

# RESIDENTIAL INFILL DEVELOPMENT

## Handout

- FAR Review
- Building Volume
- Lot Coverage
- Open Space



Infill Task Force  
January 30, 2008

*Alexandria*

# Overview of Bulk Regulations

- FAR Review & Analysis
- Other Bulk Measures
  - Building Volume Ratio
  - Lot Coverage Ratio
  - Open Space Requirement

# Single Family Residential Bulk Requirements

## Standard Interior Lot

| Zone  | Lot Size | Lot Width | Lot Frontage | Front Yard | Side Yards   |       |     | Rear Yard |     | Open Space | FAR  | Height |
|-------|----------|-----------|--------------|------------|--------------|-------|-----|-----------|-----|------------|------|--------|
|       |          |           |              |            | # Side Yards | Ratio | Min | Ratio     | Min |            |      |        |
| R-20  | 20000    | 100       | 75           | 40         | 2            | 1:2   | 12  | 1:1       | 12  | N/A        | 0.25 | 35     |
| R-12  | 12000    | 80        | 60           | 35         | 2            | 1:2   | 10  | 1:1       | 10  | N/A        | 0.30 | 35     |
| R-8   | 8000     | 65        | 40           | 30         | 2            | 1:2   | 8   | 1:1       | 8   | N/A        | 0.35 | 35     |
| R-5   | 5000     | 50        | 40           | 25         | 2            | 1:3   | 7   | 1:1       | 7   | N/A        | 0.45 | 35     |
| R-2.5 | 5000     | 50        | 40           | 25         | 2            | 1:3   | 7   | 1:1       | 7   | N/A        | 0.45 | 35     |
| RA    | 1980     | 50        | 50           | 20         | 2            | 1:3   | 7   | 1:1       | 8   | 800        | 0.75 | 45     |
| RB    | 1980     | 50        | 50           | 20         | 2            | 1:3   | 8   | 1:1       | 8   | 800        | 0.75 | 45     |

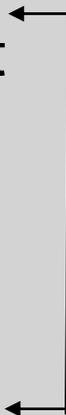
## Standard Corner Lot

| Zone  | Lot Size    | Lot Width  | Lot Frontage | Front Yard | Side Yards   |       |     | Rear Yard |     | Open Space | FAR  | Height |
|-------|-------------|------------|--------------|------------|--------------|-------|-----|-----------|-----|------------|------|--------|
|       |             |            |              |            | # Side Yards | Ratio | Min | Ratio     | Min |            |      |        |
| R-20  | 20000       | <b>120</b> | 75           | 40         | 2            | 1:2   | 12  | 1:1       | 12  | N/A        | 0.25 | 35     |
| R-12  | 12000       | <b>95</b>  | 60           | 35         | 2            | 1:2   | 10  | 1:1       | 10  | N/A        | 0.30 | 35     |
| R-8   | <b>9500</b> | <b>80</b>  | 40           | 30         | 2            | 1:2   | 8   | 1:1       | 8   | N/A        | 0.35 | 35     |
| R-5   | <b>6500</b> | <b>65</b>  | 40           | 25         | 2            | 1:3   | 7   | 1:1       | 7   | N/A        | 0.45 | 35     |
| R-2.5 | <b>6500</b> | <b>65</b>  | 40           | 25         | 2            | 1:3   | 7   | 1:1       | 7   | N/A        | 0.45 | 35     |
| RA    | 1980        | 50         | 50           | 20         | 2            | 1:3   | 7   | 1:1       | 8   | 800        | 0.75 | 45     |
| RB    | 1980        | 50         | 50           | 20         | 2            | 1:3   | 8   | 1:1       | 8   | 800        | 0.75 | 45     |

# Floor Area Definition

## *In Summary, Floor Area as defined for FAR:*

- Is the sum of all gross horizontal areas
- It is measured from exterior faces of walls
- **Includes space with a headroom of 7' 6" or more**
- Excluded are elevators, stairs, HVAC equipment areas, and other similar areas not susceptible to storage or occupancy
- Basements are excluded if no more than 4 feet above finished grade



Clear Deductions

# What does FAR do?

*FAR determines how intensively a lot may be built upon*

There are two ways to view FAR standards:

