9LAUSCO_CH9DEST_9-9-6PAST)  
6 Fox Tuttle, East Boulder Subcommunity Trip Making and Parking Projection, 30 Nov 2020  
7 ASHRAE, Addendum b to ANSI/ASHRAE/IES Standard 100-2015, Energy Efficiency in Existing Buildings, ASHRAE TABLE 7-2c ELECTRIC SITE, Climate Zone 5B, 2017,p8-11  
8 Conversion rate: 1 kWh x 3.4121416331 = 3.4121416 kbtu  
9 Lotus Engineering & Sustainability, Boulder County's 2016 Greenhouse Gas Emissions Inventory and Modeling Report, 2018, <https://assets.bouldercounty.org/wp-content/uploads/2018/12/2016-ghg-inventory-and-strategies-report-october-2018-final.pdf>

Table 3 Space Use Type Configuration Summary – Part C

ArcGIS Urban Space Use Type Configuration 1st & 2nd Order Coefficients Tabular Data		Internal Water Use Gallons		External Water Use Gallons		Waste Water <sup>14</sup> Gallons		Solid Waste <sup>15</sup> Pounds
Space Use	Notes:	gpd/hh <sup>10</sup>	gpd/job <sup>11</sup>	gpd/hh <sup>12</sup>	gpd/job <sup>13</sup>	gpd/hh	gpd/job	pp/d
1 RES_Single Family Detached	Typical Single-Family Detached Homes	185		225		185		5.8
2 RES_Single Family Attached	Townhomes, Duplex, Triplex and Other attached Single-Family with dedicated private garages	185		225		185		5.8
3 RES_Multi-Family	Mean Apt 2-4, Apt +5	185		225		185		5.8
4 RES_Group Quarters	Mean nursing home, assisted living, dorm	185		225		185		5.8
5 RES_Live-work	Use SFA other non-res use less than 25%	185		225		185		5.8
6 RES_Mobile Home Parks		185		225		185		5.8
7 RES_Accessory Dwelling Units	SFD	185		225		185		5.8
8 RES_Efficiency Units	Buildings consisting of 5+ Units	185		225		185		5.8
9 DE_Dining	Mean restaurant, fast food & other food service		50.1		not available		50.1	5.8
10 DE_Entertainment			50.1		not available		50.1	5.8
11 Lodging	Hotel		50.1		not available		50.1	5.8
12 Public and Institutional	Mean Library, Public Assembly, Colleges, Schools, Daycares, other public office/safety		50.1		not available		50.1	5.8
13 OMF_Professional and Technical Offices	Mean Admin/prof office, govt office, MU office, other office		50.1		not available		50.1	5.8
14 OMF_Medical Offices	Mean non-diag and diag, clinic, hosp		50.1		not available		50.1	5.8
15 OMF_Financial Offices			50.1		not available		50.1	5.8
16 Park, Recreation and Leisure			50.1		not available		50.1	5.8
17 CRI_Services	Mean strip mall, other service, other retail, other outpatient health		50.1		not available		50.1	5.8
18 CRI_Retail Sales	Mean retail, other retail, strip shopping, enclosed mall, convenience stores, grocery, other food sales		50.1		not available		50.1	5.8
19 CRI_Vehicle Related Retail and Services	Mean vehicle dealership, service, storage		50.1		not available		50.1	5.8
20 CRI_Industrial Light	Mean refridge/non refridge warehouse, dist ctr, lab, other office		50.1		not available		50.1	5.8
21 CRI_Industrial Heavy	Mean refridge/non refridge warehouse, dist ctr, lab, other office		50.1		not available		50.1	5.8
22 Agriculture and Natural Resources	Utilize non-refridge warehouse similar to non-conditioned storage		50.1		not available		50.1	5.8
23 Accessory					not available			
24 Parking					not available			

<sup>10</sup> Waskom, R., et al. HOMEOWNER'S GUIDE TO: Household Water Conservation, Colorado State University Extension, 2018, <https://extension.colostate.edu/docs/pubs/consumer/xcm219.pdf>

<sup>11</sup> US Energy Information Administration, 2012 Commercial Buildings Energy Consumption Survey: Water Consumption in Large Buildings Summary, 2017, <https://www.eia.gov/consumption/commercial/reports/2012/water/#:~:text=On%20a%20daily%20basis%2C%20they,and%2050.1%20gallons%20per%20worker.>

<sup>12</sup> Assumes residential wastewater is equivalent to internal water use.

