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POST EARTHQUAKE PEDESTRIAN TRAFFIC – CHRISTCHURCH

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ABSTRACT

Pedestrian counts are an important indication of inner-city vitality and critical information for many retailers who are targeting passing foot traffic. For these reasons, pedestrian counts are also of significance to valuation practitioners, property investors and developers, financiers, planners and others interested in the current state and long-term trends of central business districts. Since 1957 the New Zealand Institute of Valuers has regularly surveyed pedestrian foot traffic in the CBD of Christchurch, but this process lapsed after the 2010 and 2011 earthquakes. This paper reports on a project to re-establish these central city pedestrian counts, but also expand them to include greater levels of information about the people frequenting the city. An important feature was to use current university students to facilitate this increased level of analysis as well as introduce them to market analysis processes and techniques.

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Background

Over the last ten years authors of this paper have been involved in a variety of research projects relating to the revitalisation of the inner-city of Christchurch, New Zealand. This research took on a new direction and increased urgency following the devastating earthquakes that hit the city in 2010 and 2011 destroying most of the Central Business District (CBD). Even prior to this major event and the subsequent new plan for the central city, the implementation of which is still a work in progress, the CBD was already struggling as a retail location.

The initial plan for the city produced in the mid-19th century, envisaged a mile square heart, bounded by four avenues, (respectively: Moorhouse, Fitzgerald, Bealey and Deans) with a rectangular block or grid pattern within these boundaries, this design being typical of many other colonial era cities around the world (Wilson, 2007). Two main diagonal streets (Victoria and High) bisected the central city and were designed to connect with Ferry Road in the south, providing ready access to the port at Lyttelton, and Papanui Road in the north, providing access to the early-developed residential areas of Christchurch. (Wilson, 2005).

Christchurch since its inception has been predominantly suburban in terms of its residential population, reflecting the garden city planning movement popular at the time, so there was little high density or terrace house residential development close to the central city. By the turn of the twentieth century, early timber commercial buildings in the CBD were progressively being replaced by more substantial brick buildings reflecting the success of the businesses within them, the wealth of the owners and the height of Victorian architectural style. From then until the 1950s there was little substantial change in the CBD. There was gradual growth and the usual ebb and flow of different business tenants but the fundamental layout and uses to which buildings were put remained similar (Wilson, 2005).

During the 1950s and 1960s a slow drift of the centre of retailing in Christchurch began, northwest along High Street towards Cathedral Square and west down Cashel Street towards the Avon River. The original Victorian era retail buildings in these locations were often less substantial than those in lower High Street, and so presented a less expensive redevelopment opportunity to accommodate the changing CBD retailing environment that had emerged after WWII, which was influenced by modernist glass frontage shops and other trends imported from the USA. More importantly though, the mid 1960s saw the first emergence in Christchurch of both suburban shopping centres and supermarkets. These new retail concepts, combined with a female population now able and prosperous enough to drive, were to transform retailing, and therefore the city of Christchurch, as would occur in many other parts of New Zealand and the world (McDonagh, 1997; Wilson, 2005).

There followed an accelerating decline in the importance of the Christchurch CBD as a retailing destination through the 1970s, 1980s and 1990s as suburban malls and supermarkets, and later large format retail or "big box" centres, increased in number and substantially expanded, as they were constantly redeveloped. Land and construction costs for these new forms of retailing were low compared to aggregating and redeveloping central city retail locations (McDonagh, 1997; Wilson, 2005). Christchurch also did not have the geographical and planning restrictions of Wellington and Dunedin which slowed this trend and strengthened the CBD in those locations (Falconer, 2015; Porteous, 2012). Traditional large and small retailers in the Christchurch CBD struggled to compete with these new suburban developments. Central city life, along with foot traffic, turnover, profitability and affordability of rent declined as a result (Wilson, 2005). Only one department store, Ballantynes, survived the 1980s in the CBD. The retail uses in the CBD that could survive shrunk in number and became concentrated in the vicinity of the now pedestrianized Cashel Street "Mall".