- As a measure of habitable and useable space that is permitted on the property – interior viewpoint
- As a measure of the bulk or volume of a building allowed on the property – exterior viewpoint

# FAR – Issues

- Basement can be deducted, but can be a large percentage of total usable floor area, and can be exposed up to 4 feet above grade
- Whether floor space that has headroom less than 7' 6" can be deducted
  - Applied differently over time
  - Susceptible to varying interpretation by home owners, architects and neighbors
  - Time consuming for all—multiple plan submissions
- (Examples of plans will be reviewed)

# FAR – Analysis of Deductions

## Teardown & New Construction - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone          | All Lots |            | Lots Meeting Minimum Size |           |
|---------------|----------|------------|---------------------------|-----------|
|               | Number   | Average    | Number                    | Average   |
| R-20          | 1        | 9%         | 0                         | -         |
| R-12          | 1        | 4%         | 0                         | -         |
| R-8           | 3        | 11%        | 2                         | 1%        |
| R-2-5         | 3        | 11%        | 3                         | 11%       |
| <b>Totals</b> | <b>8</b> | <b>10%</b> | <b>5</b>                  | <b>7%</b> |

*At least two plan submissions typically needed to clarify allowable deducted areas*

# FAR – Analysis of Deductions

## Teardown & New Construction - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone   | # Lots   | Percent FAR Deductions |          |          |
|--|----------|------------------------|----------|----------|
|  |          | High                   | Medium   | Low      |
| R-20   | 1        |                        | 1 (9%)   |          |
| R-12   | 1        |                        |          | 1 (4%)   |
| R-8  | 3        | 1 (31%)                |          | 2 (0-2%) |
| R-2-5  | 3        | 1 (24%)                |          | 2 (4-5%) |
| <b>Totals</b>                                  | <b>8</b> | <b>2</b>               | <b>1</b> | <b>5</b> |
| <b>Projects Needing Deductions To Meet FAR</b> | <b>4</b> | <b>2</b>               | <b>1</b> | <b>1</b> |
| <b>Projects Not Needing Deductions</b>         | <b>4</b> | <b>0</b>               | <b>0</b> | <b>4</b> |

(Projects not needing deductions have a balance of floor area available)

# FAR – Analysis of Deductions

## Major Additions - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone          | All Lots  |            | Lots Meeting Minimum Size |            |
|---------------|-----------|------------|---------------------------|------------|
|               | Number    | Average    | Number                    | Average    |
| R-20          | 1         | 2%         | 1                         | 2%         |
| R-8           | 8         | 11%        | 7                         | 10%        |
| R-2-5         | 1         | 14%        | 1                         | 14%        |
| <b>Totals</b> | <b>10</b> | <b>11%</b> | <b>9</b>                  | <b>10%</b> |

*At least two plan submissions typically needed to clarify allowable deducted areas*

# FAR – Analysis of Deductions

## Major Additions - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone   | # Lots    | Percent FAR Deductions |          |          |
|--|-----------|------------------------|----------|----------|
|  |           | High                   | Medium   | Low      |
| R-20   | 1         |                        |          | 1 (2%)   |
| R-8  | 8         | 4 (19-21%)             |          | 4 (1-4%) |
| R-2-5  | 1         | 1 (14%)                |          |          |
| <b>Totals</b>  | <b>10</b> | <b>5</b>               | <b>0</b> | <b>5</b> |
| <b>Projects<br/>Needing<br/>Deductions<br/>to Meet FAR</b> | <b>5</b>  | <b>5</b>               | <b>-</b> | <b>0</b> |
| <b>Projects Not<br/>Needing<br/>Deductions</b>             | <b>5</b>  | <b>0</b>               | <b>-</b> | <b>5</b> |

(Projects not needing deductions have a balance of floor area available)

