Altus Group

The Altus Group Condominium Apartment Monitor

GTA Edition

Data as of May 2020

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New Condominium Apartment Dashboard

May 2020			YTD May 2020	
Sales	**Inventory**	**Benchmark Price**	**Sales**	**Benchmark Price**
428	**9,526**	**$985,436**	**7,655**	**$967,883**
-88%	**-32%**	**26%**	**-20%**	**24%**
Record low for May	***Lowest since 2017 and also below 10 year average***	***Record high***	***Lowest YTD May since 2013***	***Record high***

% change is from same period a year earlier; "record" is based on Altus Group tracking timeframe

Highlights

- **The May condominium apartment continued to see direct impacts from COVID-19 and experienced weak sales volumes and few new project launches**. Fortunately, May saw more stability compared to the tumultuous April, with consumers and businesses better adjusted to the pandemic restrictions and easing infection rates allowing the gradual plans for reopening to occur. However, as was expected, sales activity remained significantly below typical levels.
- **As was the case in April, new home sales across the GTA remained below 1,000 units** and condominium apartment sales dropped below 450 units, the lowest May level reported since tracking began in 2000. However, while condominium apartment sales declined, single-family sales improved modestly over April indicating buyer demand remains in the market.
- Given the level of uncertainty that existed in May, from the impact on the economy to the duration of the COVID-19 crisis, consumers certainly had many reasons for pause in their home buying decision. We continue to anticipate that sales volumes are not expected to immediately return to the pre-pandemic levels and overall volumes for the year will be lower than original levels. **Assuming the reopening plans continue, we may see a more active summer sales season as deferred launches are pushed into July and August; with early signs of increasing activity in the resale market.**

GTA Condominium Apartment Key Performance Indicators

	May-19	Apr-20	May-20	*Yr-Over-Yr % Change*	YTD May 2019	YTD May 2020	*Yr-Over-Yr % Change*
New Condominium Apartments (Altus Group data)*							
Total active sites	351	358	361	*3%*	336	357	*6%*
New projects opened	14	3	3	*-79%*	47	24	*-49%*
Units in new projects opened	3,053	747	175	*-94%*	12,234	5,814	*-52%*
Total sales (units)	3,612	500	428	*-88%*	9,553	7,655	*-20%*
Sales as % of total new & resale	*59%*	*43%*	*30%*		*50%*	*53%*	
Inventory (units)	14,112	9,832	9,526	*-32%*	12,603	10,647	*-16%*
Sales-to-inventory ratio	26%	5%	4%	*-82%*	14%	14%	*-2%*
Months of inventory	7.3	4.2	4.6	*-37%*	7.1	4.6	*-35%*
Benchmark price	$779,687	$984,369	$985,436	*26%*	$783,092	$967,883	*24%*
Price PSF Benchmark	$889	$1,018	$1,014	*14%*	$894	$1,011	*13%*
Unit size Benchmark (sq. ft)	877	967	971	*11%*	876	957	*9%*
Units completed	1,947	2,969	950	*-51%*	10,539	9,056	*-14%*
Resale Condominium Apartments (Toronto Regional Real Estate Board data)							
Total sales (units)	2,542	667	1,002	*-61%*	9,638	6,924	*-28%*
New listings (units)	4,133	1,659	2,526	*-39%*	15,990	12,139	*-24%*
Inventory ("active listings", units)	3,806	2,560	3,108	*-18%*	3,199	2,313	*-28%*
Sales-to-inventory ratio	67%	26%	32%	*-52%*	59%	65%	*10%*
Months of inventory	2.0	1.4	1.8	*-10%*	1.7	1.2	*-27%*
Average price of units sold	$590,876	$578,283	$625,445	*6%*	$573,862	$642,751	*12%*
HPI constant quality price index (Jan 2005=100)	267.4	300.3	300.0	*12%*	261.5	293.7	*12%*

** see end of report for Definitions*

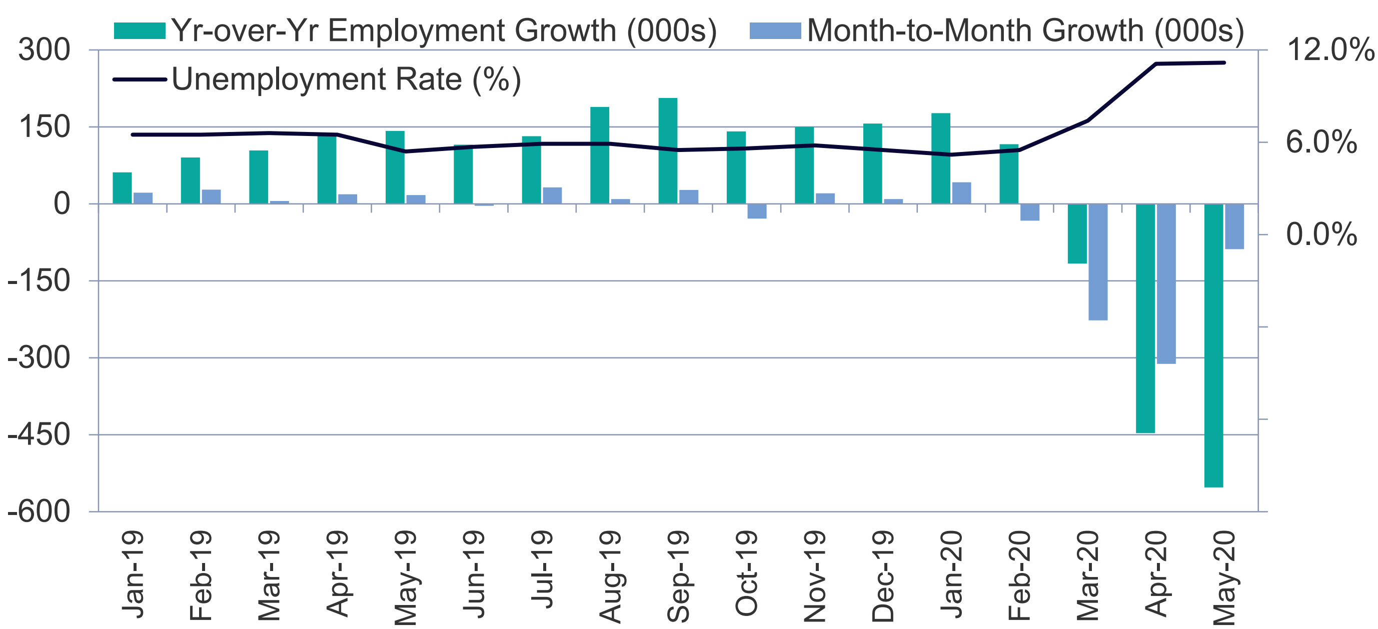
- Employment levels continued to decline in May, but **total job losses slowed compared to April as government wage subsidy programs slowed the pace of layoffs**. Government support programs, such as CERB, have also helped consumers weather the storm and mitigate some of the major concerns regarding missed rent payments and evictions. However, as these support programs are reduced or retracted, further impacts on the economy and consumers are expected.

- **The Bank of Canada maintained the target for the overnight rate at ¼ percent at its latest rate announcement on June 3**, continuing to cite it as the "effective lower bound" (*chart top of next page*). The next rate announcement date is July 15. **Mortgage rates available in the market had been relatively stable on average in recent weeks, but dipped more recently and discounted rates below 2.0% have been advertised.**

- Altus Group has been tracking homebuying intentions on a quarterly basis for over 25 years in our FIRM Survey. Our latest survey was in field in early April, when households in the GTA were starting to adapt to emergency orders and work-at-home arrangements. **As noted last month, homebuying intentions, while down, were still ahead of the same period in 2019.** However, concerns over employment stability were much more pronounced (*chart next page, bottom),* particularly amongst current renters, where over half of respondents indicated they agree completely or somewhat they are concerned about losing their job over the next year.

- CMHC recently updated their forecast for the Canadian housing market and, while generally pessimistic for most markets in the country, the outlook in the GTA is generally neutral with a more positive view into 2021.

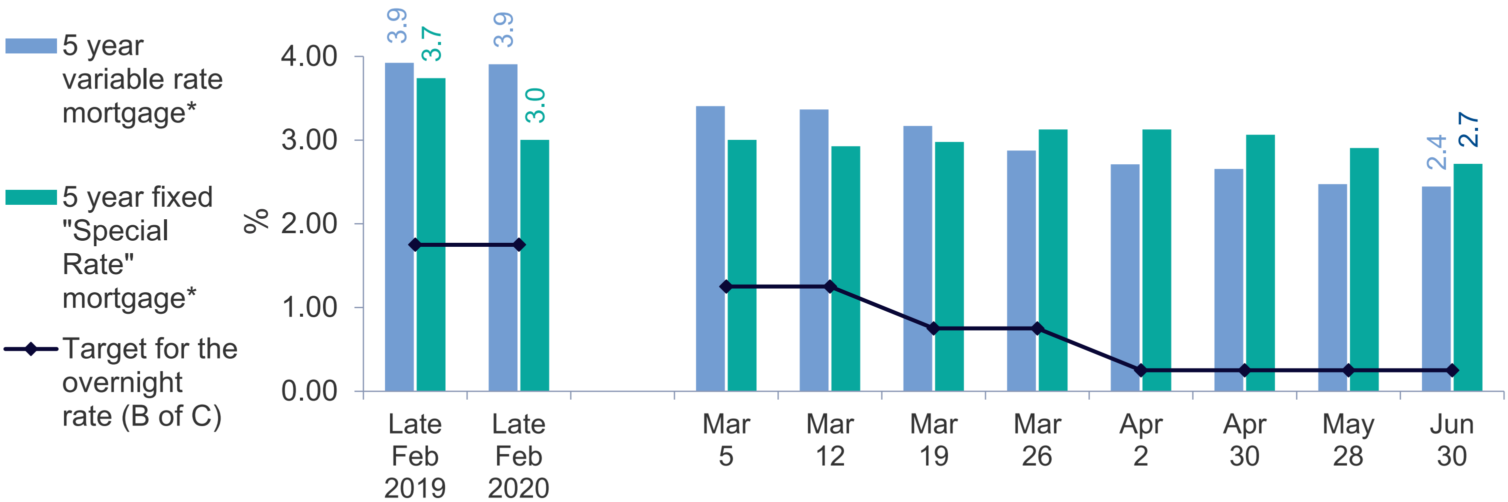
GTA Employment*



Source: Altus Group based on Statistics Canada data

** Data are monthly, seasonally adjusted*

Selected Interest Rates

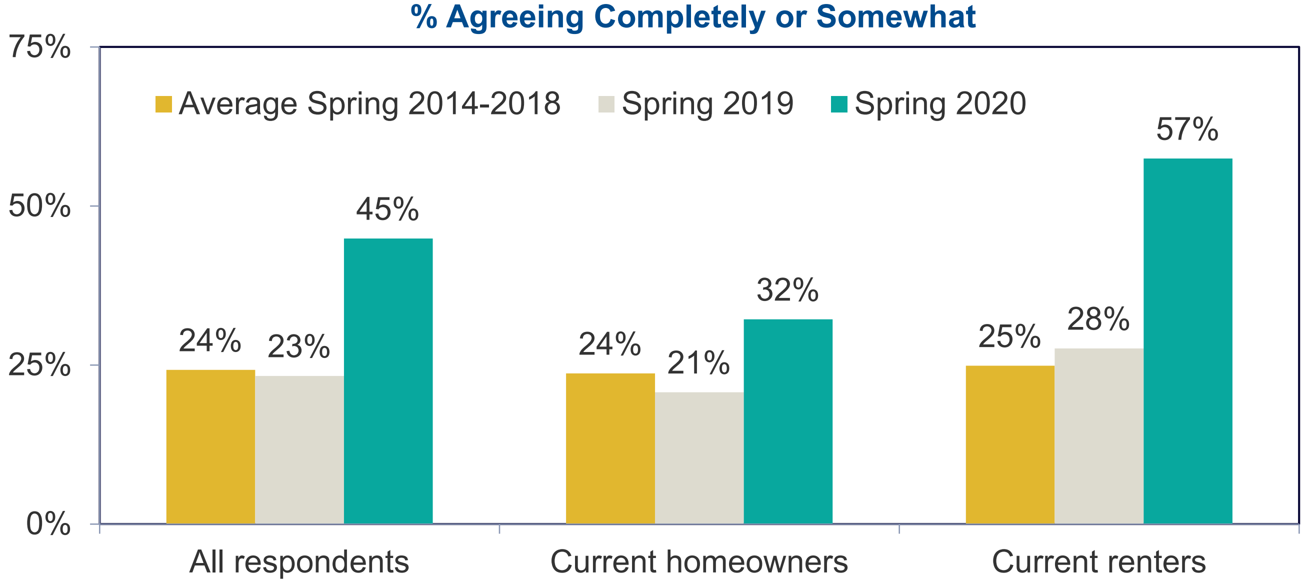


** Average for the major banks*

Source: Altus Group based on data from StatCan, Bank of Canada and major bank web sites