City Life and Pedestrian Counts

The Importance of city or public life and active streets was established in pioneering works by Jacobs (1961) and Whyte (1980) and has continued to attract attention ever since, most notably in the Christchurch context by Gehl in *A City for People* (2011), research carried out just prior to the earthquakes.

One basic method to attempt to quantify city life, and its consequent economic impact on the businesses located there, is by counting central city pedestrians (Gehl and Svarre, 2013). Pedestrian counts (often termed footfall in UK publications) are mentioned in the proceedings of the American Marketing Association as far back as 1949 and the July

1953 edition of the Appraisal Journal provides details on best practice implementation (Hubin, 1953). The New Zealand Institute of Valuers can be seen as early adopters of this technique as they commenced central city pedestrian counts in Christchurch in 1957 and repeated this exercise every two years until the first earthquake in 2010. For some of this period Lincoln University property students undertook the pedestrian counts, but changes in semeserisation meant the pedestrian count reverted to being carried out by valuation professionals until the earthquakes intervened.

The opportunity has now been taken to re-involve students in this process by organising the post-earthquake pedestrian counts in a time of year (March) that does not clash with other student commitments and by making the exercise an important learning and assessment exercise.

While pedestrian counts are a piece of hard primary data important to provide an overall view, they do have their limitations. In particular, they do not provide information as to why these spatial patterns occur. This requires interpretation (Appraisal Journal 1953).

Some techniques to aid interpretation include direct observation (Whyte, 1980) and behavioural mapping (Sommer, 2001).

Some of these aspects were included in the approach taken in this project, not only to enrichen the count data collected, but also to enhance the engagement and learning of the students involved and sharpen their observation skills. This interpretational aspect is one that is not handled easily, even by the latest technology, whereas simple counting of pedestrians passing a point can now largely be automated.

Another technique that was part of this research project was involving students in interviewing “experts” on central city life and retail economics. Results from this process are the subject of a separate paper.

Method:

Up to 2008, the New Zealand Institute of Valuers performed a pedestrian count in the Christchurch CBD. They made counts at 60 locations, which was expanded to 72 counts for 2003, 2005, and 2008. The number of weekday adult pedestrians (over age of 15) were collected for an hour in late October. Their goal was to count “genuine shoppers” although they made no effort to classify the pedestrians other than the age restriction.

This research builds on the Institute’s work and their locations were used as a starting point for data locations in the CBD. Of their 72 locations, 24 were discarded because they were either inaccessible to pedestrians, or, post-earthquake were no longer near any meaningful concentration of premises (retail, office, or tourist). The 48 locations that were retained form the basis for comparisons with the historical data. An additional 13 new locations were added, making a total of 61 locations for the current research.

The current data collection occurred on the 23-27 March 2018 by 61 students in Lincoln University's marketing research course (MKTG301). Each student was assigned a specific location and collected 3 hours of pedestrian counts; 1-hour late Friday afternoon, 1-hour including mid-day Saturday, and 1-hour mid-morning on either Monday or Tuesday). The weekday mid-morning collection was used for comparisons with the historical data.

The students were also required to classify the pedestrians as they counted, placing them in the following 16 categories:

	Younger Shopper	Older Shopper	Office Worker	Construction Worker	Tourist	Senior	School Child	Young Child
Female								
Male								

This type of demographic categorisation is important for retailers, and therefore property investors and developers, as it helps define the type of retail outlet that is most likely to be successful in a location. For example, fashion clothing is likely to be more important to younger shoppers than seniors, whereas tourists are likely to need services and attractions. Office workers, along with the other categories, are likely to patronise food outlets and the same may be said for construction workers, but their presence is more likely to be transient. Amongst shoppers, it is useful to categorise by age where possible as the style, price and target market for particular stores can vary substantially on this basis.