# FAR – Analysis of Deductions

## Medium & Small Additions - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone          | All Lots  |           | Lots Meeting Minimum Size |           |
|---------------|-----------|-----------|---------------------------|-----------|
|               | Number    | Average   | Number                    | Average   |
| R-20          | 9         | 6%        | 6                         | 5%        |
| R-12          | 3         | 5%        | 3                         | 5%        |
| R-8           | 33        | 6%        | 20                        | 4%        |
| R-5           | 17        | 8%        | 14                        | 6%        |
| R-2-5         | 22        | 4%        | 12                        | 4%        |
| RA            | 3         | 5%        | 3                         | 5%        |
| RB            | 10        | 6%        | 4                         | 2%        |
| <b>Totals</b> | <b>97</b> | <b>6%</b> | <b>62</b>                 | <b>4%</b> |

*More than one plan submission typically needed to clarify allowable deducted areas*

# FAR – Analysis of Deductions

## Medium & Small Additions - 2007

Percent Deduction from Gross Floor Area (excluding Basement)

| Zone   | # Lots    | Percent FAR Deductions     |           |           |
|--|-----------|----------------------------|-----------|-----------|
|  |           | High                       | Medium    | Low       |
| R-20   | 9         | 2 (17-19%)                 |           | 7 (0-4%)  |
| R-12   | 3         | 1 (15%)                    |           | 2 (0%)    |
| R-8  | 33        | 2 (23%, 30%)<br>6 (10-15%) | 4 (6-9%)  | 21 (0-5%) |
| R-5  | 17        | 2 (26%, 38%)<br>2 (14-16%) | 1 (8%)    | 12 (0-5%) |
| R-2-5  | 22        | 1 (22%)<br>2 (10-14%)      | 3 (6-7%)  | 16 (0-5%) |
| RA   | 3         |                            | 2 (7-9%)  | 1 (0%)    |
| RB   | 10        | 1 (15%)                    | 5 (6-9%)  | 4 (0-5%)  |
| <b>Totals</b>                                  | <b>97</b> | <b>19</b>                  | <b>15</b> | <b>63</b> |
| <b>Projects Needing Deductions to Meet FAR</b> | <b>19</b> | <b>12</b>                  | <b>4</b>  | <b>3</b>  |
| <b>Projects Not Needing Deductions</b>         | <b>78</b> | <b>7</b>                   | <b>11</b> | <b>60</b> |

# Analysis of FAR Deductions

## Conclusions

**Majority of cases, both standard and substandard in lot size, are not maximizing FAR and take few deductions:**

- 76% of projects in 2007 did not need to take deductions to meet the FAR requirement
- 63% of projects took deductions of 5% or less
- The 89 cases with up to 9% deductions averaged 3-4%

# FAR – Analysis of Deductions

## Conclusions

**28 projects of 115 needed the deductions in order to meet the FAR requirement and build:**

- Of the 9 new construction and major additions:
  - 7 had deductions of 10% or higher
  - 2 had deductions of 0 to 9%
- Of the 19 medium and small additions:
  - 12 had deductions of 10% or higher
  - 4 had deductions of 6-9%
  - 3 had deductions of 5% or less

# FAR – Analysis of Deductions

## Conclusions

**Projects maximizing FAR or deducting high percentages rely upon 7'6" language**

# FAR – Modification Options

1. Clarify allowable deductions:
  - A. NO DEDUCTIONS—*Count all floor space except basements (gross calculation)*
  - B. DEDUCT ONLY SPECIFIED UNOCCUPIABLE AREAS—*Count all floor space except basements and those areas specifically identified in definition (elevators, stairs, HVAC equipment areas, and basements); remove reference to 7'6" ceiling height*
  - C. DEDUCT ONLY SPECIFIED UNOCCUPIABLE AREAS AND AREAS BELOW CERTAIN HEIGHT IN ATTIC—*Count all floor space except those deductions specifically identified, and establish a ceiling height for deductible areas in attic*
2. Reduce exposure of deductible basements (incentive to lower first floor height)
3. Others?