Concerned About Self/Spouse Losing Job Over Next Year, GTA

% Agreeing Completely or Somewhat

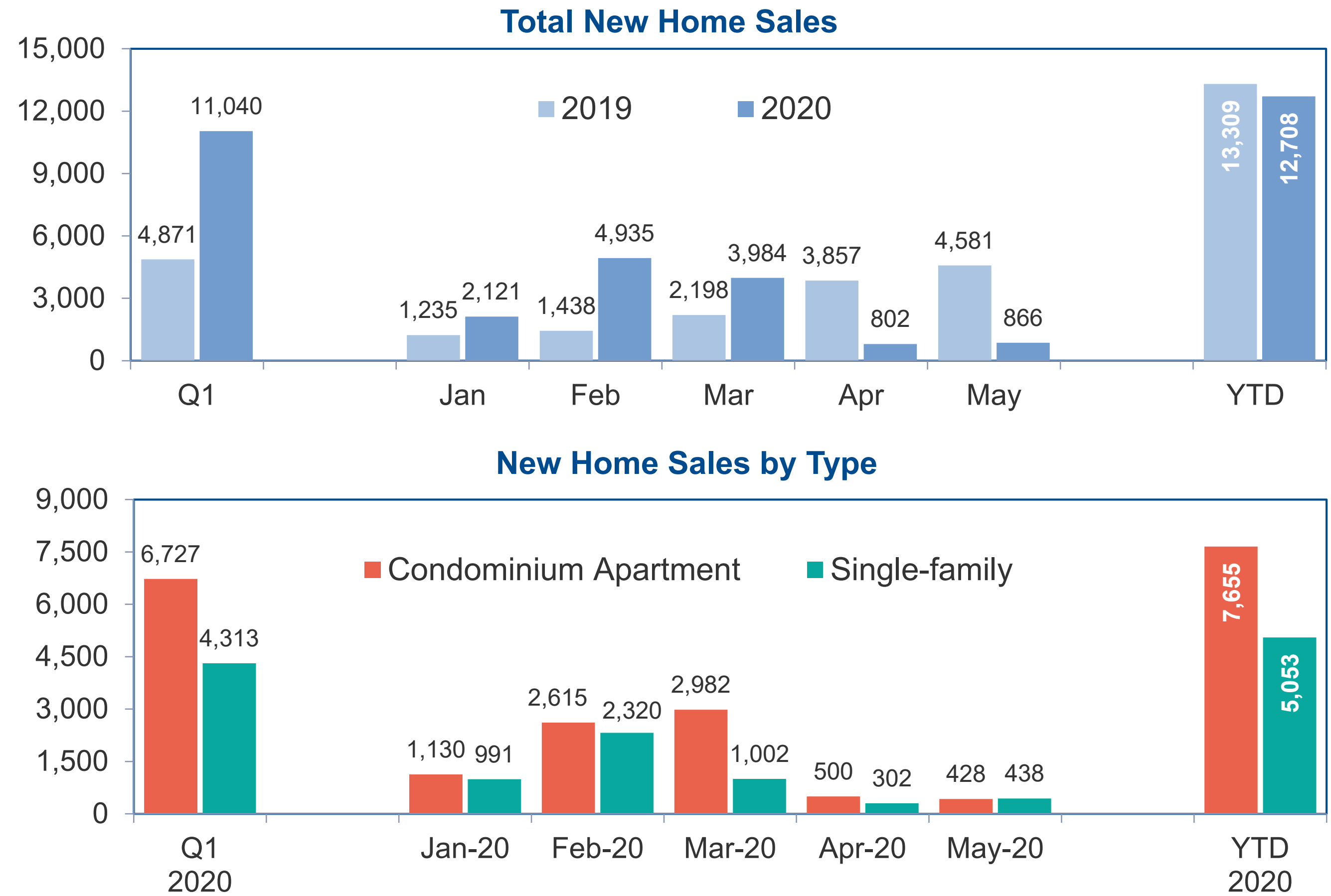


Source: Altus Group, The FIRM Survey

New Home Market - Sales

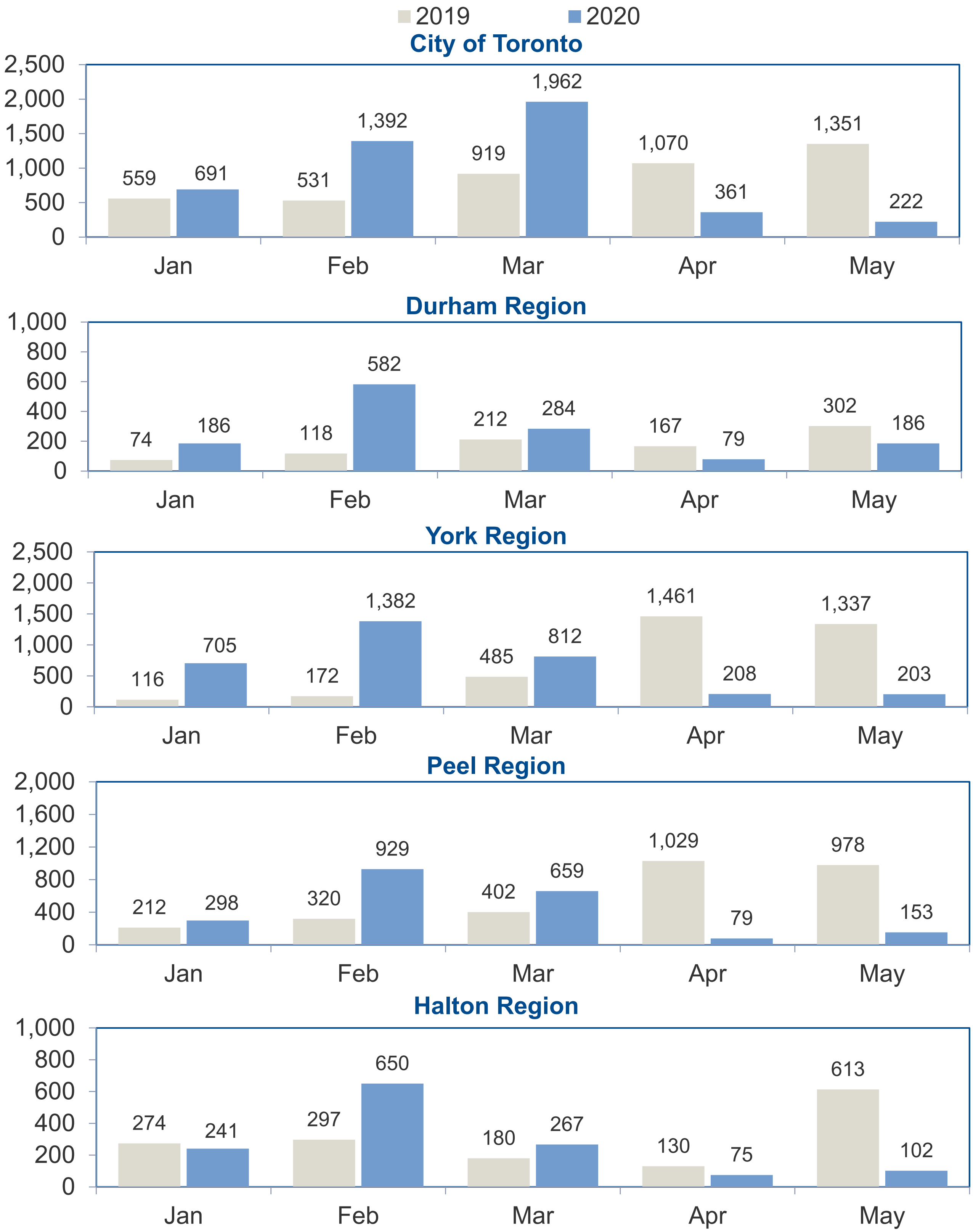
- The impacts of COVID-19 continued to disrupt the new homes market in May with sales remaining far below typical volumes. **Total new homes sales volumes were down over 80% in May** compared to a year earlier, and while overall sales volumes increased from April, condominium apartment activity declined to levels not seen since 2009.
- Similar to April, sales last month **were the lowest reported in May since tracking began in 2000**. This also represents the first consecutive two month period with sales under 1,000 per month since January and February 2009 during the financial crisis.
- The decline in sales was more significant for condominium apartment, where volumes dropped further from April levels as new project launches have been delayed; only 3 new projects opened during May and many anticipated openings continue to be delayed by the pandemic.
- **Single-family sales have improved since April**, with notable increases seen in detached projects where sales more than doubled in May.
- **Year-to-date sales for the GTA have now slipped below last years volumes** at 12,708 (compared to 13,309 in 2019) (*chart after next page*).

GTA New Home Sales



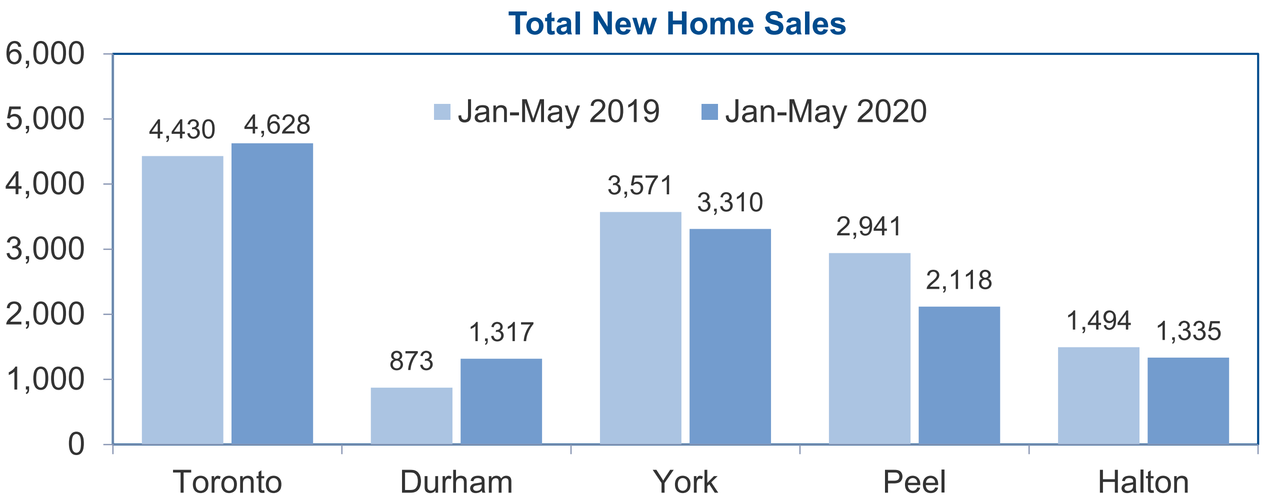
Source: Altus Group

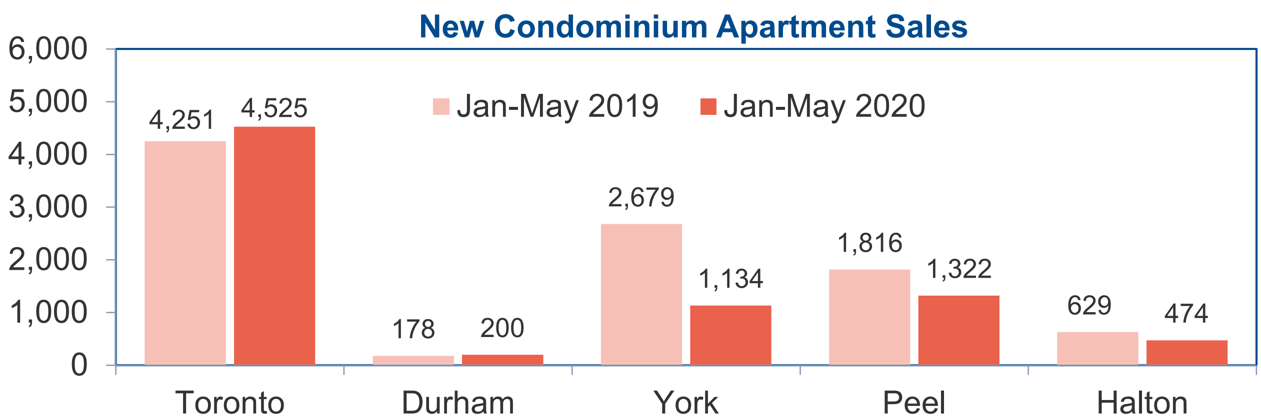
GTA Total New Home Sales by Region and Month