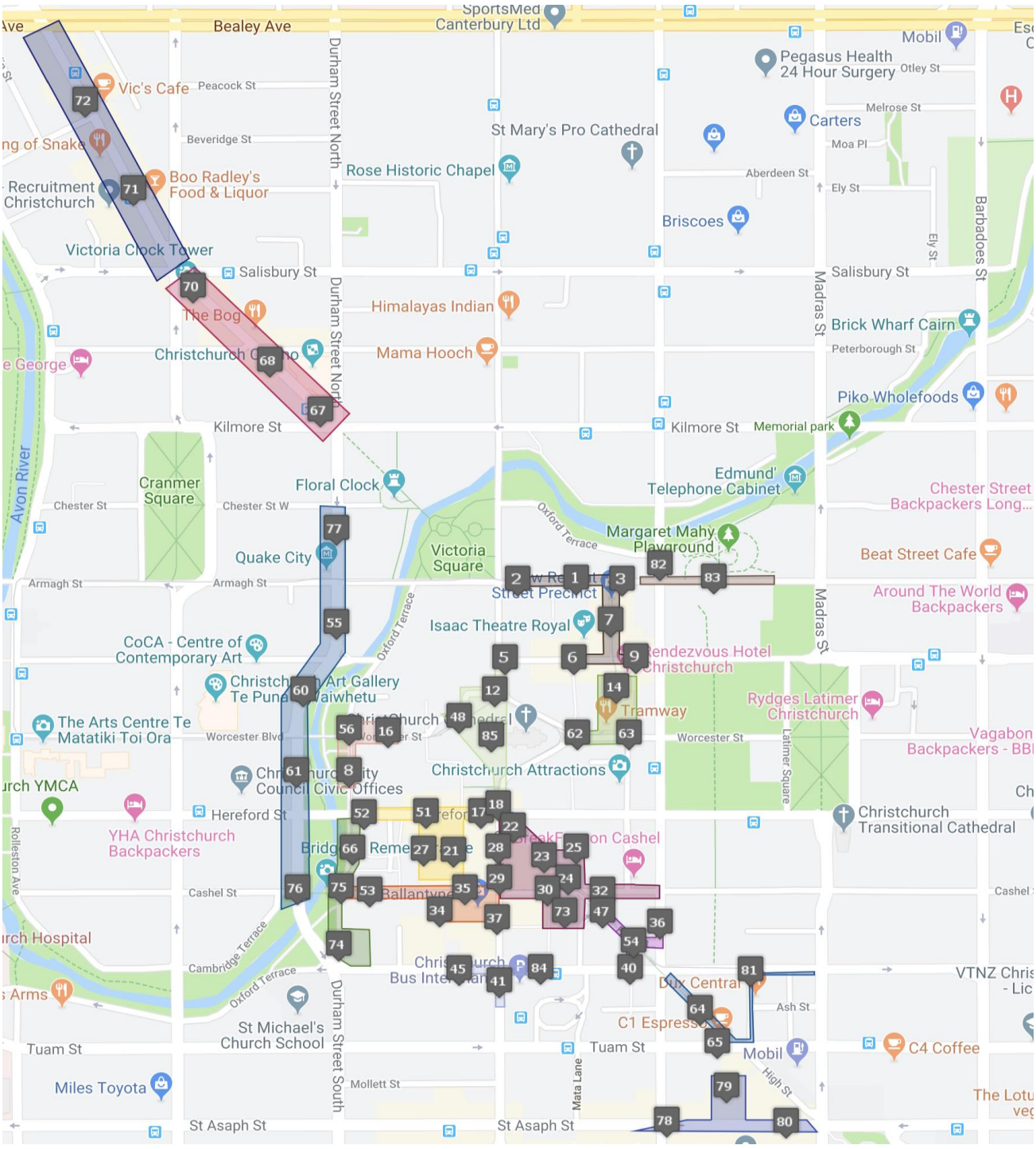
The students were given cues to identify the various classifications but "Shopper" was the default if no evidence of another category was present. For example, if people were wearing business attire, had ID lanyards, briefcases, etc… they were likely to be office workers. School children were in uniform, of school age, and often unaccompanied by adults whereas young children were usually with adults. The observers were also given the choice of collecting data using a pencil/paper form or via a data collection app. For the historical comparisons, the children counts were ignored.