# Floor Area Ratio

## Advantages:

- Uses floor area to regulate bulk/volume
- Floor area is commonly used to measure space in dwellings

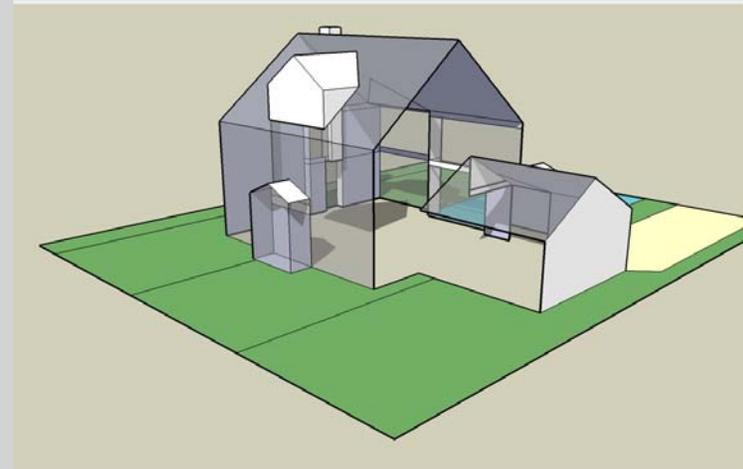
## Disadvantages:

- With exclusions, not a true measure of residential bulk
- Problems with addressing attic space
- Problems with addressing basement area
- With current definition, not easy to calculate
- Does not address high floor to ceiling heights

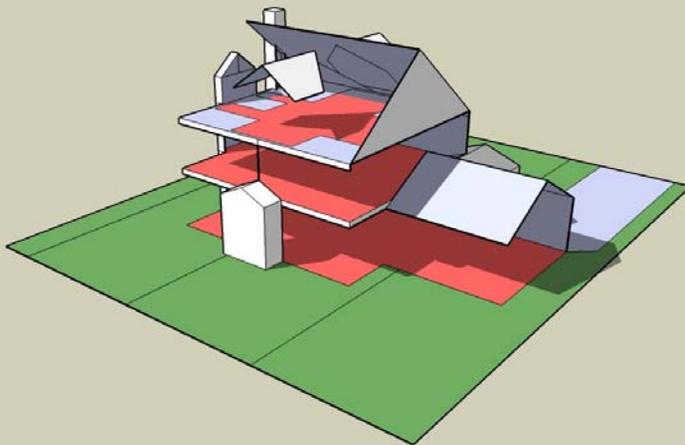
## Other Bulk Measures

- Building Volume Ratio
- Lot Coverage Ratio
- Open Space Requirement
- (Height & Setback measures were covered at the December 2007 Infill Task Force Meeting)