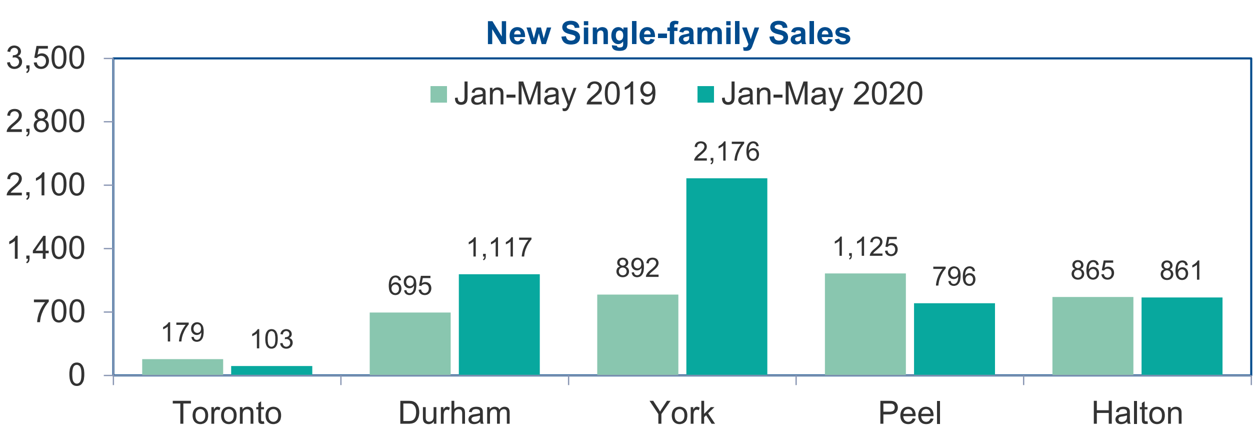


Source: Altus Group

GTA New Home Sales by Region





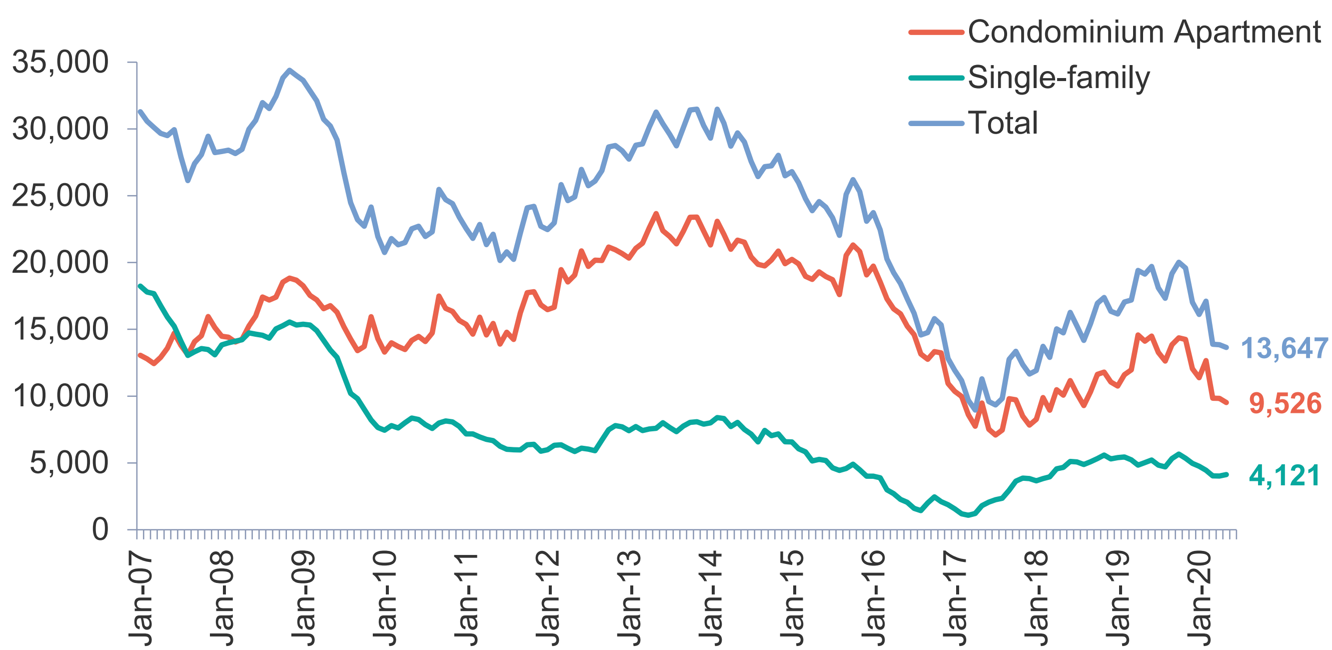


Source: Altus Group

New Home Market - Inventory

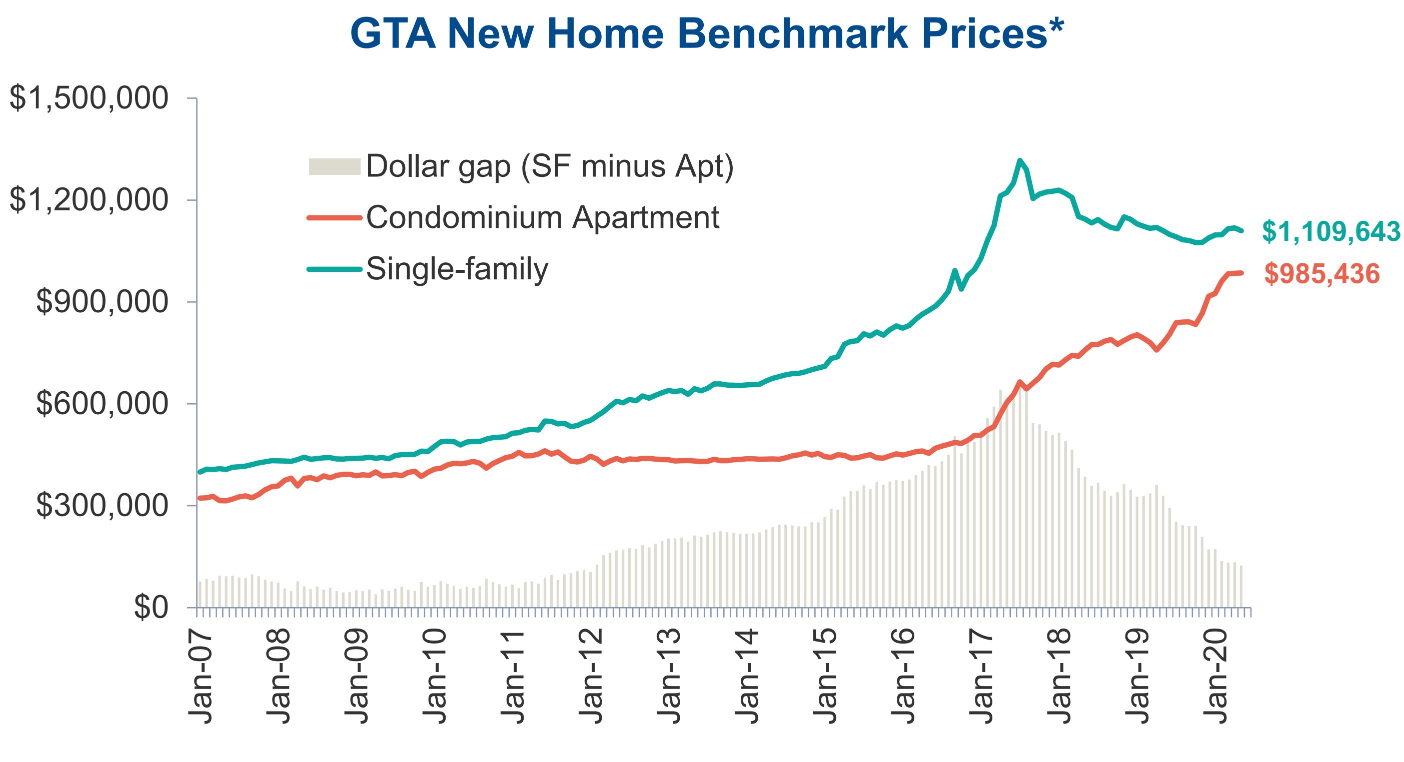
- **The total new home inventory declined for the seventh consecutive month to 13,647 units**, as delayed project launches have not brought new units to market and sales activity, while weak, was more than double the new supply.
- **The current condominium apartment supply represents approximately 4.6 months of inventory at normalized sales volumes**; however, as noted these are not normal market conditions.
- Given the slower market conditions and sales centre restrictions, the current supply remains balanced to sales demand with the market, in effect, on pause. **It will be critical to watch sales activity volumes as the economy reopens as faster recovery in sales without new supply could quickly erode available inventories.** That said, we are currently tracking over 30 projects representing almost 7,000 units that were expected to launch this spring which would add much needed supply.

GTA New Home Inventory



Source: Altus Group

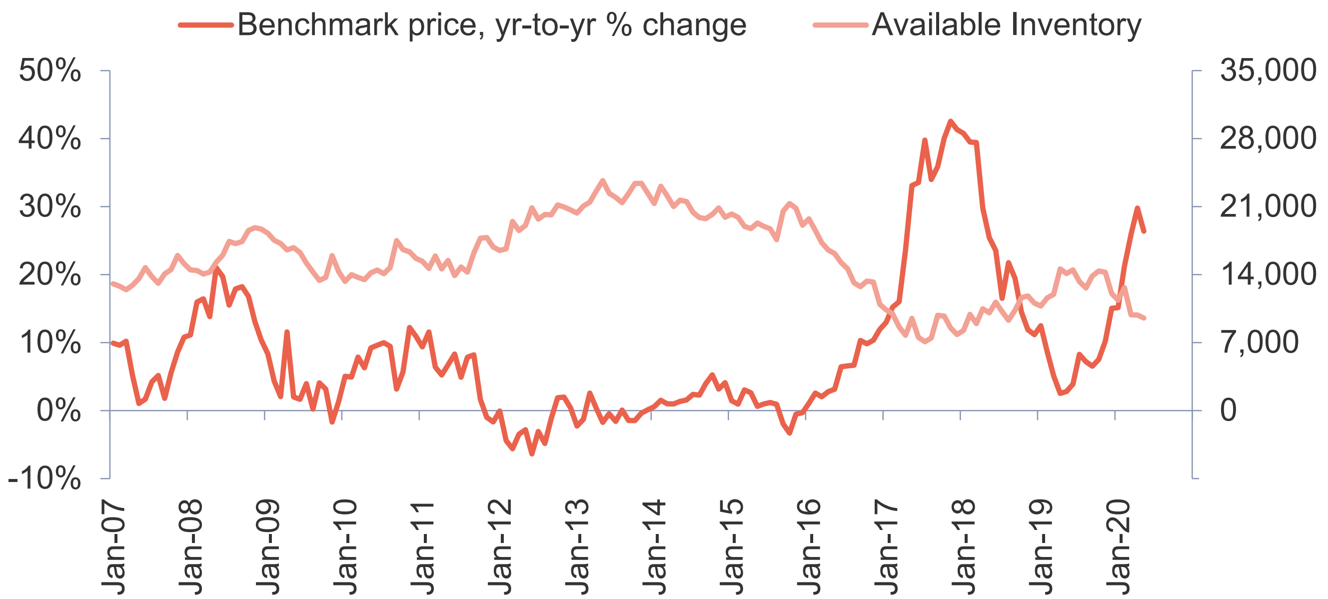
- **The Benchmark price for available inventory in the new single-family and condominium apartment projects was stable again in May**, largely as a result of little change in inventory from new supply OR sales. Short term price movements are not anticipated while the market remains under pandemic restrictions; COVID-19 impacts to consumers have been partially mitigated by government support programs such as CERB and many consumers who may be impacted are sitting on the sidelines waiting.
- **While asking prices have so far remained stable, developer incentives are expected to become more prevalent**; not only as a financial incentive to purchasers but also as a means to re-attract consumers to the market. While the Ontario market has remained largely closed by the pandemic, increasing use of incentives and promotions have been noted in other areas of the country that have reopened, such as Vancouver (charts next page).



** Average asking price of available new home inventory at end of period with outliers removed*

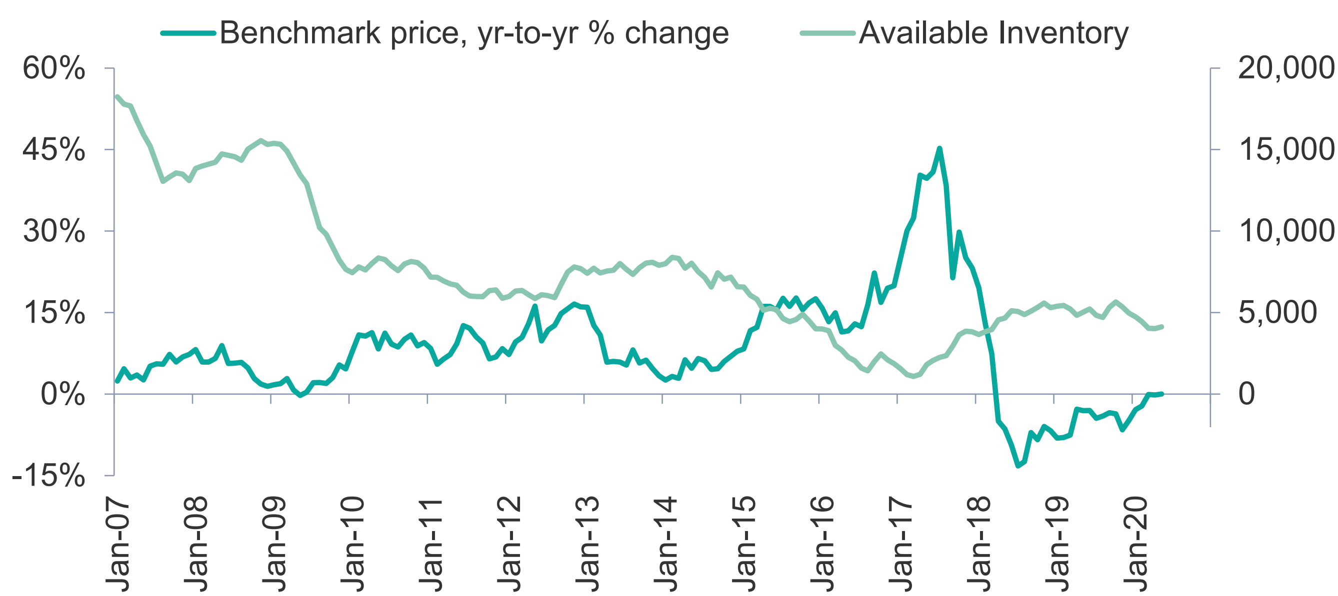
Source: Altus Group

GTA New Condominium Apartment Benchmark Price Changes and Available Inventory



Source: Altus Group

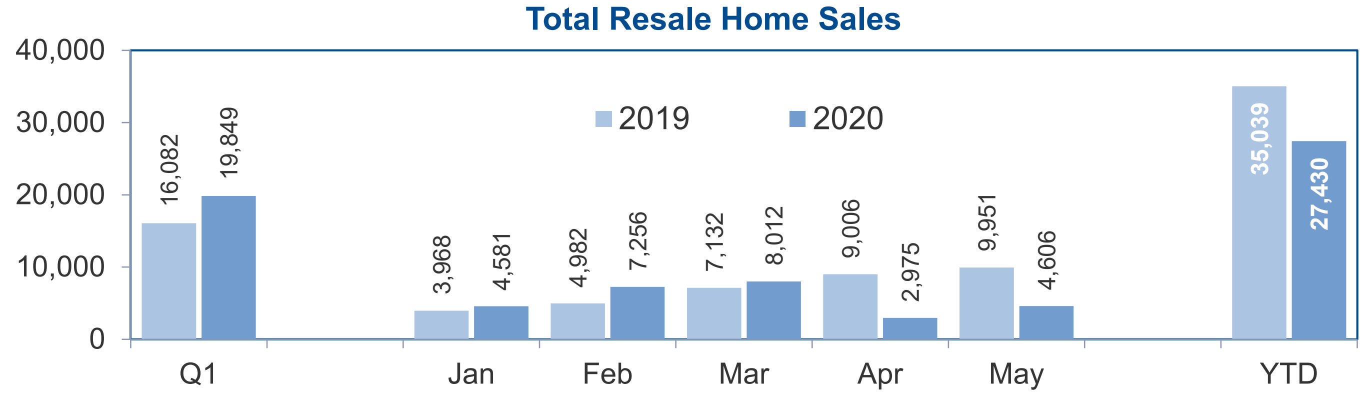
GTA New Single-Family Home Benchmark Price Changes and Available Inventory

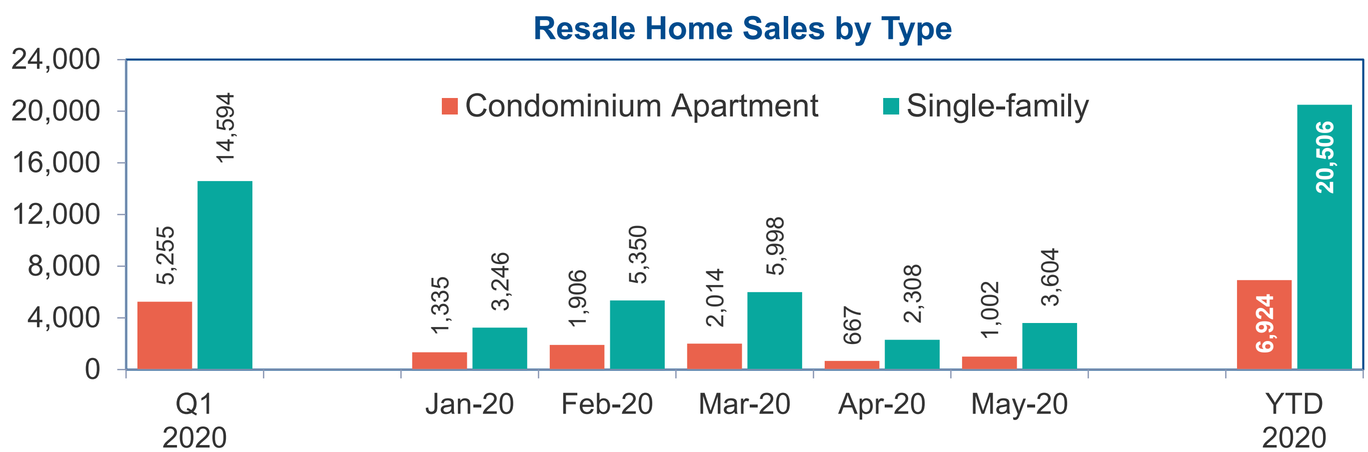


Source: Altus Group

- **Total sales of existing homes in May** (as reported by the Toronto Regional Real Estate Board), while still 54% lower than the same period last year, improved following the sharp decline in activity seen in April. The improvement in sales activity compared to April is a positive indication that buyer demand, that was impacted by the speed at which COVID-19 restrictions were placed on the market, is gradually coming back into the market.
- Similar to the sales improvement, new listing activity also increased in May resulting in a modest improvement in the number of active listings *(chart top of next page)*. That said, the number of active listings remains very low compared to more typical levels (over 30% below the 10 year average). Continued improvements in sales, as restrictions are relaxed, could result in more upward pressure on prices.
- After dipping in April, the average price of homes sold climbed higher in May and now sits 3.0% higher than May 2019 (*chart bottom of next page*). The low levels of inventory will continue to put pressure on prices and TRREB is continuing to forecast price growth through the balance of the year.

