

# TECHNICAL BULLETIN

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## Case Study Status Quo Standards versus an Alternative Standard, East Clayton two alternative development site standards compared

### I. Introduction

#### Sites Compared



Figure 2-1 - East Clayton Site

In all of the discussion about alternative and sustainable development standards, there is precious little in the way of cost comparison between sustainable and unsustainable community design options. This bulletin is an attempt to partially redress this deficit. We will compare the cost of providing infrastructure and for building comparable dwellings using two different development standards. The first, characterized herein as the “status quo” standard, represents a typical example of the type of urban development that presently predominates in our region. The second more sustainable model is titled the “East Clayton” standard as it describes the standards that will be implemented in the City of Surrey’s East Clayton Neighbourhood Concept Plan (NCP) area. The most significant results of this comparison are described in greater depth below.

### II. Standards Compared

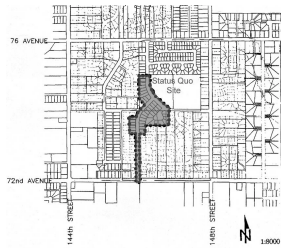


Figure 2-2 - Status Quo Site

The status quo standard, a 4.27 ha Surrey subdivision area, is in a part of Surrey dominated by an urban design pattern common to most North American communities designed after WWII (figure 2-2 and 2-4). The streets of this residential area are curvilinear and are a part of the disintegrated dendritic street hierarchy of the post war suburban landscape.

The East Clayton standard is a 4.23 ha portion of East Clayton — a model sustainable community proposed in the City of Surrey (figure 2-1 and 2-3). The NCP for East Clayton supports enough variety in land use and home type to maximize the affordability, sociability, and access to services for the proposed 13,000 residents. East Clayton’s integrated street network, together with higher than usual densities, mixed land uses (including commercial live/work and business), and pedestrian friendly green streets, are features that will curb reliance on the automobile, allow for an infiltration based stormwater management system, and create safe, walkable neighbourhoods.

In Table 2-1, we provide cost and quantity comparisons between the two development types. Certain results of this analysis, all of which are detailed in the table, are worth special mention and fall under the headings of:

- Density.
- Impervious cover.
- Land, building, and infrastructure cost analysis.

#### Terminology

**DWELLING UNIT** - In the East Clayton site, ‘dwelling unit’ refers to each individual habitable unit, whether a single-family home, duplex or secondary suite. Therefore there may be more than one dwelling unit per lot. For the purposes of this comparison, we assume that each is serviced individually.

#### Density

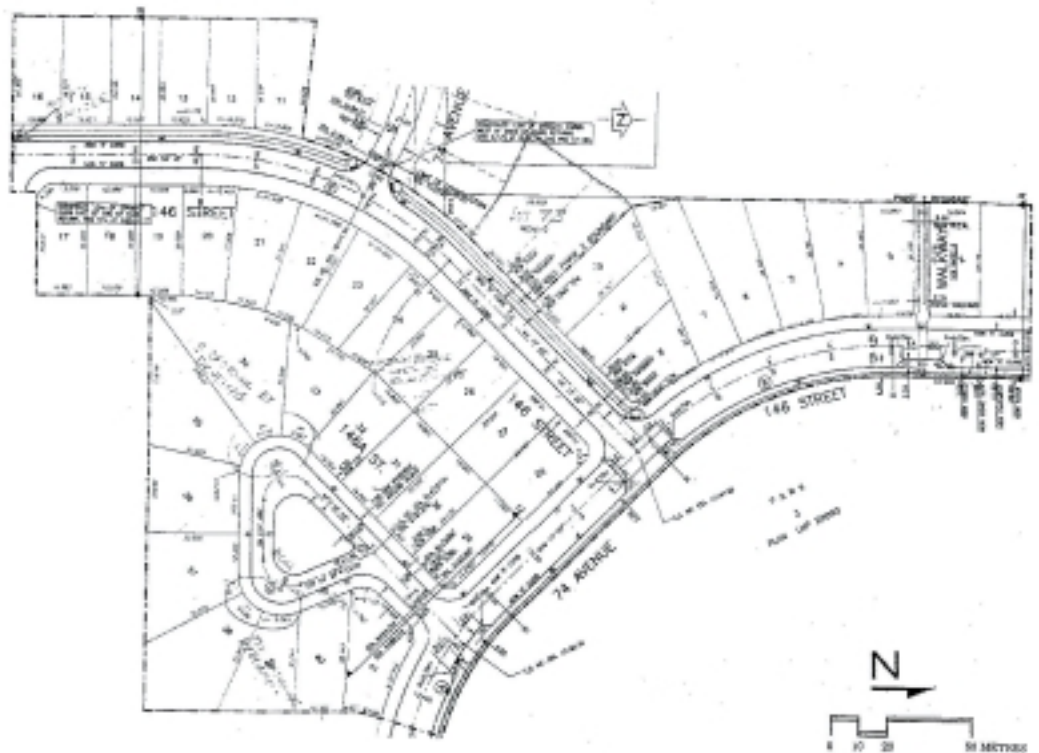
The East Clayton standard provides almost 10 dwelling units per acre (u.p.a.). This is over twice as many u.p.a. as provided by the status quo standard. This density is important for a variety of reasons, not the least of which is that a density of 10 u.p.a. appears to be the minimum required to ensure a viable transit service, and to create the conditions necessary for supporting commercial services within walking distance of residences.