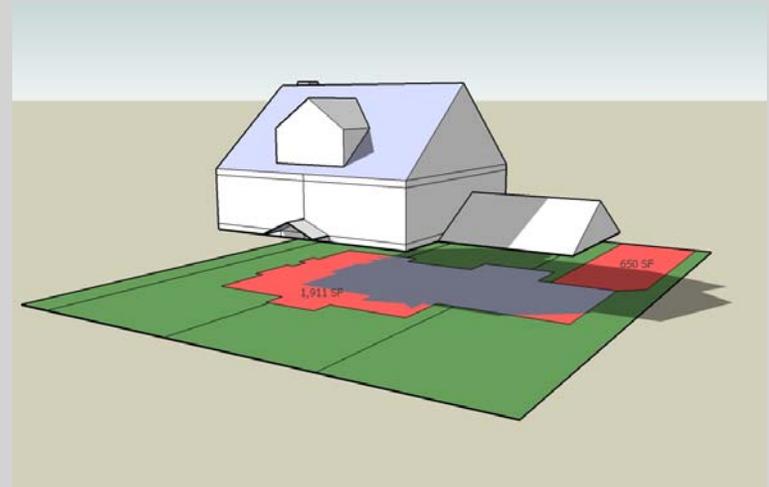
# Bulk Control Options



**Cubic Volume**

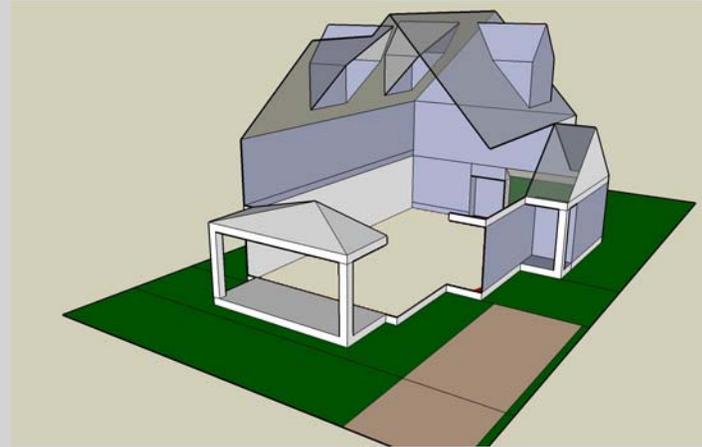


**Floor Area Ratio**

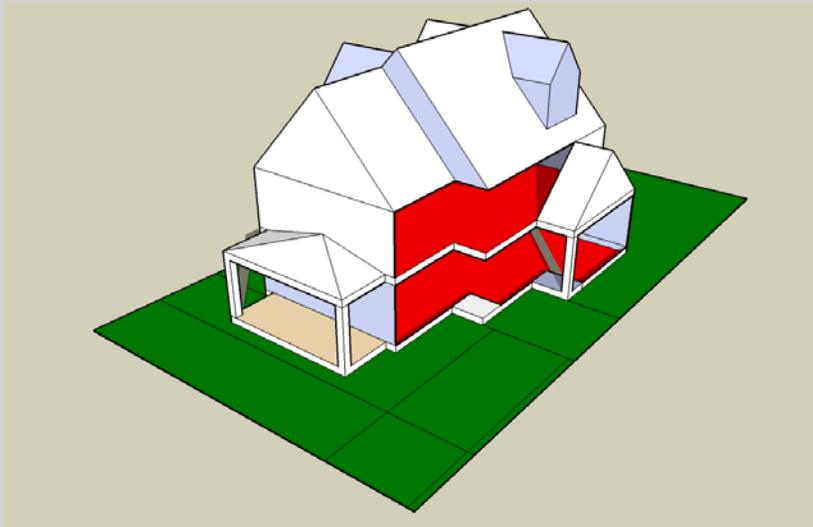


**Lot Coverage**

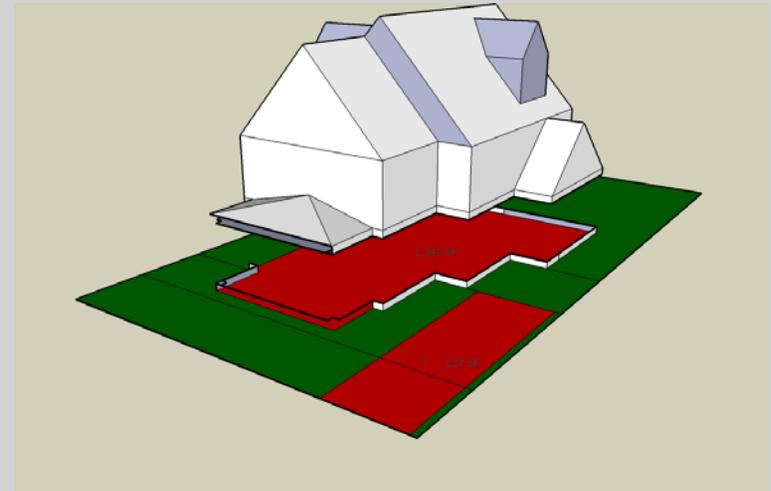
# Bulk Control Options



**Cubic Volume**



**Floor Area Ratio**

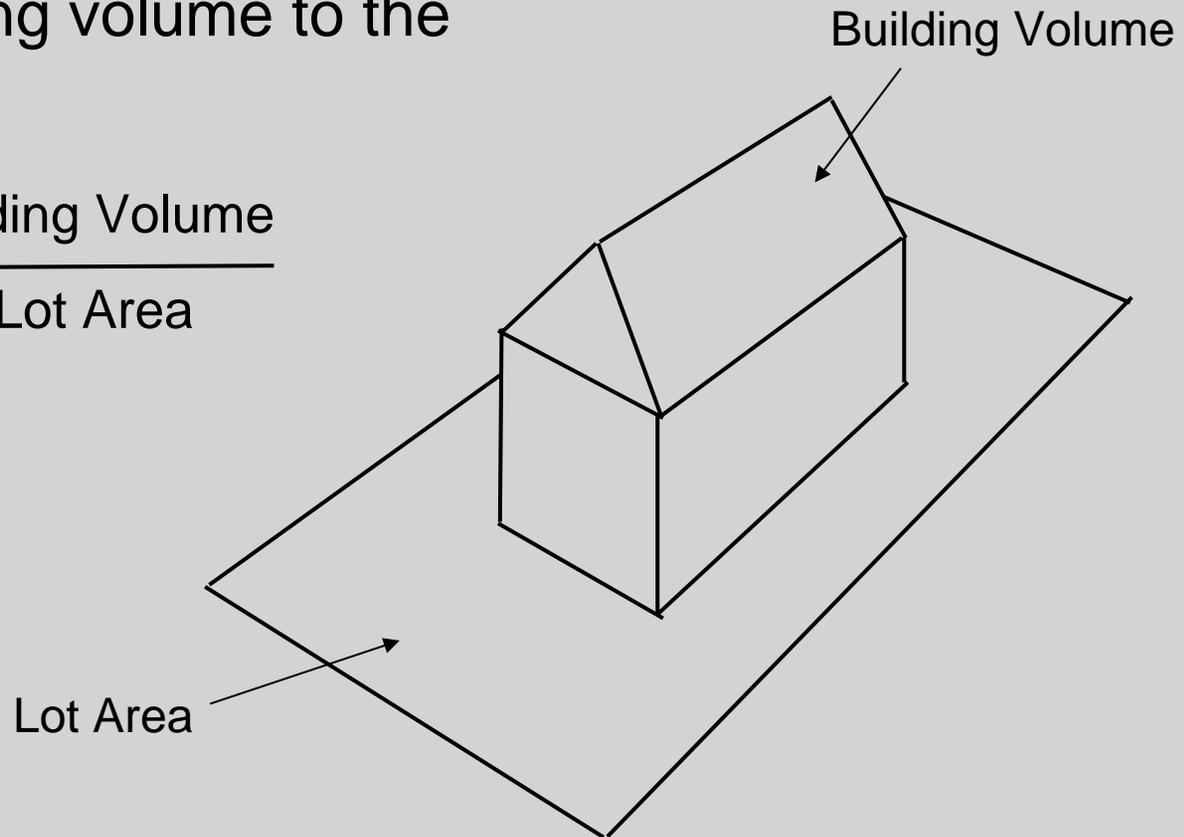


**Lot Coverage**

# Building Volume Ratio

- Defined as the ratio of the total building volume to the lot area, or

$$\text{Ratio} = \frac{\text{Building Volume}}{\text{Lot Area}}$$



# Building Volume Ratio

## Advantages:

- Accounts for all bulk visible from the exterior of the residence (similar to a gross FAR)
- Handles attics, complex roof lines, and higher floor to ceiling heights
- Permits flexible design

## Disadvantages:

- May require computer aided design software to calculate
- May be a difficult concept for the homeowner
- Less familiar and tested than FAR

# Building Volume Calculation

Calculation Results from an analysis of a building plan:

|  | <b>Cubic Feet</b> |
|--|-------------------|
| First & Second Floors                  | 26,873            |
| Attic (including front & rear dormer)  | 9,214             |
| Attached garage                        | 5,966             |
| Basement – portion visible above grade | 2,596             |
| Back porch                             | 1,218             |
| Front porch                            | 400               |
| <b>Total</b>                           | <b>46,267</b>     |