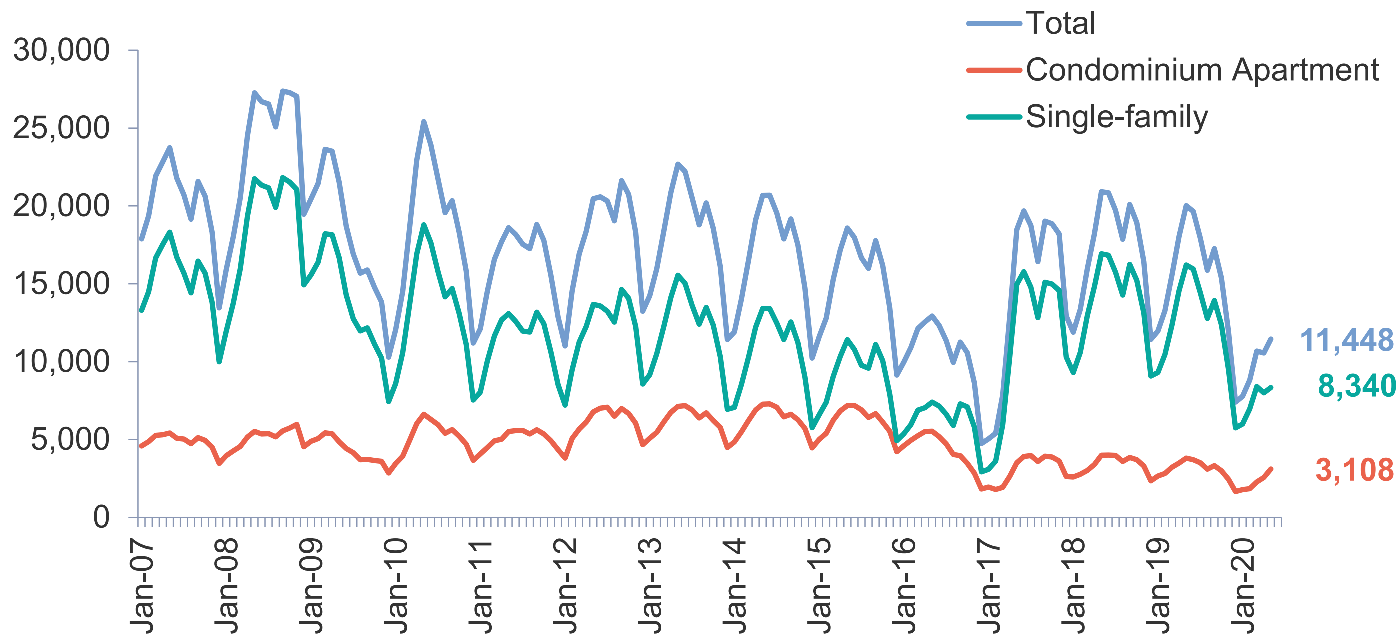
GTA Resale Home Sales





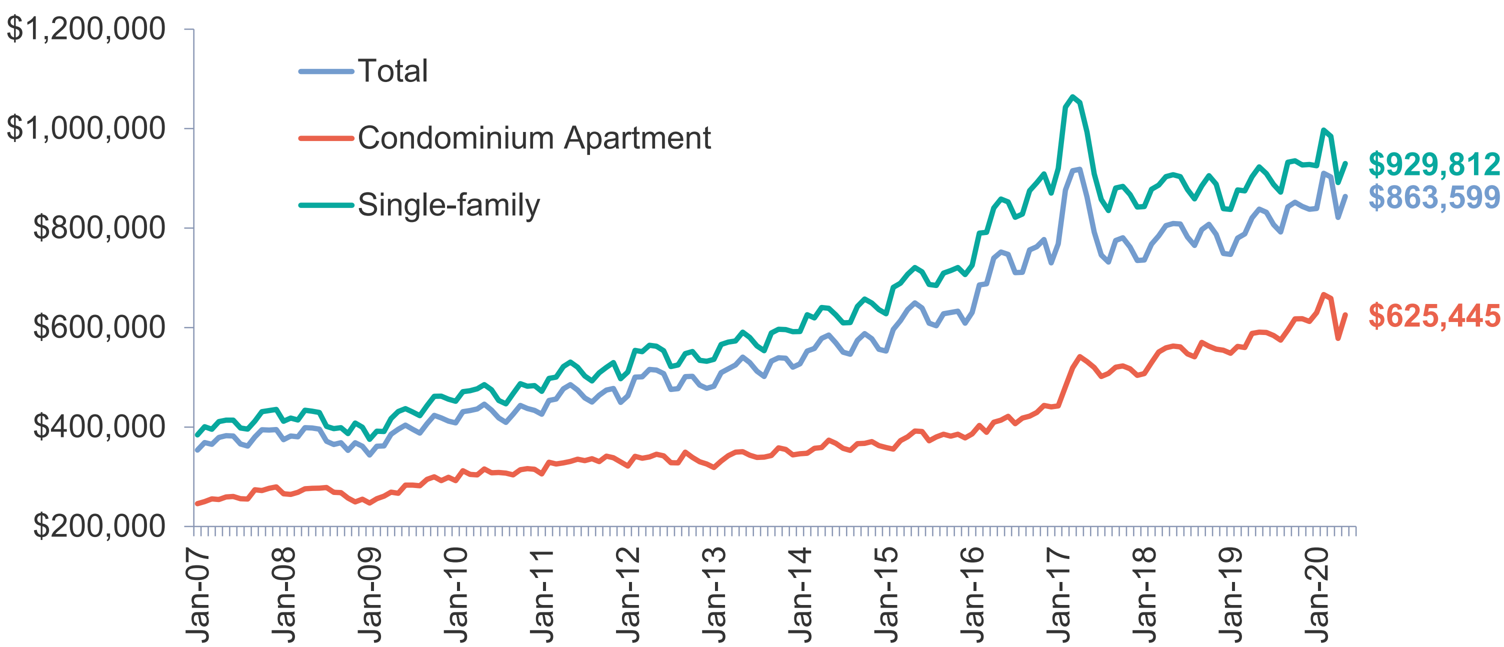
Source: Altus Group based on Toronto Regional Real Estate Board data

GTA Resale Home Inventory ("Active Listings")



Source: Altus Group based on Toronto Regional Real Estate Board data

GTA Resale Home Prices



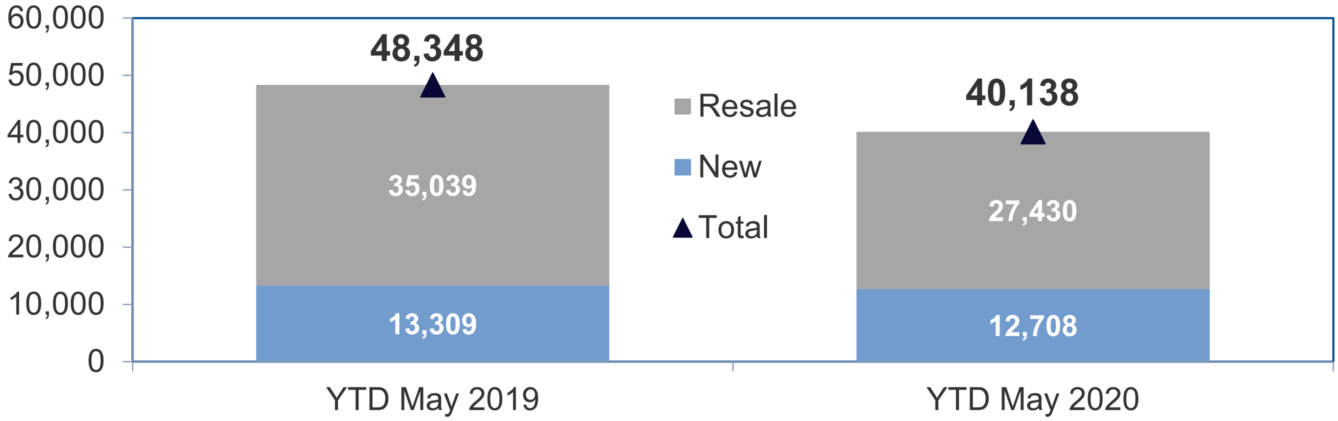
Source: Altus Group based on Toronto Regional Real Estate Board data

Overall Home Market - Sales

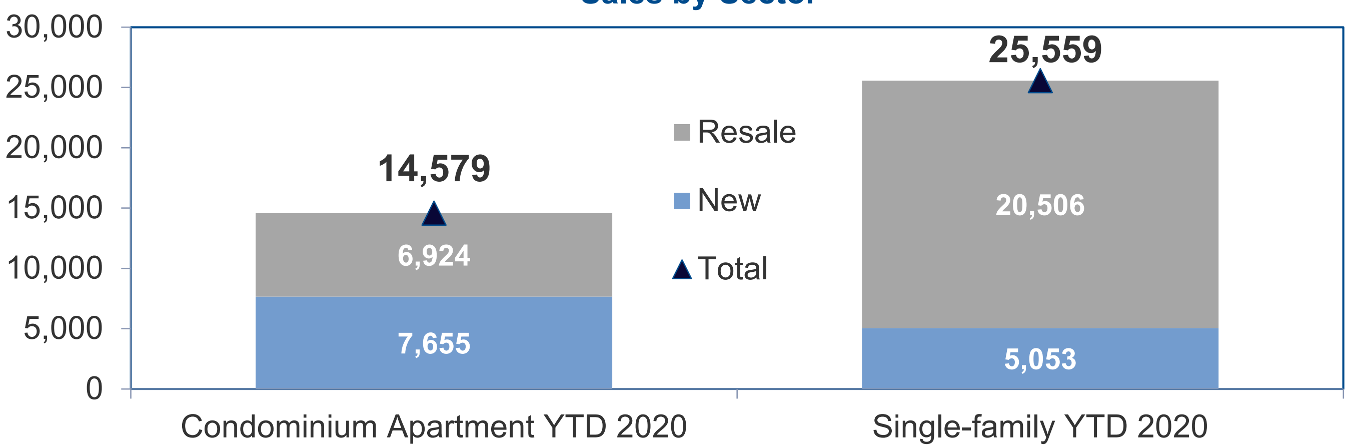
- **Combined new and resale activity**, as measured by TRREB and Altus Group, totaled just over 40,000 units for year-to-date May, which is down from the over 48,300 units reported in 2019. The decline in sales in 2020 is more significant in the resale market, which means that about 1 in 3 homes sales in the GTA was a new home.
- While YTD sales in the GTA has proportionally improved for new homes compared to resale, the trend through the back half of the year is one which is expected to be shaped on inventory supply (new listings in the resale market and new project launches in new homes).
- **The new home sector accounted for over half of total condominium apartment sales** for year-to-date May, compared to about one-fifth of single-family sales.

GTA Combined New & Resale Home Sales

Total Sales



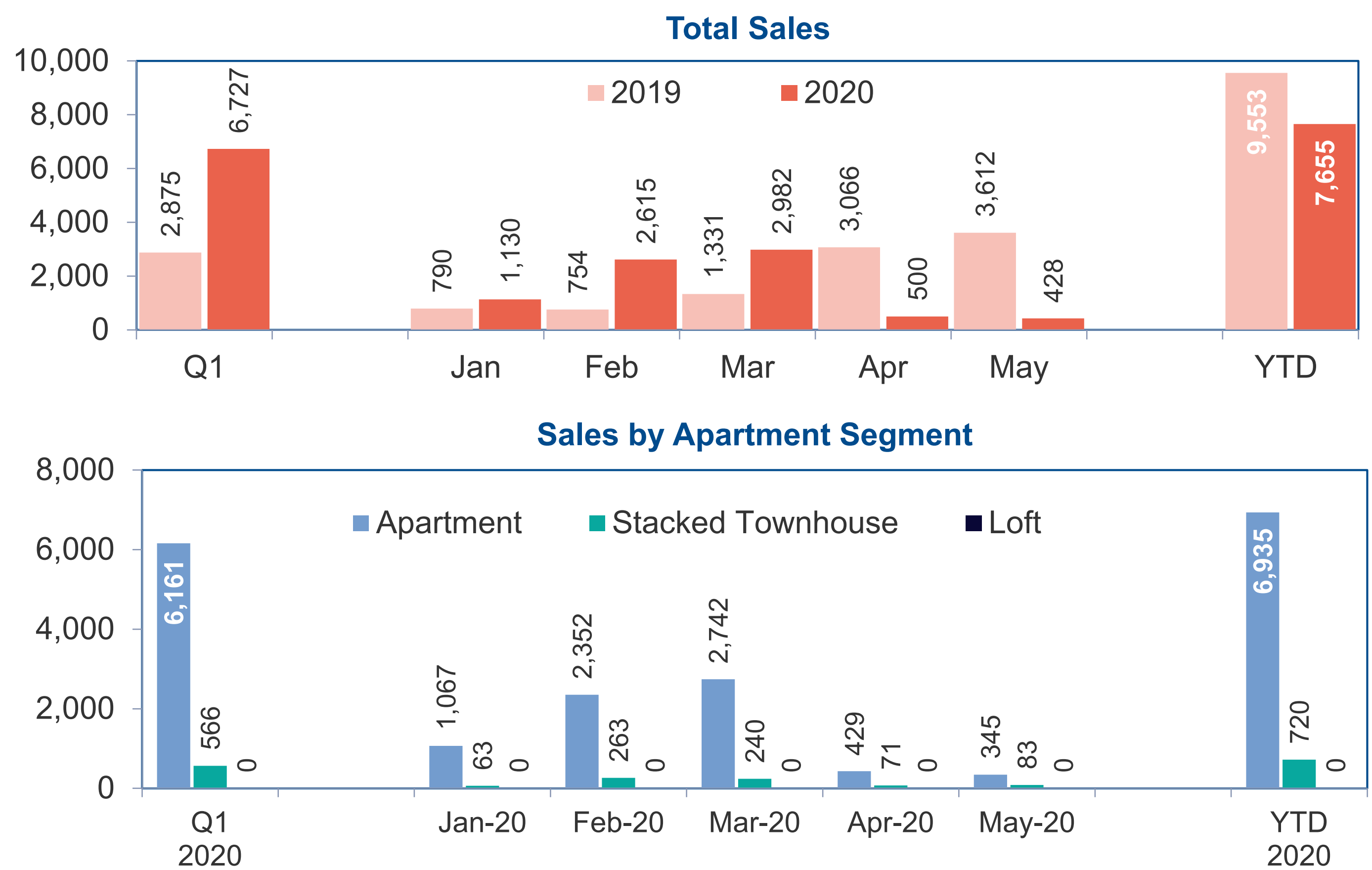
Sales by Sector



Source: Altus Group and Toronto Regional Real Estate Board data

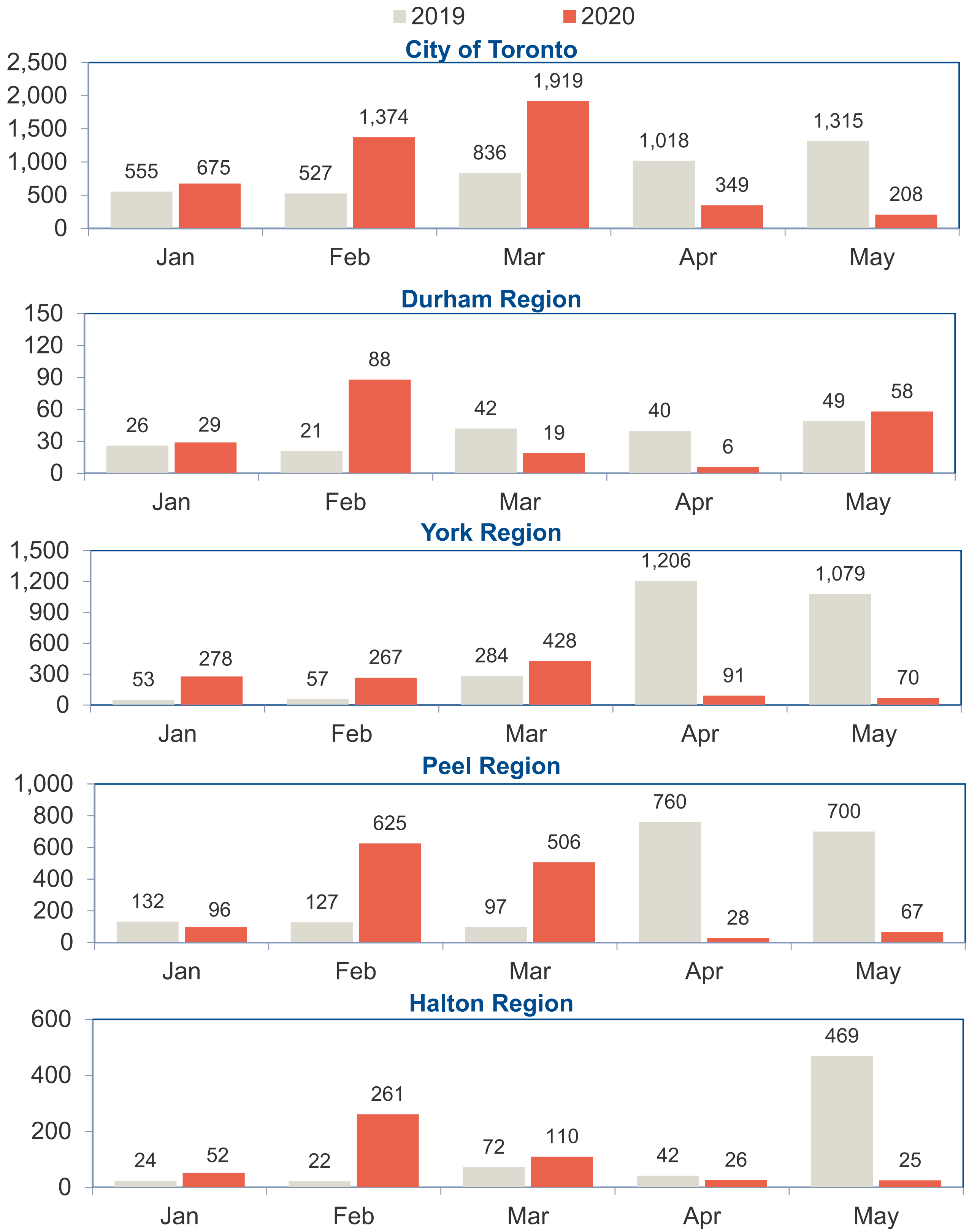
- New condominium apartment sales declined further in May to 428 units, **the lowest May level since tracking started in 2000.** The volumes reported in May are far below the seasonal norms for the typically robust Spring sales market, down 88% from May 2019 and 81% below the 10 year average.
- The May sales numbers declining below April stats reflects the lack of new project launches, where we typically see the largest sales volumes. That said, over 40% of the sales that were reported in May were at the 8 projects which have launched since the beginning of March indicating continued market support for new projects.
- Unlike the apartment stats, stacked townhouse sales improved modestly in May.
- New condominium apartment sales were down in May in all regions, except for Durham Region *(chart next page)* which actually reported an increase over May 2019 volumes. Activity in Durham Region was supported by the fact that 2 of the 6 recent project launches in April and May were within the region.