<sup>13</sup> Non-residential water use was not calculated at this time. This coefficient is fairly complicated due the variety of the property types and uses driving external water use. To supply this coefficient would require a further level of research to ensure data reliability.

<sup>14</sup> Wastewater is assumed to be the equivalent of internal water use

<sup>15</sup> Colorado Department of Public Health and Environment, FY2019 Annual Report to the Colorado General Assembly Status of the Solid Waste Management Program in Colorado, 2020, <https://oitco.hilandcloud.com/Pop/docpop/docpop.aspx>

Land Use Types

Staff reviewed the Boulder Valley Comprehensive Plan (BVCP) for descriptions and general intent of use and intensity for each land use. All 25 land use categories were created as land use types within the ArcGIS Urban model. When configuring the land use types in ArcGIS, the platform required populating the allowed spaces uses into a given land use to measure the possible development impacts as capacity.

While the BVCP is not prescriptive in assigning specific use and intensity thresholds there was a correlation between land use category descriptions and the subsequent zoning district characteristics (Table 4). The zoning districts within the BRC provided prescriptive information regarding “Form and Bulk”, “Intensity” and “Use” standards that helped to populate Land Use types configuration in sufficient detail to allow the ArcGIS Urban platform to utilize the capacity indicators. For the purposes of the ArcGIS Urban modeling, the following zoning districts were assigned to the land use categories:

Table 4 Land Use to Zoning District Association

<b>Residential Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Very Low Density Residential	VLR	RR-1 RR-2
Low Density Residential	LR	RE, RL-1 RL-2
Manufactured Housing	MH	MH
Medium Density Residential	MR	RM-1 RM-2 RM-3
Mixed Density Residential	MXR	RMX-1 RMX-2
High Density Residential	HR	RH-1 RH-2 RH-3 RH-4 RH-5 RH-6 RH-7

<b>Mixed Use Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Mixed Use Business	MUB	BMS MU-1 MU-2 MU-3 MU-4
Mixed Use Industrial	MUI	IMS
Mixed Use Residential	MUR	MU-1 MU-2 MU-3 MU-4
<b>Industrial Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Community Industrial	CI	IS-1 IS-2
General Industrial	GI	IM, IG
Light Industrial	LI	IG
<b>Business Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Community Business	CB	BC-1, BC-2
General Business	GB	BC-1, BC-2
Transitional Business	TB	BT-1, BT-2
Regional Business	RB	BR-1 BR-2 DT-1 DT-2 DT-3 DT-4 DT-5
Service Commercial	SC	BCS



<b>Open Space Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Open Space, Acquired	OS-A	A P
Open Space, Development Rights	OS-DR	A P
Open Space, Other	OS-O	n/a
<b>Other Categories</b>		
<i>Land Use Category</i>	<i>Abbreviation</i>	<i>ArcGIS Urban Associated Zoning District</i>
Agricultural	AG	A
Park, Urban and Other	PK-U/O	P
Public	PUB	P
Environmental Preservation	EP	n/a
Natural Ecosystems Overlay	NEO	n/a

Table 5 summarizes the 8 configuration inputs required for the Land Use types. The land use types were configured for the East Boulder Subcommunity Plan to include definition regarding the target percentage of each use within the land use. Considering ArcGIS Urban does not allow for uses to be categorized by limited, conditional or use review, all uses under these categories were categorized allowed for the modeling purposes. The rationale was the limited, conditional, and use review uses were not expressly prohibited. If ESRI updates the ArcGIS Urban application to accommodate a more nuance classification of the allowed uses staff will review and revise the land use configuration accordingly.

In addition to allowed uses, maximum lot coverage was estimated. Currently, the zoning districts do not define maximum lot coverage. Lot coverage was defined in combination with land use efficiency or net area factor, as these two inputs provided a rough estimate of the space needed for circulation and general open space. This set aside a portion of the overall land. The maximum dwelling units per acre (DU/ac) and maximum floor area ratio (FAR) thresholds represented the ceiling of the density scale from the associated zoning districts. Lastly, the maximum height settings represented the by-right height limit and the maximum floors. Any exception to the by-right height limit was programmed into ArcGIS Urban according the Appendix J map and allowed for building height maximums up to 55'.