Building Volume Ratio (BVR) = Building Volume / Lot Size

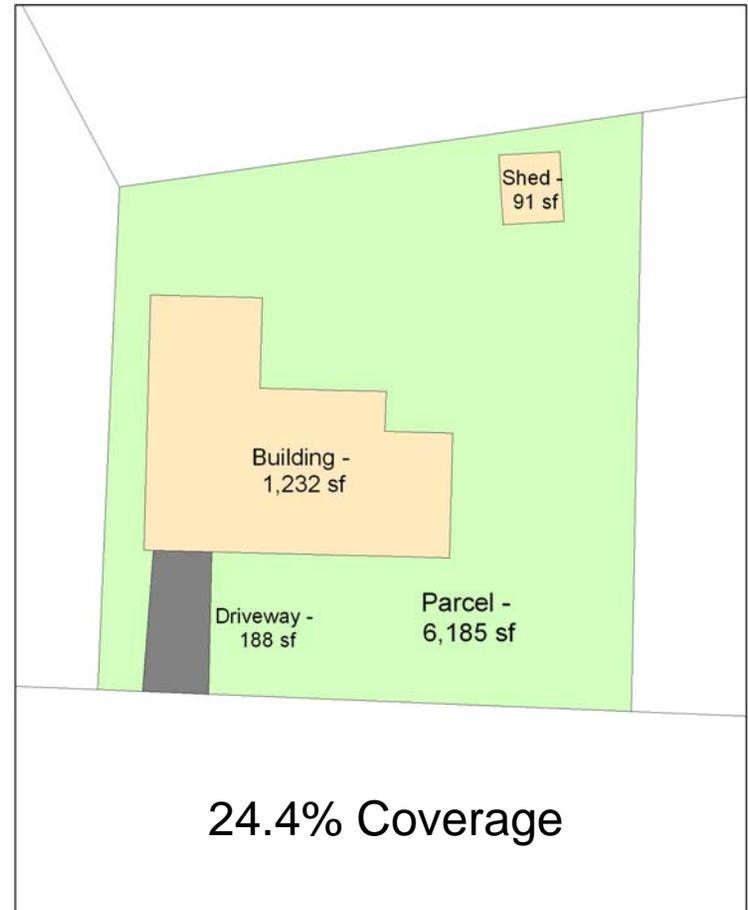
$$\text{BVR} = 46,267 / 8,120$$

$$\text{BVR} = 5.7$$

(The FAR standard for this property is 0.45)

# Lot Coverage Ratio

- Defined as the ratio of occupied area (buildings and driveways) to total lot area
- Limits size of building footprint and impermeable areas
- Larger lot coverage ratio for smaller lot zones – smaller ratio for large lot zones (Arlington County)



# Lot Coverage Ratio

## Arlington's Experience

- Five year planning effort
- Already had a lot coverage ratio – 56% for residential
- Legislation adopted in 2005
- Reduced lot coverage by zone with the larger lots having a smaller lot coverage ratio
- Incentives:
  - 5% bonus for detached garages in rear yard
  - 3% bonus for front porches

# Lot Coverage Ratio

Arlington legislation included more than just lot coverage

| <i>Categories</i>   | <i>R-5</i> | <i>R-6</i> | <i>R-8</i> | <i>R-10</i> | <i>R-20</i> |
|---|------------|------------|------------|-------------|-------------|
| Maximum Lot Coverage  | 45%        | 40%        | 35%        | 32%         | 25%         |
| Maximum Lot Coverage with front porch                       | 48%        | 43%        | 38%        | 35%         | 28%         |
| Maximum Lot Coverage with rear detached garage              | 50%        | 45%        | 40%        | 37%         | 30%         |
| Maximum Lot Coverage with rear garage and front porch       | 53%        | 48%        | 43%        | 40%         | 33%         |
| Maximum Main Building Footprint Coverage                    | 34%        | 30%        | 25%        | 25%         | 16%         |
| Maximum Main Building Footprint Coverage with a front porch | 37%        | 33%        | 28%        | 28%         | 19%         |
| Main Buildings Footprint Cap                                | 2380 sf    | 2520 sf    | 2800 sf    | 3500 sf     | 4480 sf     |
| Main Buildings Footprint Cap with a front porch             | 2590 sf    | 2772 sf    | 3136 sf    | 3920 sf     | 5320 sf     |