GTA New Condominium Apartment Sales

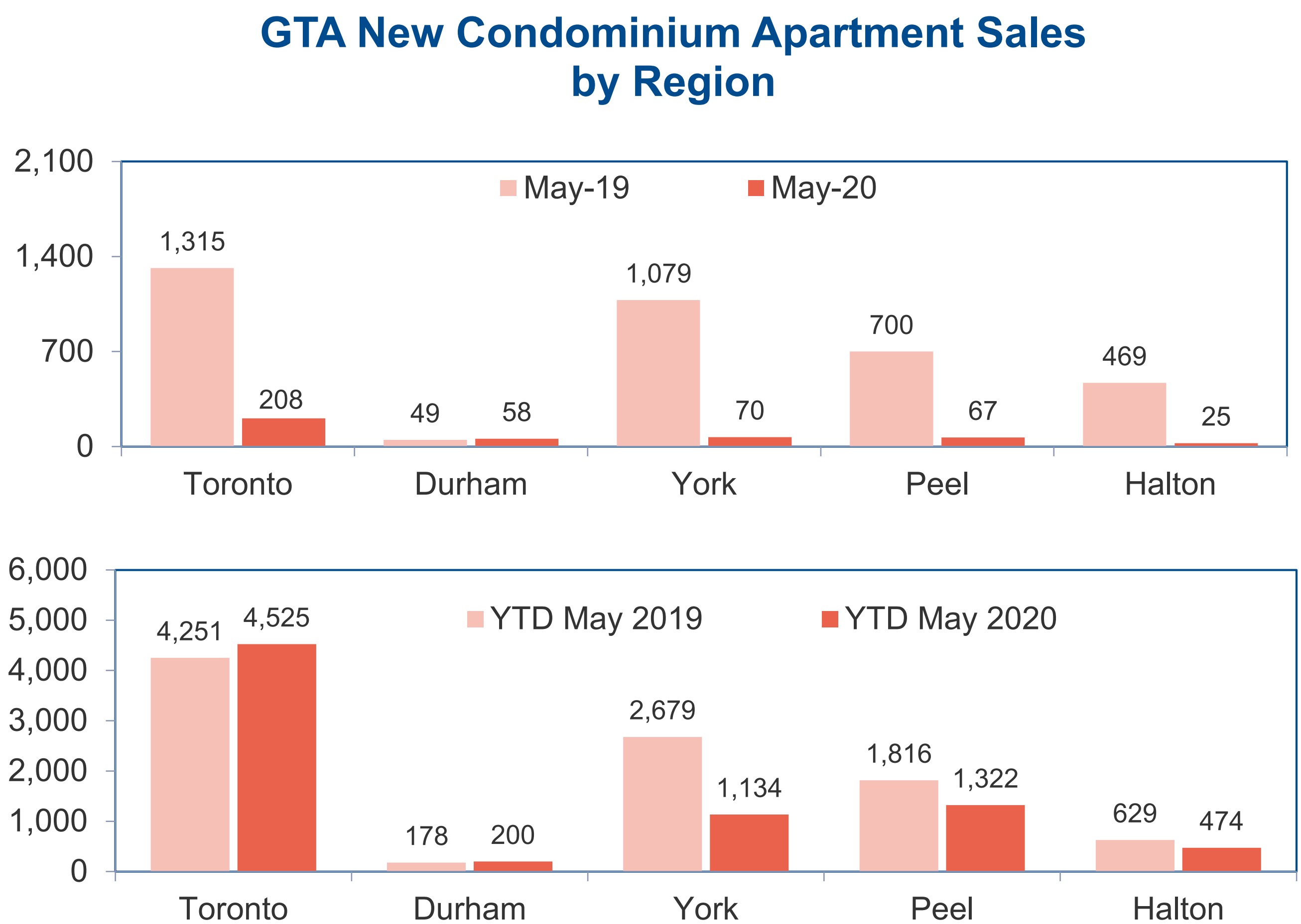


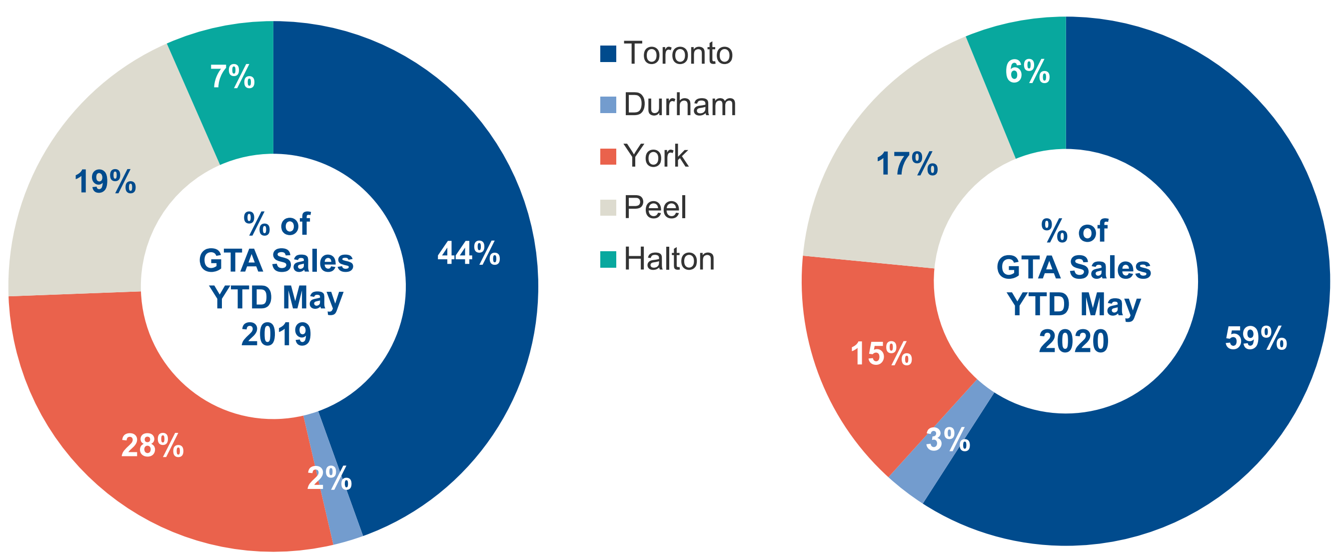
Source: Altus Group

New Condo Apartment Sales by Region and Month



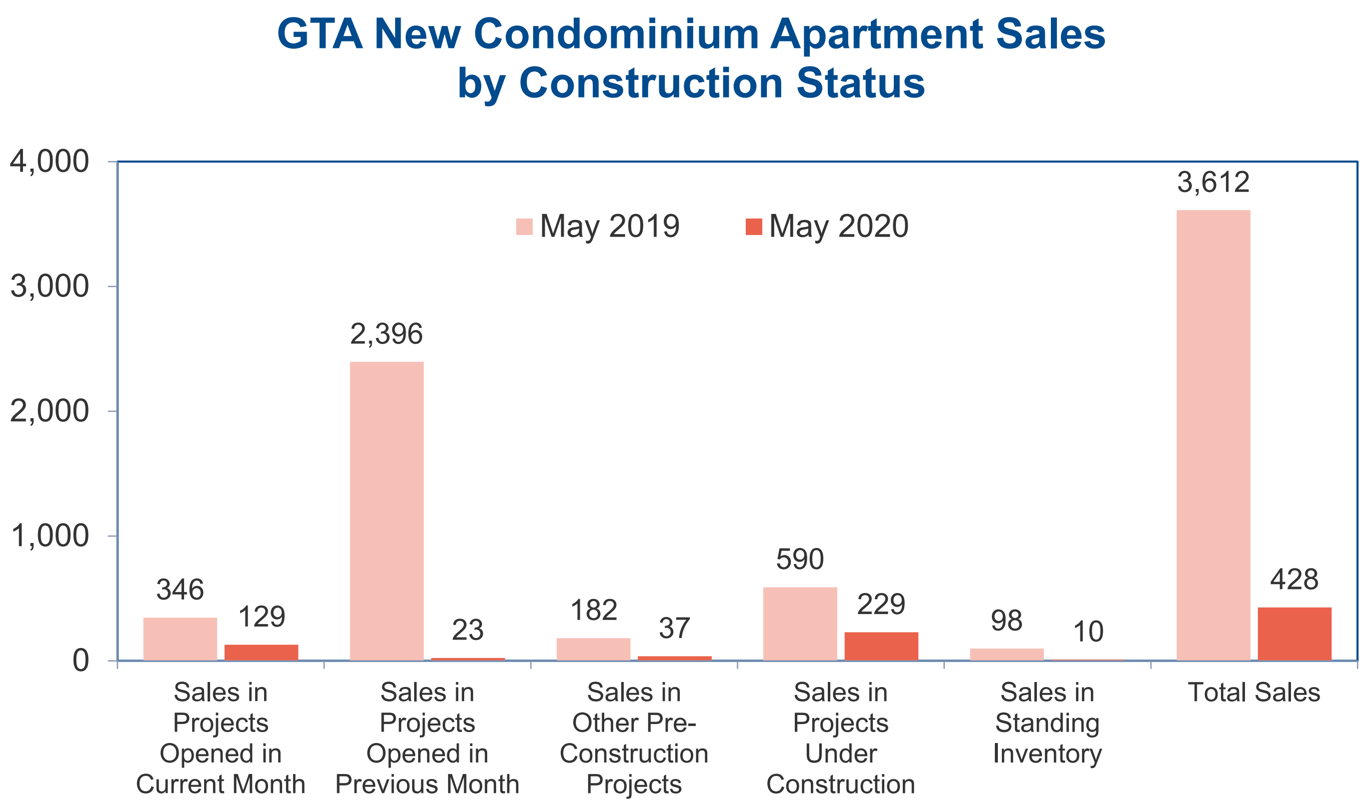
Source: Altus Group





Source: Altus Group

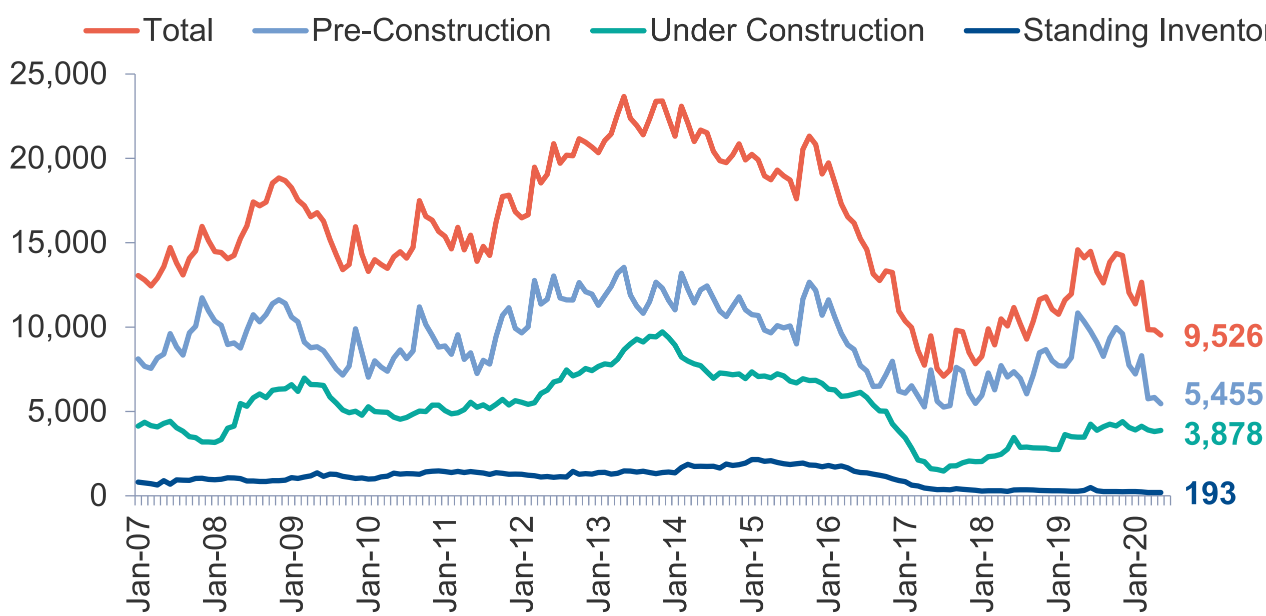
- **While only three projects opened sales in May**, they accounted for a significant share of the total sales volumes at almost a third of sales for the month. Sales at new project launches are a significant contributor to overall sales volumes with 5 of the top 10 selling projects in May having launched sales in the past three months.
- Sales of under construction inventory were the highest in May, supported by the fact that the best selling project, which recently launched, is already under construction. There were also 10 sales of standing inventory units, up slightly from April.