Table 5 Land Use Type Configuration Summary Table

Land Use	Description	Allowed Space UseTypes and Target Distribution	Maximum Lot Coverage	Maximum FAR	Maximum Height in feet	Max Dwelling Units per acre	Maximum Floors	Land Use Efficiency net area factor
AG	AGRICULTURAL	AG 80%; PUB 15%; RES_SFD 5%	10%	0	35		3	70%
CB	COMMUNITY BUSINESS	DE_ENT 15%; DE_DIN 15%; OMF_FIN 7%; OMF_MED 7%; OMF_PRO 6%; CRI_SVCS 15%; CRI_RET 20%; CRI_VEH 15%	80%	1	35		3	70%
CI	COMMERCIAL INDUSTRIAL	OMF_PRO 20%; CRI_INDL 60%; CRI_INDH 20%	80%	0.5	40		3	70%
EP	ENVIRONMENTAL PRESERVATION	N/A		0	0		0	70%
GB	GENERAL BUSINESS	DE_DIN 5%; DIN_ENT 5%; OMF_FIN 10%; OMF_MED 10%; OMF_PRO 10%; CRI_RET 10%; CRI_SVCS 10%; CRI_VEH 10%; LOD 5%; PKG 25%	80%	2.5	35		3	70%
GI	GENERAL INDUSTRIAL	OMF_PRO 20%; CRI_INDI 20%; CRI_INDH 60%	80%	0.5	40		3	70%
HR	HIGH DENSITY RESIDENTIAL	RES_SFA 20%; RES_MF 40%; RES_GQ 5%; RES_EFF 10%; PKG 25%	80%		35	80	3	70%
LI	LIGHT INDUSTRIAL	CRI_INDI 60%; CRI_INDH 20%; OMF_PRO 20%	80%	0.5	40		3	70%
LR	LOW DENSITY RESIDENTIAL	RES_SFD 90%; RES_ADU 10%	25%		35	7	3	70%
MH	MANUFACTURED HOME	RES_MH 100%	50%		35		3	70%
MR	MEDIUM DENSITY RESIDENTIAL	RES_SFA 45%; RES_MF 45%; RES_ADU 10%	80%		38	25	3	70%
MUB	MIXED-USE BUSINESS	RES_MF 35%; DE_DIN 75%; DE_ENT 75%; LOD 5%; OMF_FIN 3%; OMF_MED 3%; OMF_PRO 4%; CRI_RET 5%; CRI_SVCS 5%; PKG 25%	80%	2	38		3	70%
MUI	MIXED-USE INDUSTRIAL	OMF_PRO 20%; CRI_INDI 50%; RES_MF 20%; RES_LW 10%	80%	0.5	40		3	70%
MUR	MIXED-USE RESIDENTIAL	RES_SFA 20%; RES_MF 30%; DE_DIN 7.5%; DE_ENT 7.5%; CRI_RET 5%; CRI_SVCS 5%; PKG 25%	80%	2	38	80	3	85%
MXR	MIXED DENSITY RESIDENTIAL	RES_SFA 75%; RES_MF 20%; RES_GQ 5%	80%		35	20	3	70%
NSO	NATURAL SYSTEMS OVERLAY			0	0		0	0%
OS-A	OPEN SPACE - ACQUIRED	PR 20%; AG 70%; PUB 10%	10%		35		3	70%
OS-DR	OPEN SPACE - DEVELOPMENT RIGHTS	PR 20%; AG 70%; PUB 10%	10%	0	35		3	70%
OS-O	OPEN SPACE - OTHER	AG 70%; PR 20%; PUB 10%	10%	0	35		3	70%
PK-U/O	PARK, URBAN AND OTHER	PUB 20%; PR 80%	10%	0	35		3	70%
PUB	PUBLIC/SEMI-PUBLIC	PUB 100%		0.5	35		3	70%
RB	REGIONAL BUSINESS	RES_SFA 50%; RES_MF 20%; DE_DIN 10%; DE_ENT 10%; LOD 5%; OMF_FIN 3%; OMF_MED 3%; OMF_PRO 4%; CRI_RET 5%; CRI_SVCS 5%; CRI_VEH 5%; PKG 25%	80%	2.5	35		3	70%
SC	SERVICE COMMERCIAL	OMF_FIN 10%; OMF_MED 15%; OMF_PRO 15%; CRI_RET 20%; CRI_SVCS 20%; CRI_VEH 20%	80%	0.5	35		3	70%
TB	TRANSITIONAL BUSINESS	RES_SFA 5%; RES_MF 20%; OMF_FIN 17%; OMF_MED 17%; OMF_PRO 16%; CRI_RET 12.5%; CRI_SVCS 12.5%	80%	0.5	35		3	70%
VLR	VERY LOW DENSITY RESIDENTIAL	RES_SFD 90%; RES_ADU 10%	25%		35		3	70%

## Building Types

Configuration of the building types included inputting spatial organization details by building floor and the associated space use (Figure 1). The buildings types were created to include a mix of the 69 space use types, e.g. Single-Family Res - 2 Story (Low Density), Mid-Rise Mixed-Use Residential with Multifamily and Efficiency Units over Retail, and Industrial Warehouse (Table 6-Table 7). ArcGIS Urban allowed for new building types to be proposed on an as-needed basis. Possible proposed building types could include identifying affordable housing or affordable commercial uses.