### Sites Compared

Figure 2-3 - East Clayton site- A sustainable residential development to be built in East Clayton, B.C. The NCP, which is based on seven principles of sustainable design (NCP, p 24), envisions a complete, mixed use community with an integrated street system. The plan calls for smaller lots and higher density within a network of community green spaces and natural systems. This 4.23 ha area of the East Clayton plan is low density residential, which in the East Clayton NCP is defined as 6-10 dwelling units per acre.



Figure 2-4 - Status Quo site - A residential development in South Newton, B.C. comprised of a 4.27 ha area of single-family homes on large lots with a curvilinear street pattern. The density is 4 dwelling units per acre.



### Impervious cover

The percent of impervious surface in both standards is about the same at approximately 50%. Considering the higher density, the East Clayton standard performs even better than expected for impervious cover because the dwelling units are relatively thin and tall, and roads are narrower. Despite the land efficiency of the East Clayton standard, every dwelling unit includes at least a small terrace or small backyard, and in some cases a backyard comparable to those found in the status quo standard.

### Land, building and infrastructure cost analysis

On a per dwelling unit basis, the cost for land is \$48,000 less in the East Clayton standard as compared to the status quo standard. This difference is primarily a result of the higher density and more efficient street layout in the East Clayton standard.

The cost for infrastructure in the East Clayton standard is less than half the cost of infrastructure per dwelling unit in the status quo standard, amounting to a difference of over \$12,000 per dwelling unit.