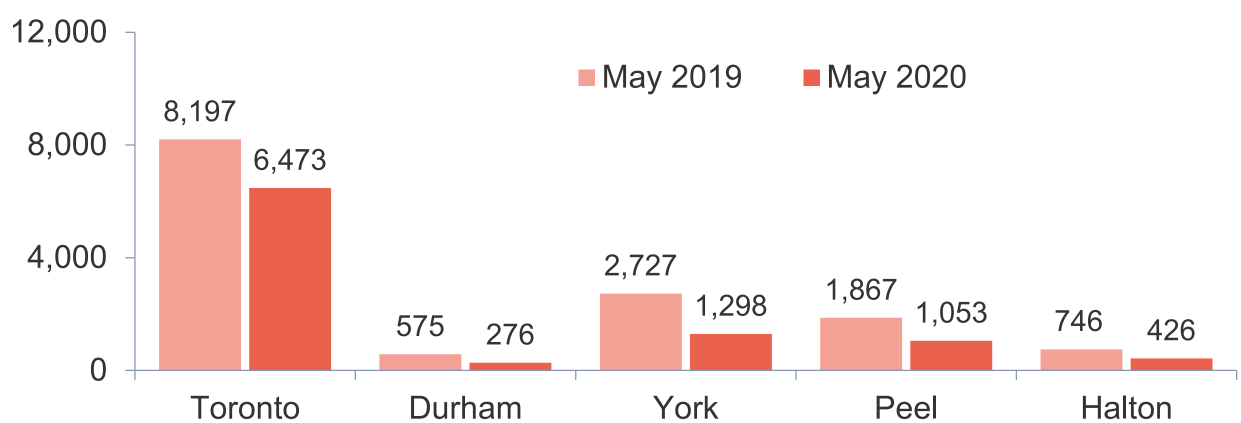


Source: Altus Group

- The lack of new project launches has meant that **available inventory declined in May from April** and is now at the lowest level since August 2018 and is approaching the levels seen in 2017.
- The majority of inventory remains in pre-construction projects, **while quick occupancy inventory remains at the historic low levels,** with only two new buildings offering immediate occupancy inventory in May.
- **The current unsold inventory at new condominium apartment projects represents approximately 4.6 months of supply** at the past of sales seen over the past 12 months, which is less than half the long term average. In light of the current sales volumes, and lack of new supply, these numbers need to be viewed with caution, but do highlight the fact that the market has relatively little excess supply and could face inventory constraints once sales improve.

GTA New Condominium Apartment Inventory

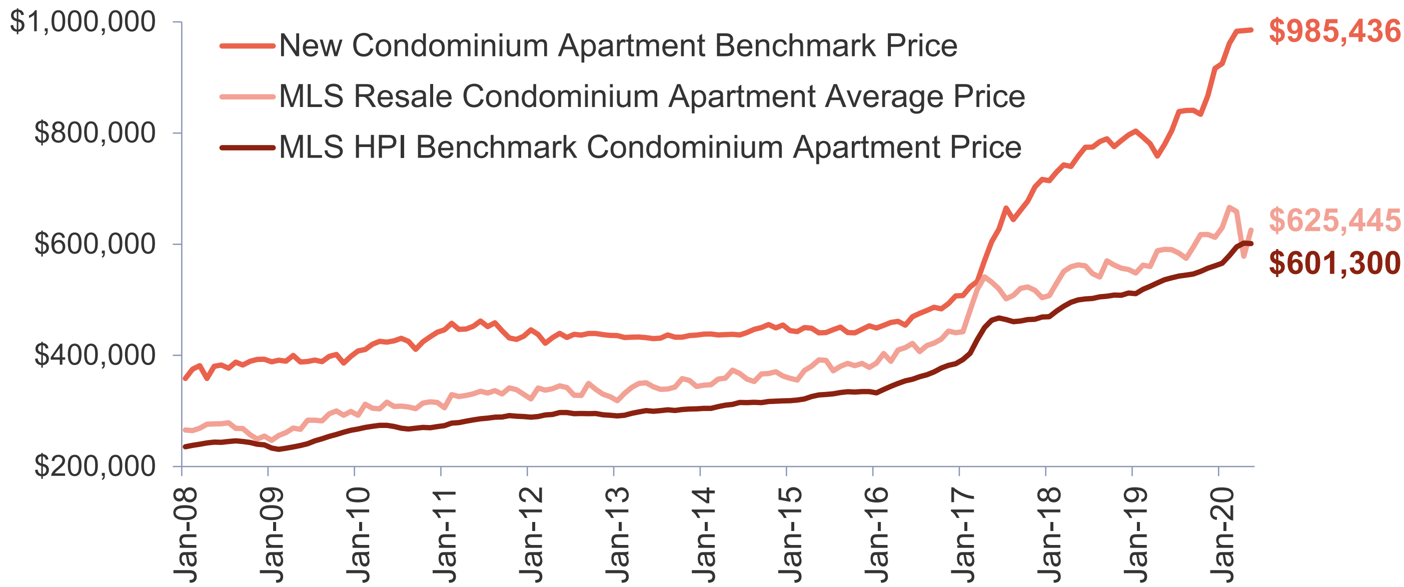


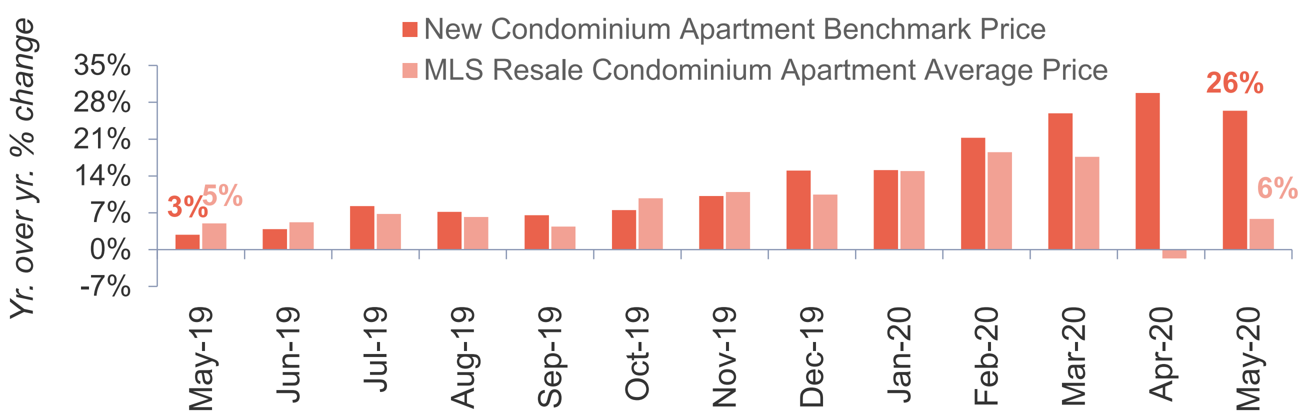


Source: Altus Group

- **The Benchmark price of the available inventory continued its steady increase** with the 7th consecutive month of higher values, reaching over $985,000 in May - up 0.1% over April. The relatively stable Benchmark price reflects the lack of new supply and modest sales, as well as the fact that builders have not adjusted prices during the COVID-19 crisis.
- After dipping in April, the average price of a resale condominium apartment recovered in May and now sits 6% higher than a year earlier. The HPI Benchmark price dipped slightly in May but remained stable with the pre-COVID-19 prices, indicating little resale price movement related to the pandemic.

GTA New and Resale Condominium Apartment Prices

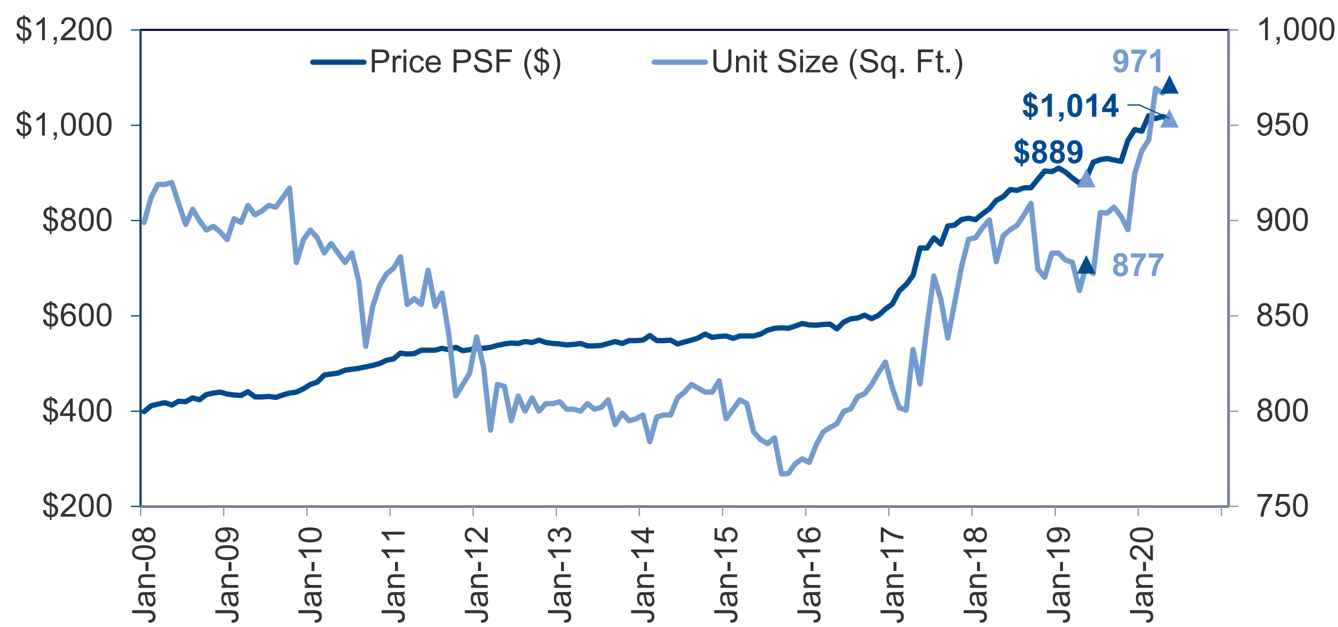




Source: Altus Group and Toronto Real Estate Board data

- **Since the start of the COVID-19 crisis, the benchmark price indictors have remained stable** with relatively little change in market pricing – both as a result of few new project launches and slower sales which has kept the available inventory fairly static. The few projects that have launched are in line with current market pricing and little price movement has been noted at projects.
- With the economy and market paused by COVID-19, we are not anticipating any short term movements in pricing outside of normal price adjustments as inventory sells; any market signals on pricing direction are first anticipated within the resale market where to date, pricing has remained stable. As the economy opens up, some pricing/short term incentives may be offered as a means to re-attract consumers and raise project profiles, but are not expected to be made permanent.
- While price increases have paused during the pandemic, delayed project launches and tight inventory, both in the new home and resale market, may contribute to continuing price growth this Fall. However, conditions for price growth may be challenged by other factors such as success of the re-opening, emerging challenges in the economy, and any shifts in housing preferences brought about by changes in income or pandemic concerns.

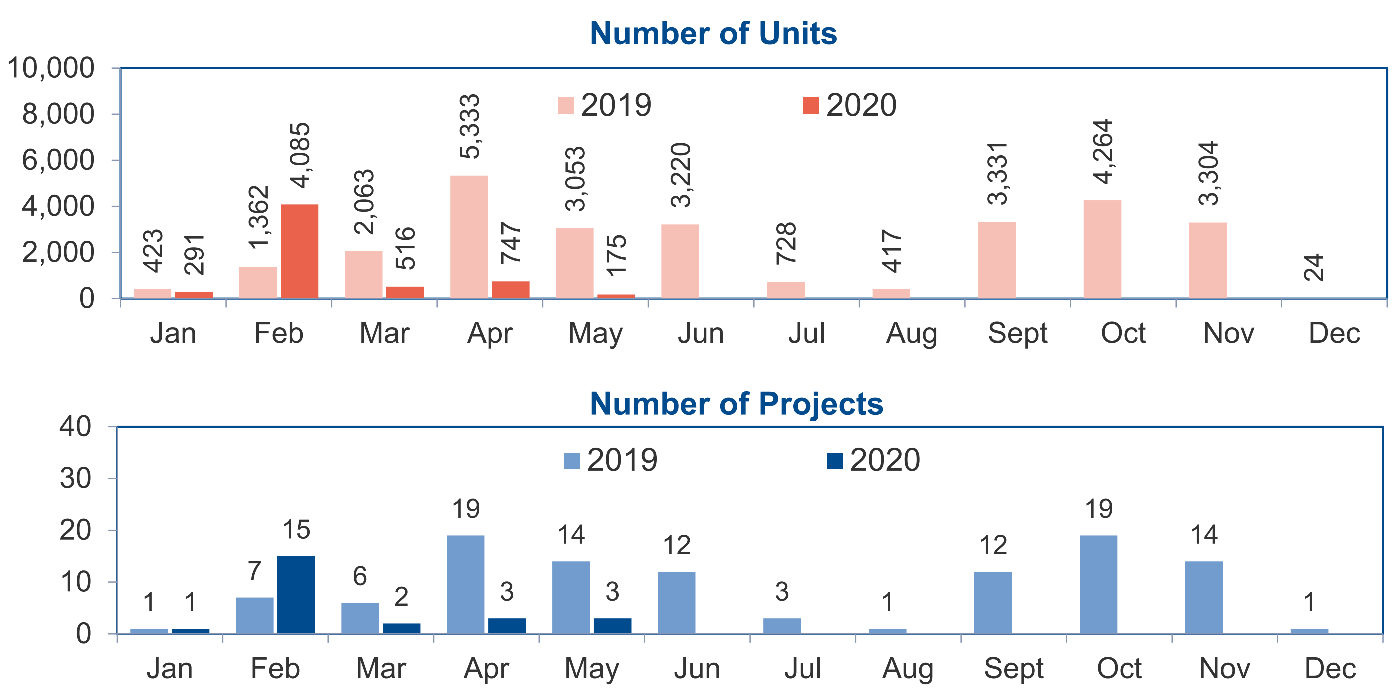
GTA New Condominium Apartment Benchmark Price Per Sq. Ft. and Unit Size



Source: Altus Group

- **As previously noted, May saw far fewer project launches than is typical for this time of year with only three new projects coming to market representing 175 units**. This is down sharply from 2019 when 14 projects launched bringing over 3,000 units to market. The past two months have seen the fewest project launches reported since 2000 and year to date openings are down by half compared to 2019.
- The lack of new projects is a result of many deferred openings, with July/August expected to see an above average number of new project openings. Early indications are that recent project launches (June 2020) are seeing more interest and achieving more typical sales absorptions which is a positive sign for a busier summer sales season.
- Following this page are maps showing the location of new projects launched in April and May 2020, accompanied by summary tables with additional detail on each project.
- *Note: clicking on the "project record" link in the summary tables will take logged-in Altus Group RealNet GTA High-Rise module subscribers directly to the full on-line record for that project; as the on-line record becomes updated, specific data may be more up-to-date than information contained in the report here.*