Building Type: Low-Rise MU MF Residential over Retail (existing) x

Name  
Low-Rise MU MF Residential over Retail

Type  
Building Dwelling Units

Building Parts Configuration

Space Use Type  
CRI\_Retail Sales

Number of Floors (exact)  
1 - 1

Massing  
Tower

Building Type: Low-Rise MU MF Residential over Retail (existing) x

Name  
Low-Rise MU MF Residential over Retail

Type  
Building Dwelling Units

Building Parts Configuration

Space Use Type  
RES\_Multi-Family

Number of Floors (range)  
1 - 2

Massing  
Tower

Figure 1 Building Type Spatial Organization by Floor and Space Use

Table 6 Building Type Summary Table – Part A

	BuildingTypeName	Above Grade Building Parts	Substructure Building Parts
1	Cultural	DE_ENT, maximum floors 5	
2	Industrial Facility - Heavy Manufacturing	CRI_INDH, maximum floors 2	
3	Industrial Flex + Tech	OMF_PRO, maximum floors 5	
4	Industrial Warehouse	CRI_INDI, maximum floors 2	
5	Low-Rise Hotel	LOD, maximum floors 3	
6	Low-Rise Prof/Tech Office	OMF_PRO, maximum floors 3	
7	Low-Rise MU Prof Tech Office over Retail	CRI_RET, maximum floors 1;OMF_PRO, maximum floors 2	
8	Low-Rise Multifamily Residential	RES_MF, maximum floors 3	
9	Low-Rise MU MF Residential over Retail	CRI_RET, maximum floors 1; RES_MF, maximum floors 2	
10	Main Street Retail	CRI_RET, maximum floors 2	
11	Main Street Retail w/ Prof/Tech Office	CRI_RET, maximum floors 1; OMF_PRO, maximum floors 2	
12	Main Street Retail w/ MF Residential	CRI_RET, maximum floors 1; RES_MF, maximum floors 2	
13	Medical Facility	OMF_MED, maximum floors 5	
14	Mid-Rise Hotel	LOD, maximum floors 5	PKG, maximum floors 1
15	Mid-Rise Hotel w/ Retail	CRI_RET, maximum floors 1; LOD, maximum floors 4	PKG, maximum floors 1
16	Mid-Rise Prof/Tech Office	OMF_PRO, maximum floors 5	PKG, maximum floors 1
17	Mid-Rise MU Prof/Tech Office over Retail	CRI_RET, maximum floors 1; OMF_PRO, maximum floors 4	PKG, maximum floors 1
18	Mid-Rise Multifamily Residential	RES_MF, maximum floors 5	PKG, maximum floors 1
19	Mid-Rise MU Res over Prof Services	CRI_SVCS, maximum floors 1; RES_MF, maximum floors 4	PKG, maximum floors 1
20	Mid-Rise MU Residential MF and Eff Units w/ Retail	CRI_RET, maximum floors 1; RES_MF, maximum floors 2; RES_EFF, maximum floors 2	PKG, maximum floors 1
21	Surface Parking Lot	PKG, maximum floors 0	
22	Parking Structure 3 Story	PKG, maximum floors 3	
23	Parking Structure 4-5 Story	PKG, maximum floors 5	
24	Neighborhood Strip Mall 1 Story	CRI_SVCS, maximum floors 1	
25	Neighborhood Strip Mall 2 Story	CRI_RET, maximum floors 1; CRI_SVCS2, maximum floors 2	
26	School 1 Story	PUB, maximum floors 1	
27	School 2-3 Story	PUB, maximum floors 3	
28	Main Street Retail w/ Med Office	CRI_RET, maximum floors 1; OMF_MED, maximum floors 2	
29	Main Street Retail w/ Financial Office	CRI_RET, maximum floors 1; OMF_FIN, maximum floors 2	
30	Low-Rise Med Office	OMF_MED, maximum floors 3	
31	Low-Rise Financial Office	OMF_FIN, maximum floors 3	
32	Big Box Retailer	CRI_RET, maximum floors 1	
33	Big Box Retailer Auto Related	CRI_VEH, maximum floors 1	
34	Mid-Rise Hotel w/ Dining	DE_DIN, maximum floors 1; LOD, maximum floors 4	PKG, maximum floors 1
35	Mid-Rise Med Office	OMF_MED, maximum floors 5	PKG, maximum floors 1