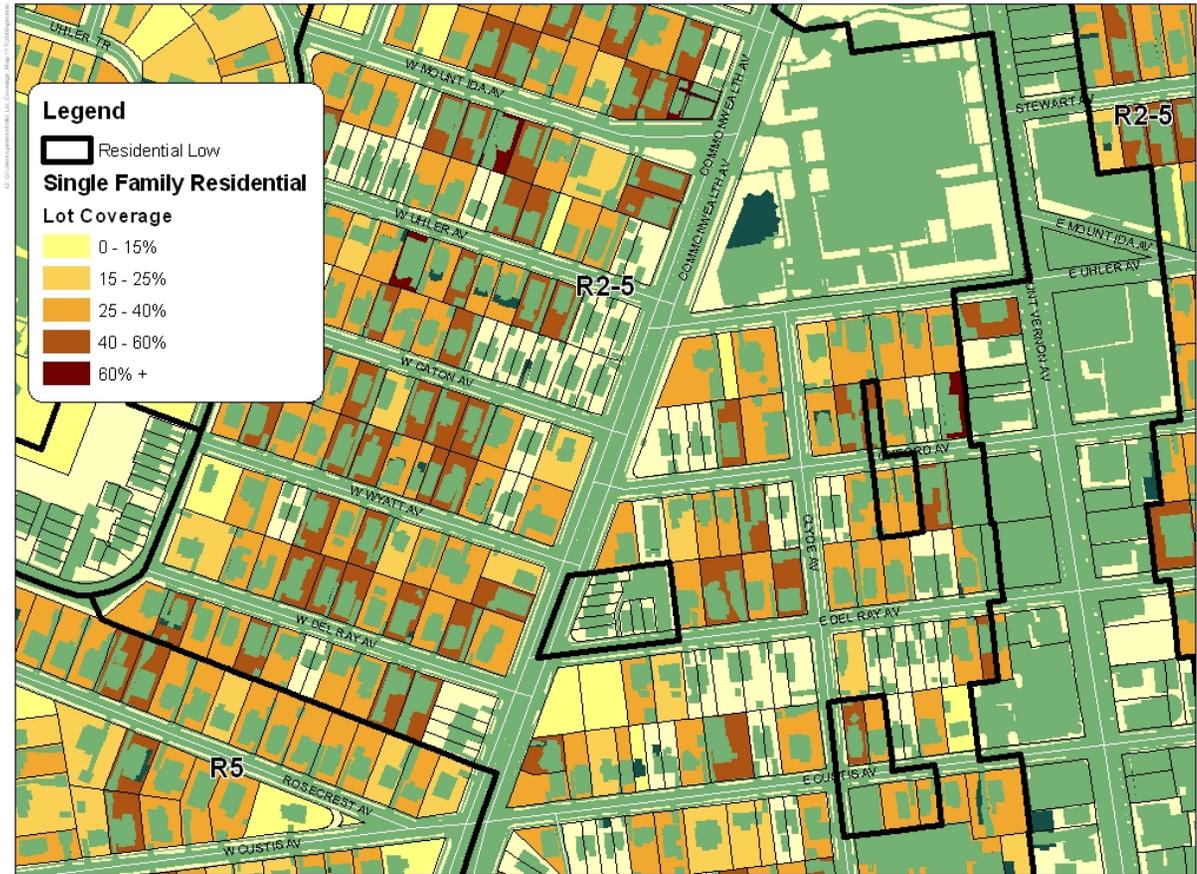
Lot Coverage

Main Building Footprint Coverage

Main Building Footprint Cap

# Lot Coverage Ratio

An Alexandria neighborhood showing the current amount of building coverage on existing lots



# Lot Coverage Ratio

## Advantages:

- Limits impervious surfaces
- Limits bulk of residences and accessory buildings in the horizontal dimensions
- Can provide incentives (e.g., detached garages in the rear yard)

## Disadvantages:

- Does not address height of residences
- Does not address location of residences in relation to the street or adjacent properties
- Extensive research needed on lot coverage patterns

# Open Space Requirement

- Purpose is to provide areas of trees, shrubs, lawns, pathways and other amenities
- That portion of a lot that is open and usable space
- Open space is required in townhouse and multi-family zones, but not in single-family zones (except for RA, RB, and RM zones)

# Open Space Requirement

## Advantages:

- Provides a minimum amount of usable open space for enjoyment
- Limits the horizontal extent of residential and accessory buildings

## Disadvantages:

- Does not address height of residences
- Does not address location of residences in relation to the street or adjacent properties

## Conclusion

- Alexandria has a strong array of bulk control tools currently available
- The Floor Area definition needs to be clarified or the City needs to move to a better measure of bulk
- These bulk tools need to be considered in the context of design controls (which is the subject of the February 2008 Infill Task Force meeting)