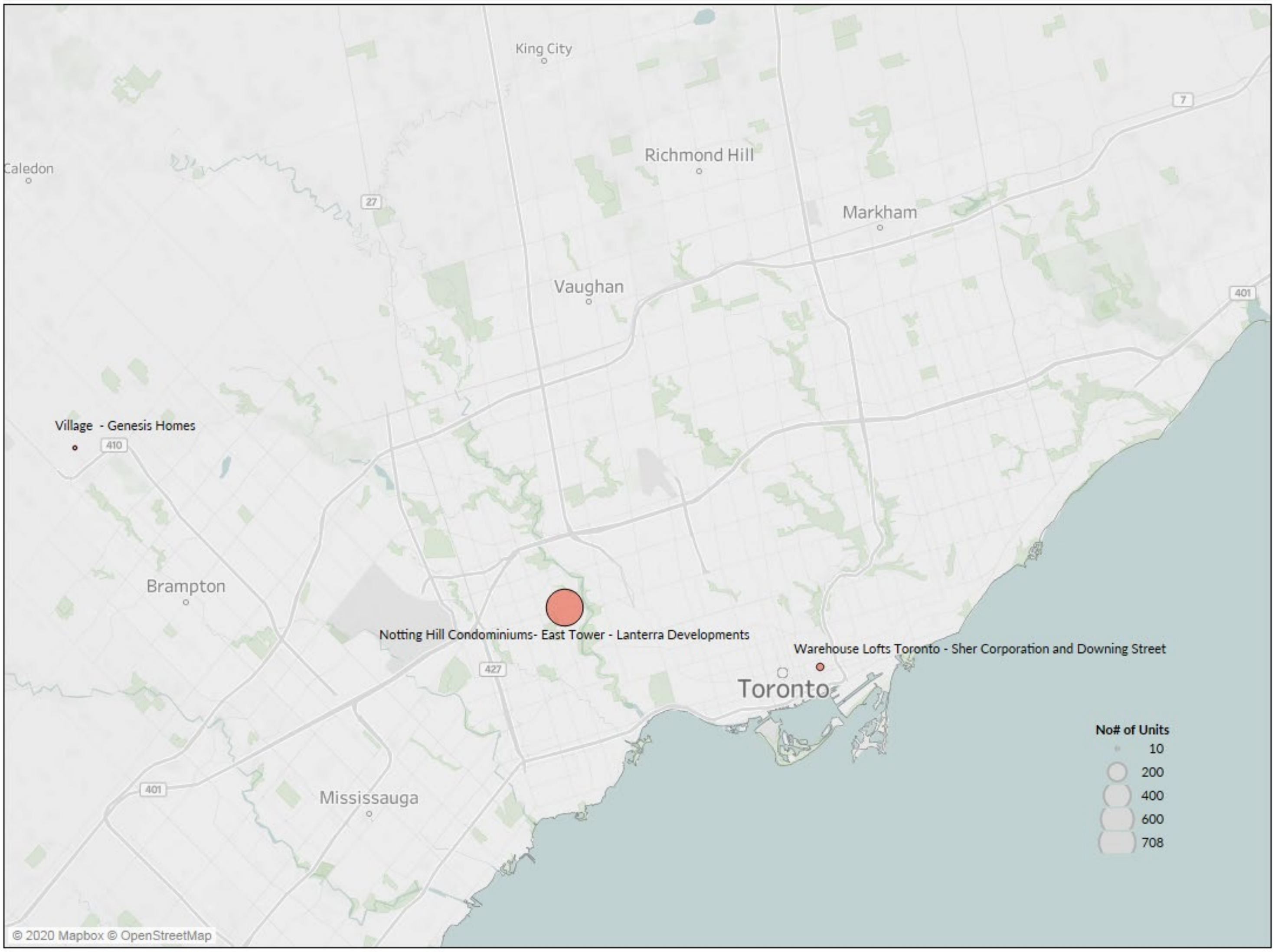
GTA New Condominium Apartment Project Openings



Source: Altus Group

New Condominium Apartments - Openings

April 2020 New Project Launches by Number of Units



Source: Altus Group

Project Record	Notting Hill Condominiums - East Tower	Village	Warehouse Lofts Toronto

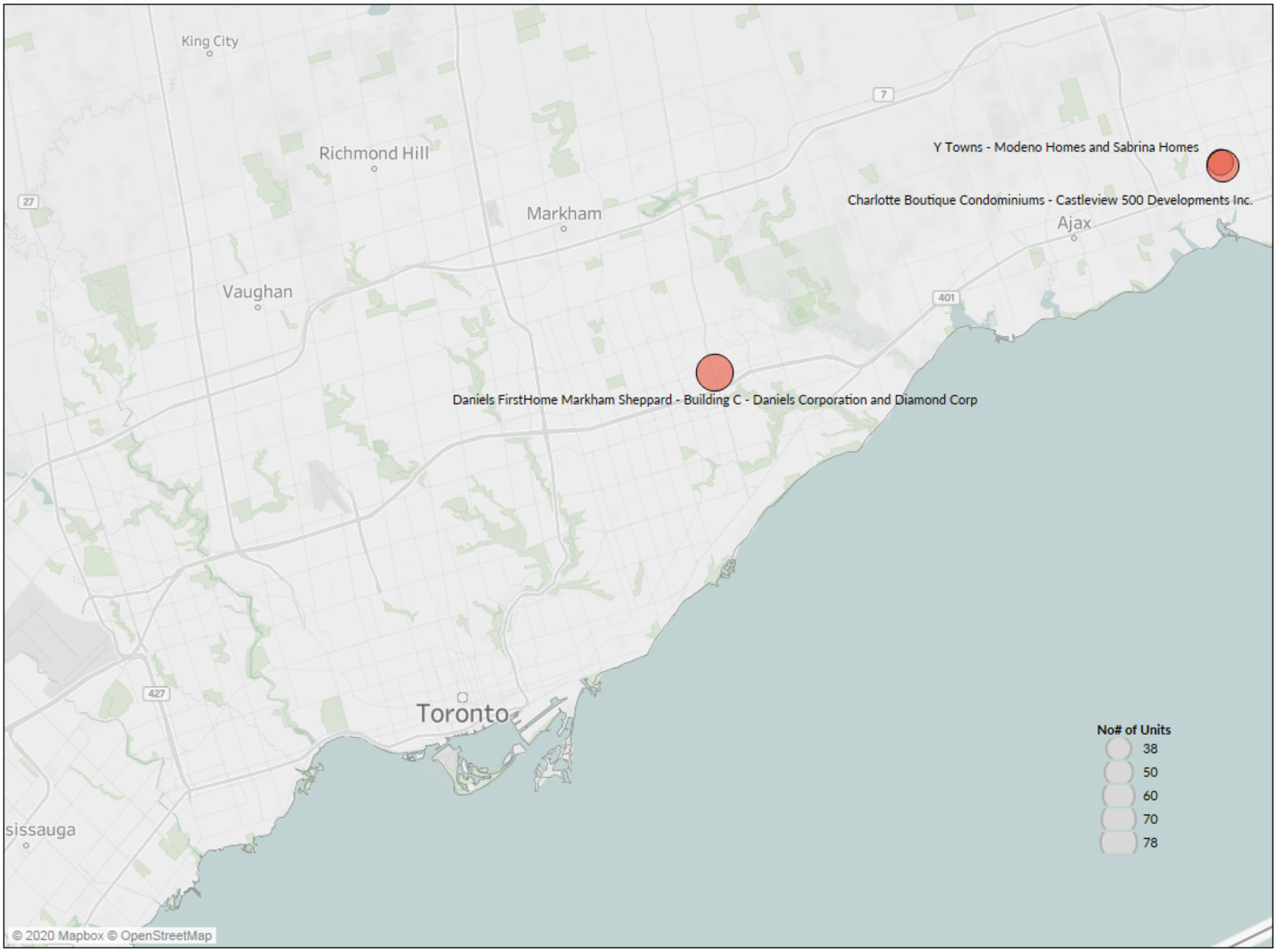
New Condominium Apartment Project Openings - April 2020

Project Name	Notting Hill Condominiums - East Tower	Village	Warehouse Lofts Toronto
Developer	Lanterra Developments	Genesis Homes	Sher Corporation and Downing Street
Date Opened	2020-04-03	2020-04-01	2020-04-01
Municipality	Etobicoke	Caledon	Old Toronto
Region	Toronto	Peel	Toronto
Structural Type	Apartment	Stacked	Apartment
Floors	25	3	11
Project Total Units	**708**	**10**	**29**
Total Units Released	**708**	**1**	**29**
Studio	74	--	--
1 bedroom	161	--	--
1 bedroom + den	170	--	--
2 bedroom	127	--	29
2 bedroom + den	123	--	--
3 bedroom & up	53	1	--
Penthouse	--	--	--
Other	--	--	--
Opening month sales	**97**	**0**	**9**
Next month sales	**23**	**0**	**0**
% Sold (of released units)	*17%*	*0%*	*31%*
Remaining available inventory	588	1	20
Original $PSF	$882	n.a.	$1,089
Minimum Size (sq. ft.)	321	2,380	961
Maximum Size (sq. ft.)	1,243	2,380	1,674
Minimum Price	$315,900	$705,000	$1,069,900
Maximum Price	$1,075,900	$705,000	$1,799,900
Notes			

Source: Altus Group

AltusGroup

May 2020 New Project Launches by Number of Units



Source: Altus Group

Project Record	Charlotte Boutique	Daniels FirstHome - Building C	Y Towns

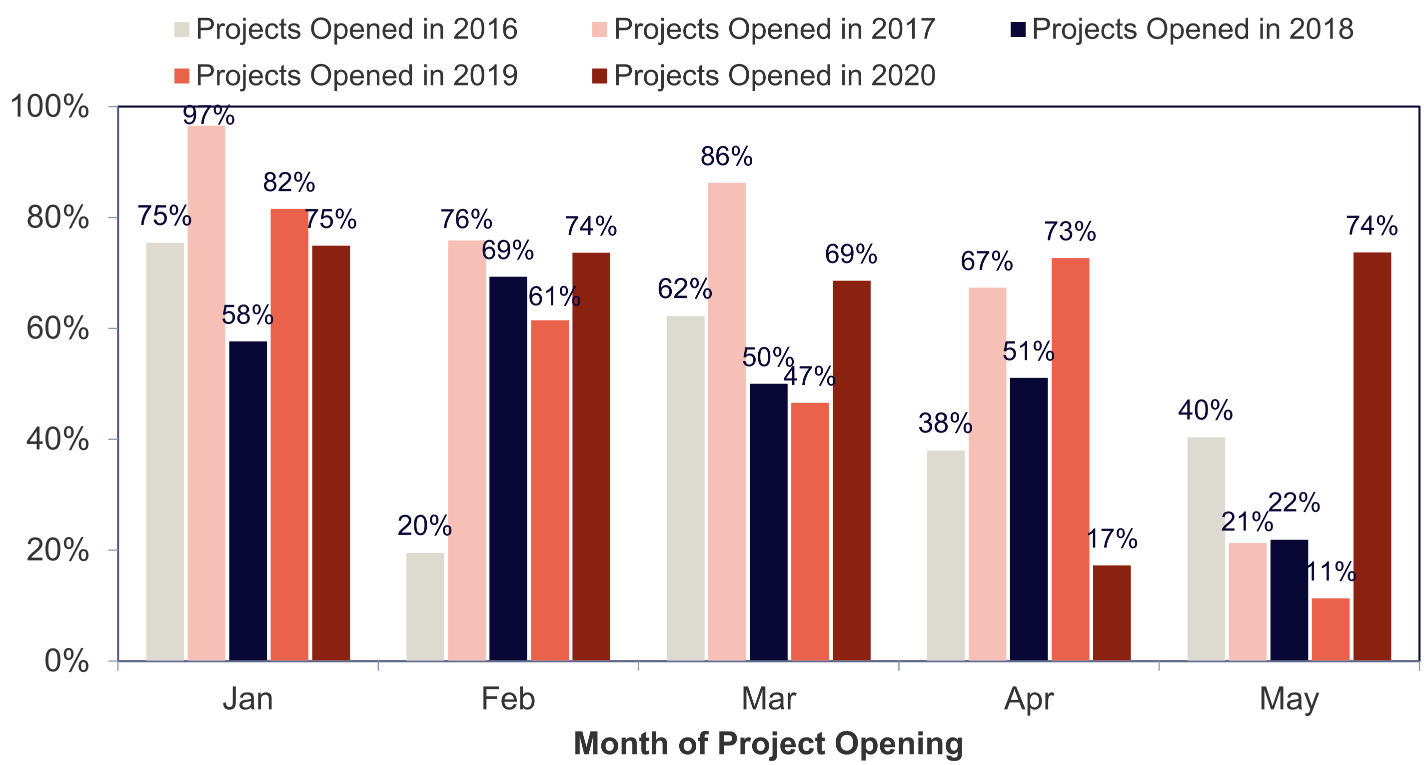
New Condominium Apartment Project Openings - May 2020

Project Name	Charlotte Boutique Condominiums	Daniels FirstHome Markham Sheppard - Building C	Y Towns
Developer	Castleview 500 Developments Inc.	Daniels Corporation and Diamond Corp	Modeno Homes and Sabrina Homes
Date Opened	2020-05-02	2020-05-14	2020-05-01
Municipality	Whitby	Scarborough	Whitby
Region	Durham	Toronto	Durham
Structural Type	Apartment	Apartment	Stacked
Floors	6	6	4
Project Total Units	**59**	**78**	**38**
Total Units Released	**59**	**78**	**38**
Studio	--	1	--
1 bedroom	24	19	--
1 bedroom + den	9	30	--
2 bedroom	18	23	19
2 bedroom + den	2	--	--
3 bedroom & up	--	5	19
Penthouse	--	--	--
Other	6	--	--
Opening month sales	**40**	**75**	**14**
% Sold (of released units)	*68%*	*96%*	*37%*
Remaining available inventory	19	3	24
Original $PSF	$600	$629	$466
Minimum Size (sq. ft.)	657	443	964
Maximum Size (sq. ft.)	1,593	1,070	1,614
Minimum Price	$404,900	$293,000	$544,900
Maximum Price	$841,900	$570,000	$669,900
Notes	Townhouse units included in Other.		

Source: Altus Group

- While the number of new project launches was low during April and May, sales at the recently launched projects were back in-line with typical sales volumes with developers successfully able to orchestrate virtual launch events during COVID**. The improving sales also occurred as restrictions began to lift in late May** and buyers and builders were able to more easily interact (while maintaining social distancing requirements).
- Caution needs to be used in comparing sales in projects opened in the latest month, as the proportion of projects opened in the last 10 days of the month (when firm sales are not recorded) can vary from one year, or one month, to another. For example, all 3 projects opened in May were opened early in the month.
- This caution should specifically be applied during pandemic restrictions where sales activity during the "opening" period is not directly comparable to periods without social distancing requirements.

GTA New Condominium Apartment New Project Absorption Timelines (% of Total Units Sold Through May)*

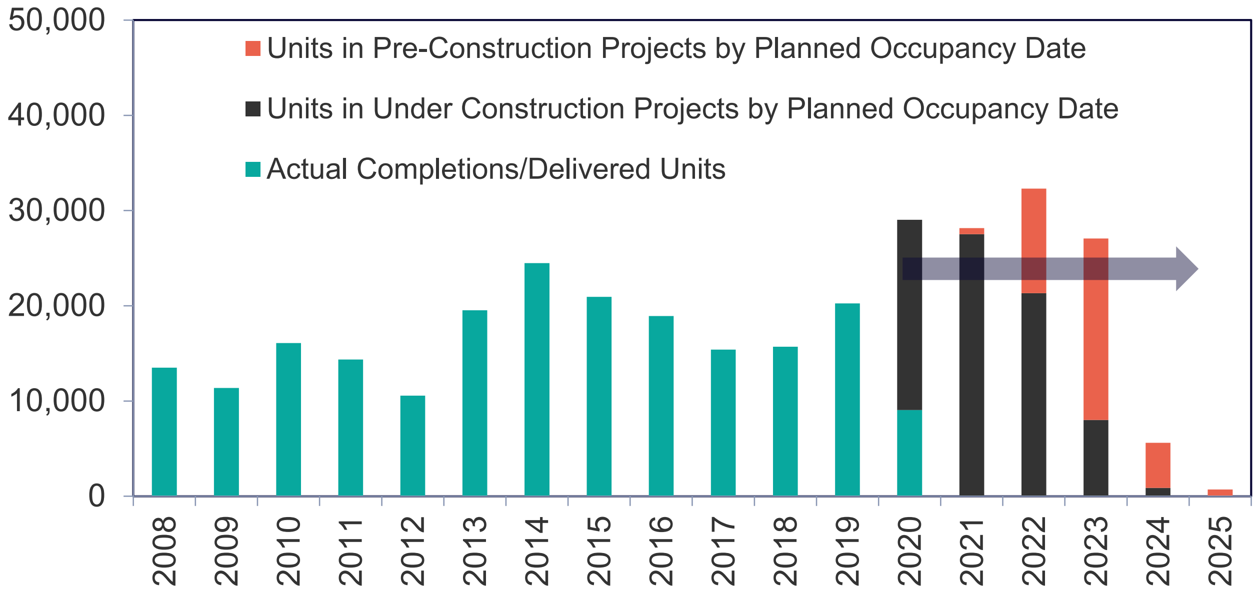


** The total includes unreleased units, and projects opened in the last 10 days of the month.*

Source: Altus Group

- As of the end of May 2020, there were about 113,800 new condominium apartment units in projects either under construction or in pre-construction stages.
- **Just under 1,000 units were delivered/ready for occupancy in May 2020**, based on Altus Group data. This is 51% below the 10 year average for May. Year-to-date, there have been just over 9,000 units delivered, down 14% from a year ago.
- Based on planned occupancy dates, and only considering units currently under construction, it is likely that annual completions of condominium apartment units could be significantly higher in 2020. **While the limited work stoppages mandated during the Province's Emergency Period have now all been lifted, there may still be some COVID-19 related disruptions (such as some construction site delays due to social distancing measures, worker illness, disruption in materials supply chain, etc.) which could delay deliveries beyond the "typical" delays experienced in recent years.** Looking beyond 2020, slower absorption rates of more recently launched projects could push intended start dates for some newer projects out, with a corresponding delay in delivery dates.