Table 7 Building Type Summary Table – Part B

	<b>BuildingTypeName</b>	<b>Above Grade Building Parts</b>	<b>Substructure Building Parts</b>
36	Mid-Rise MU Med Office over Retail	CRI_RET, maximum floors 1; OMF_MED, maximum floors 4	PKG, maximum floors 1
37	Mid-Rise Financial Office	OMF_FIN, maximum floors 5	PKG, maximum floors 1
38	Mid-Rise MU Financial Office over Retail	CRI_RET, maximum floors 1; OMF_FIN, maximum floors 4	PKG, maximum floors 1
39	Mid-Rise Public Office	PUB, maximum floors 5	PKG, maximum floors 1
40	Mid-Rise MU Public Office w/ Retail	CRI_RET, maximum floors 1; PUB, maximum floors 4	PKG, maximum floors 1
41	Main Street Retail w/ Public Office	CRI_RET, maximum floors 1; PUB, maximum floors 2	
42	Mid-Rise MU Financial Office over Dining	DE_DIN, maximum floors 1; OMF_FIN, maximum floors 4	PKG, maximum floors 1
43	Mid-Rise MU Financial Office over Entertainment	DE_ENT, maximum floors 1; OMF_FIN, maximum floors 4	PKG, maximum floors 1
44	Main Street Retail w/ Prof Services	CRI_RET, maximum floors 1; CRI_SVCS, maximum floors 2	
45	Mid-Rise MU Public Office over Dining	DE_DIN, maximum floors 1; PUB, maximum floors 4	PKG, maximum floors 1
46	Low-Rise MU Public Office over Retail	CRI_RET, maximum floors 1; PUB, maximum floors 2	
47	Mid-Rise Hotel w/ Entertainment	DE_ENT, maximum floors 1; LOD, maximum floors 4	PKG, maximum floors 1
48	Mid-Rise MU Public Office over Entertainment	DE_ENT, maximum floors 1; PUB, maximum floors 4	PKG, maximum floors 1
49	Single Family Res - 2 Story (Low Density)	RES_SFD, maximum floors 2	
50	Single Family Res - 1 Story (Low Density)	RES_SFD, maximum floors 1	
51	Single Family Res - 3 Story (Medium Density)	RES_SFD, maximum floors 3	
52	Livework	RES_LW, maximum floors 3	
53	Single Family Res - 1 Story (Medium Density)	RES_SFD, maximum floors 1	
54	Single Family Res - 2 Story (Very Low Density)	RES_SFD, maximum floors 2	
55	Single Family Res - 1 Story (Very Low Density)	RES_SFD, maximum floors 1	
56	Single Family Res - 2 Story (Medium Density)	RES_SFD, maximum floors 2	
57	Single Family Res - 3 Story (Very Low Density)	RES_SFD, maximum floors 3	
58	Town/Row Houses	RES_SFA, maximum floors 3	
59	Low-Rise MU MF Residential over Dining	DE_DIN, maximum floors 1; RES_MF, maximum floors 2	
60	Low-Rise MU Med Office over Retail	CRI_RET, maximum floors 1; OMF_MED, maximum floors 2	
61	Mid-Rise MU Residential w/ Dining	DE_DIN, maximum floors 1; RES_MF, maximum floors 4	PKG, maximum floors 1
62	Low-Rise MU MF Residential over Light Industrial	CRI_INDI, maximum floors 1; RES_MF, maximum floors 2	
63	Low-Rise Multifamily & Efficiency Residential	RES_MF, maximum floors 2; RES_EFF, maximum floors 1	
64	Low-Rise MU MF Residential over Prof/Tech Office	OMF_PRO, maximum floors 1; RES_MF, maximum floors 2	
65	Main Street Retail w/ Efficiency Units	CRI_RET, maximum floors 1; RES_EFF, maximum floors 2	
66	Manufactured/Mobile Homes	RES_MH1, maximum floors 1	
67	Mid-Rise MU Med Office over Dining	DE_DIN, maximum floors 1; OMF_MED, maximum floors 4	PKG, maximum floors 1
68	Mid-Rise MU Fin & Prof/Tech Office over Retail	CRI_RET, maximum floors 1; OMF_FIN, maximum floors 2; OMF_PRO, maximum floors 2	PKG, maximum floors 1
69	Single Family Res - 3 Story (Low Density)	RES_SFD, maximum floors 3	