**Table 2-1 - Cost Comparison**

		CONVENTIONAL SUBURBAN SITE	EAST CLAYTON SITE
Site Area	hectares	4.27	4.23
	acres	10.55	10.45
Total Parcels		41	74
Total Dwelling Units <sup>1</sup>		41	111
Parking	stalls per unit	2	2
	total stalls	82	222
Gross Density	d.u./ha.	9.60	26.24
	d.u./acre	3.90	10.62
Lot Coverage	net (lots only)	0.40	0.45
Floor Area Ratio <sup>2</sup>	net (lots only)	0.30	0.55
	gross (lots & ROWs)	0.20	0.38
Average Unit Size <sup>3</sup>	sq.m.	214.00	155.00
	s.f.	2303.00	1668.40
Average Utility Run	m/d.u.	13.80	8.50
	f./d.u.	45.30	27.88
Pavement	sq.m./d.u.	229.00	83.45
	s.f./d.u.	2464.94	898.25
Site Permeability (%) <sup>4</sup>		50.00	49.65
<b>LAND COST <sup>5</sup></b>			
per unit <sup>6</sup>		\$76,829	\$28,243
per parcel <sup>7</sup>		\$76,829	\$42,365
<b>BUILDING COST <sup>8</sup></b>			
per average sized unit (2300 sq. ft./1661 sq. ft.)		\$138,000	\$99,660
per equal sized structure 2,000 sq. ft.		\$120,000	\$120,000
<b>INFRASTRUCTURE COST</b>			
Roadworks		\$218,894	\$256,853
	Asphalt Paving	\$24,553	\$38,247
Storm Sewer		\$205,820	n/a
Surface Drainage	Swale Pipe <sup>9</sup>	n/a	\$80,000
Boulevard Landscaping		\$30,000	\$36,070
Water Mains		\$113,705	\$169,107
Water Tie-ins and Connections *		\$18,177	\$49,211
Sanitary Sewers		\$135,255	\$229,780
Sanitary Tie-ins and Connections *		\$5,000	\$13,536
Street Lighting		\$44,000	\$64,500
Lot Grading and/or Swales		\$24,450	\$24,221
Hydro/ Telephone installation (buried services) *		\$54,000	\$146,196
Boulevard Tree Planting		\$20,000	\$24,052
Utilities *		\$54,000	\$89,859
Block interior pathways and emergency access		\$12,500	n/a
Block interior pathways landscaping		\$4,000	n/a
Total Infrastructure Cost	entire site	\$964,354	\$1,221,632
	per unit	\$23,521	\$11,005.69
	per parcel <sup>10</sup>	\$23,521	\$16,509
<b>TOTAL COST OF AN AVERAGE SIZED UNIT (Land+Building+Infrastructure) <sup>11</sup></b>			
Average unit sizes (2300 sq. ft.vs. 1661 sq.ft)		\$238,350	\$138,909
<b>Total Cost per Square Foot of interior space (Land+Building+Infrastructure)</b>			
Average unit sizes (2300 sq. ft.vs. 1661 sq.ft)		\$104	\$84
<b>TOTAL COST OF EQUAL SIZED STRUCTURE (Land+Building+Infrastructure)</b>			
Equal sized structures of 2000 sq. ft.		\$220,350	\$178,873
<sup>1</sup> The East Clayton site includes 111 units on 74 parcels: 47 single-family homes, 54 duplexes and 10 accessory apartments.			
<sup>2</sup> Includes 2 habitable floors.			
<sup>3</sup> Habitable space is on average 1661 s.f. per dwelling unit. This figure is based on an average single-family home size of 2266 s.f. (47 units), a strata unit size of 1200 s.f. (54 units) and an accessory apartment of 800 s.f. (10 units).			
<sup>4</sup> Site permeability refers to the percentage of each parcel that is covered with impervious surface (i.e., building, driveway, pathways).			
<sup>5</sup> Assumes \$300,000 /acre for raw land.			
<sup>6</sup> Per unit land costs are calculated by multiplying bare land cost (\$300,000/acre) by the total site area and dividing by total number of units.			
<sup>7</sup> Per parcel land costs are calculated by multiplying bare land cost (\$300,000/acre) by the total site area and dividing by total number of parcels.			
<sup>8</sup> Assumes \$60.00/s.f. construction cost for building only. Note: These reflect building costs only for the single-family residential areas used for this study.			
<sup>9</sup> Assumes 'Infiltrator' system is used. Additional product information can be found in Technical Bulletin # 3. Surface drainage system cost analysis is provided by Infiltrator Systems, Durante Kreuk and Green Thumb Landscaping Co.. For a more detailed summary, call 822-5148.			
<sup>10</sup> Per parcel infrastructure is calculated by taking the total infrastructure cost and dividing by number of parcels. In the case of East Clayton, a proportion of infrastructure costs, such as individual servicing hook-ups, are dependant upon the number of units. As there are 111 units in the East Clayton pattern, the total infrastructure costs are derived by multiplying those items marked with (*) by 111 units and adding all other infrastructure costs. To calculate the per parcel infrastructure costs, the total infrastructure cost is then divided by the number of parcels (74).			
<sup>11</sup> Does not include DOCs, developer profit, carrying costs, permit fees, realtor fees, etc.			

**Cost Comparisons -- total cost benefits of the East Clayton site**

**Land cost differs  
OVER \$48,000 PER D.U.**

**Building cost differs  
OVER \$38,000 PER D.U.**

**Infrastructure cost differs  
OVER \$12,000 PER D.U.**

**Total differs  
OVER \$99,000 PER average size  
D.U.  
or \$20.00 PER S.F. of interior  
space**

The total average cost (land, building and infrastructure) per dwelling unit in the status quo standard is over \$99,000 more than the average cost per dwelling unit in the East Clayton standard. The total savings come from reductions in infrastructure cost and from increased density. As a way of comparing "apples to apples", the total cost of equal sized structures is calculated by adding the per parcel land costs, the per parcel infrastructure costs and a 2,000 sq. ft. building cost. The total cost of equal sized structures is over \$41,000 more in the conventional plan when compared to the East Clayton plan.<sup>1</sup>

An additional important consideration for the City is the relationship between the value of its homes and the future cost of replacing the infrastructure that serves them, especially as it relates to municipal tax revenue. The higher the relative value of the homes to the replacement cost of the infrastructure the better. Given that there is almost twice as much housing value per acre in the East Clayton site than in the status quo site, the potential tax revenues would also be double, while the infrastructure to serve the area would be about equal in cost to replace.

Finally it should be recognized that our computations do not consider the effect of the two alternative proposals on off-site infrastructure and development cost charges; however, most assessments of this question support the common sense conclusion that a tighter community pattern requires lower per capita expenditures for roads, storm drains, utility trunk lines, and sanitary systems than do more sprawling communities.

## Resources

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Condon, Patrick. 1997. *Alternative Development Standard for Sustainable Communities: Design Workbook*. University of British Columbia: UBC Press.

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