GTA New Condominium Apartment Actual and Potential Completions

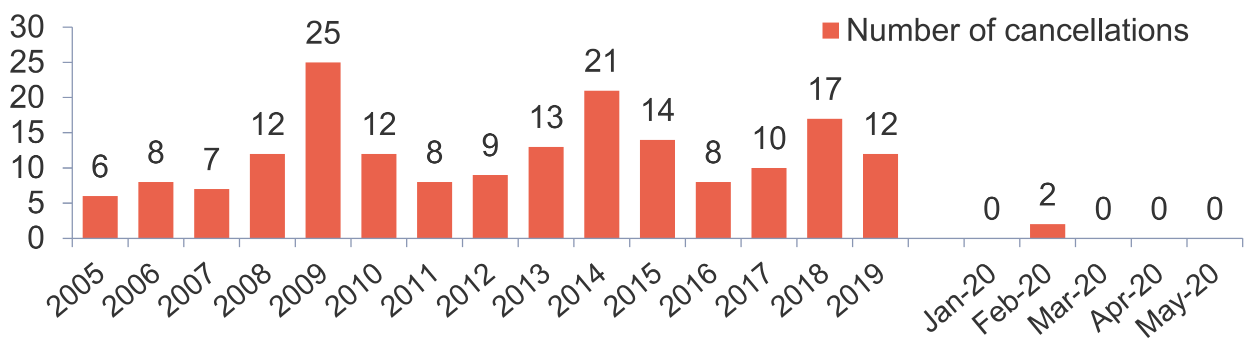


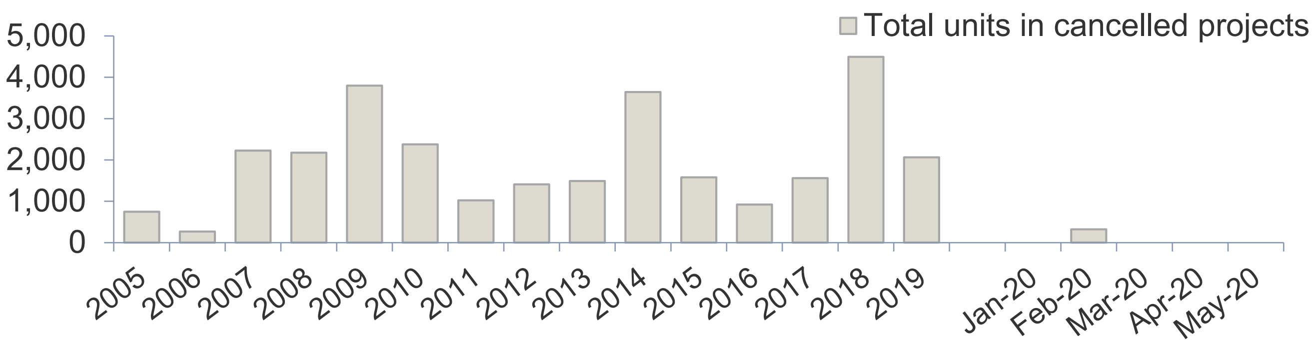
Source: Altus Group

New Condominium Apartments - Cancellations

- While COVID-19 is expected to heighten the risk that developments may cancel in the future, we have not reported any project cancellations since the start of the pandemic. During past economic cycles, such as the financial crisis in 2009, an increase in the number of cancellations followed the economic downturn. Given the recency of the pandemic impact on the market, as well as the fact that the government has introduced a broad range of financial support for industry and consumers, we are not anticipating a short term increase in cancellations.
- **Projects are cancelled for a number of reasons**, including poor sales (some of these projects are redesigned and relaunched), financing challenges and possibly operational challenges (for less experienced builders). Rather than direct cancellations, some of the projects delayed by the pandemic may be deferred for a longer period of time or under-go redesign before launching, which would reduce the number of cancellations.
- Impacts from delays in construction or any changes in cost structures due to COVID-19 are not fully understood at this point and may heighten risk in the future.

Condominium Apartment Projects Cancelled During Each Year, GTA

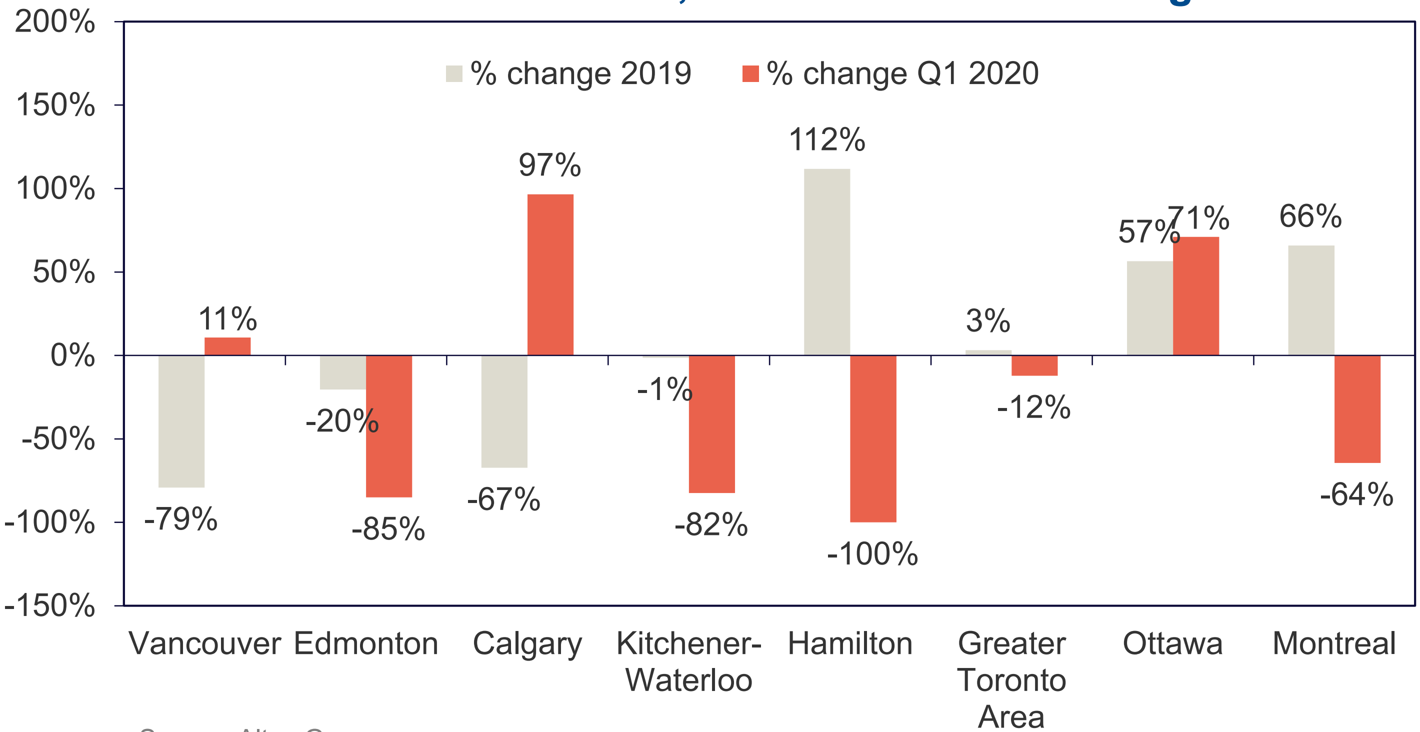




Source: Altus Group

- **High-density land continued to see strong demand in the GTA in Q1 2020**, with dollar and deal volumes consistent with the activity seen through much of 2019. Following the decline in activity in 2018, the volume of activity has been fairly consistent for the past 5 quarters, resulting in little change year-over-year.
- Demand for high-density land in other markets in Ontario and across Canada was more mixed, which is not surprising given the varying new home activity levels in markets outside of the GTA. Vancouver saw a modest improvement in Q1 2020 following a very weak 2019 as slower housing market conditions impacted developer demand for new land. In Alberta, poor market conditions continue to hamper demand for land, with much of the high-density land earmarked for rental development. Ottawa again saw increases as past over-supply conditions have improved, while Montreal saw volumes drop as this market slowly moderates following a red-hot sales environment in 2018 and 2019.
- As the vast majority of deals reported in Q1 were negotiated/closed prior to the pandemic, future activity is expected to be more directly impacted and we will be closely following land activity during Q2 and Q3. **Updated land sales activity is available within the RealNet and Data Studio applications for subscribers to this module.**

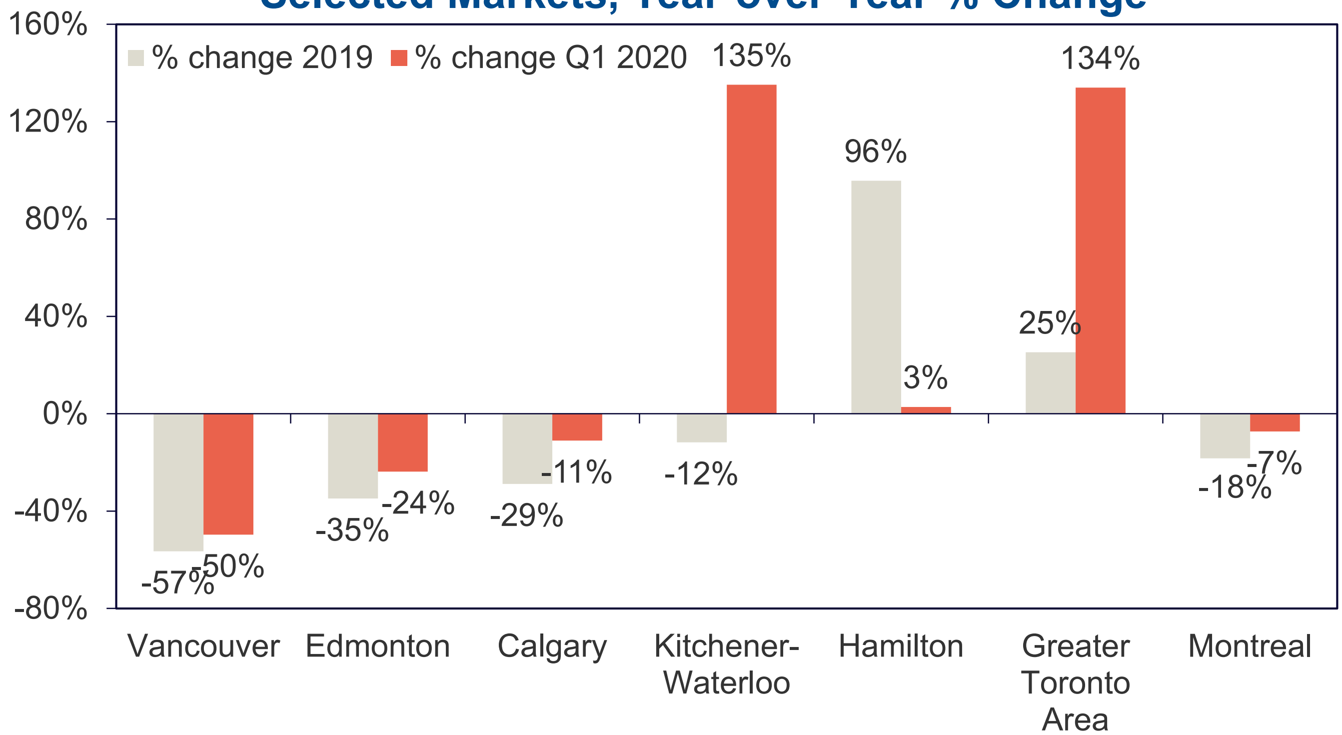
High-Density Residential Land Sales Transactions ($)
Selected Markets, Year-over-Year % Change



Source: Altus Group

- Comparing new condo apartment activity in the major markets highlights the disparity across the country, with lower sales noted in every market outside of Ontario. **The GTA remains by far the largest condominium apartment market in the country and experienced a sharp improvement in sales activity prior to COVID-19.**
- All markets across the country saw some restrictions related caused by the pandemic; generally more severe in Eastern Canada and sales centre operations while construction impacts were not as restrictive in Alberta or BC. That said, these markets did experience a sharp drop off in sales towards the back half of March and into April, indicating the psychological impact consumers were experiencing across the country regardless of how tight the restrictions placed on the industry and consumers.
- The market performance prior to the pandemic should be an accurate measure of post-COVID restriction activity and the trends seen in the Q1 by market are expected to re-occur (at least in part) as the economies open, with continued weakness in Western Canada. That said, other economic impacts from COVID-19 will threaten some parts of the country differently, such as weakness in the energy sector or shifts in immigration.

New Condominium Apartment Sales, Selected Markets, Year-over-Year % Change



Source: Altus Group

Altus Group GTA New Home Data Definitions

AltusGroup

Condominium apartment	Includes condominium apartment structures of all heights (low, medium and high-rise), stacked townhouses, and loft units. Replaces the former RealNet term “high-rise”.
Single-family	Includes detached, link, semi-detached and townhouse units (excluding stacked townhouse). Replaces the former RealNet term “low-rise”.
Inventory	New units available to purchase/unsold at end of the period. Includes available units in pre-construction, under construction, and completed projects.
Months of inventory	Unsold available inventory at period end divided by average monthly sales for a defined previous period (e.g. previous 12 months). Indicates how long current inventory would last assuming same pace of sales (and no additional product added).
Average price	Average asking price of all available new home inventory at end of period.
Benchmark price	Average asking price of available new home inventory at end of period with outliers removed. Replaces the former RealNet term “Price Index”
$PSF Benchmark	Average asking price per square foot for units in remaining inventory at the end of the period with outliers removed.
Unit size Benchmark	Average size (sq. ft.) of units in remaining inventory at the end of the period, with outliers removed.
Completions	Units in projects that have reached occupancy status during the period.
“Record” performance	All “record highs” and “record lows” are based on the time period over which Altus Group has been tracking the variable.

Note: all historical data is subject to revision