The 61 individual data locations were grouped by Lincoln University property research students (VAPM308) into 16 meaningful concentrations (groups) of retail, office, or tourist locations as listed below. These concentrations represented locally well-known groups of retail outlets of a similar type or target market. For example – Group 1 Cashel/Crossing/Upper High Street has a concentration of "fast fashion" lower price mainstream stores appealing to younger shoppers including brands such as H&M, Glassons and Hallensteins. In contrast, Group 4 - Oxford Terrace/Bridge of Remembrance has a concentration of bars and restaurants catering especially for late night revellers. Group 8- Upper Victoria Street, is different again, with a concentration of professional offices on the upper floors of taller buildings, while at ground level there is a preponderance of high-end designer fashion stores and expensive interior design showrooms.

Fourteen of these groupings of individual data collection locations had sufficient shared locations for historical comparisons.

Location Groups

Figure 1 shows the data collection locations (identified by number) and the location groups (coloured boundary around groups of numbered locations).
(Source: ttps://drive.google.com/open?id=1y5h22WmuZ-8rJ2wigPhAacZ-KH0IF_6R&usp=sharing)


Bealey Ave
SportsMed Canterbury Ltd
Mobil
Pegasus Health 24 Hour Surgery
Otley St
Vic's Cafe
Peacock St
Melrose St
Carters
Moa Pl
St Mary's Pro Cathedral
Beveridge St
Rose Historic Chapel
Aberdeen St
Ely St
Boo Radley's Food & Liquor
Briscoes
Barbadoes St
Victoria Clock Tower
Salisbury St
Durham Street North
Madras St
Himalayas Indian
Brick Wharf Cairn
The Bog
Peterborough St
Mama Hooch
Piko Wholefoods
Kilmore St
Memorial park
Avon River
Cranmer Square
Floral Clock
Edmund' Telephone Cabinet
Chester St
Chester St W
Chester Street Backpackers Long...
Oxford Terrace
Margaret Mahy Playground
Quake City
Victoria Square
Beat Street Cafe
Armagh St
Around The World Backpackers
Isaac Theatre Royal
CoCA - Centre of Contemporary Art
Rendezvous Hotel Christchurch
Tramway
Rydges Latimer Christchurch
The Arts Centre Te Matatiki Toi Ora
Worcester Blvd
Worcester St
Latimer Square
Vagabon Backpackers - BB
Christchurch Attractions
Council Civic Offices
YMCA
Hereford St
YHA Christchurch Backpackers
Christchurch Transitional Cathedral
Rolleston Ave
Cashel St
Cambridge Terrace
Oxford Terrace
Durham Street South
St Michael's Church School
Tuam St
Mata Lane
Ash St
C1 Espresso
C4 Coffee
Mobil
Miles Toyota
Mollett St
High St
St Asaph St
The Lotu
VTNZ Chris - Lic

Results:

Historical Comparisons

Figure 2 depicts total pedestrian counts including historical data. The data previously collected by the NZIV from 72 locations is shown (old locations) in the top (blue) line.

The current research used 61 locations and the total count of 15835 is shown as the grey coloured point to the right (new locations).

48 of locations were used by both the historical and current research projects (shared locations) and are shown in the lower (orange) line.

Using the shared locations, the total adult weekday pedestrians in 2018 were lower than all of the prior years, but given the significant changes in the CBD, the drop was less dramatic than expected.

Figure 2. Total Pedestrian Count Historical Comparison

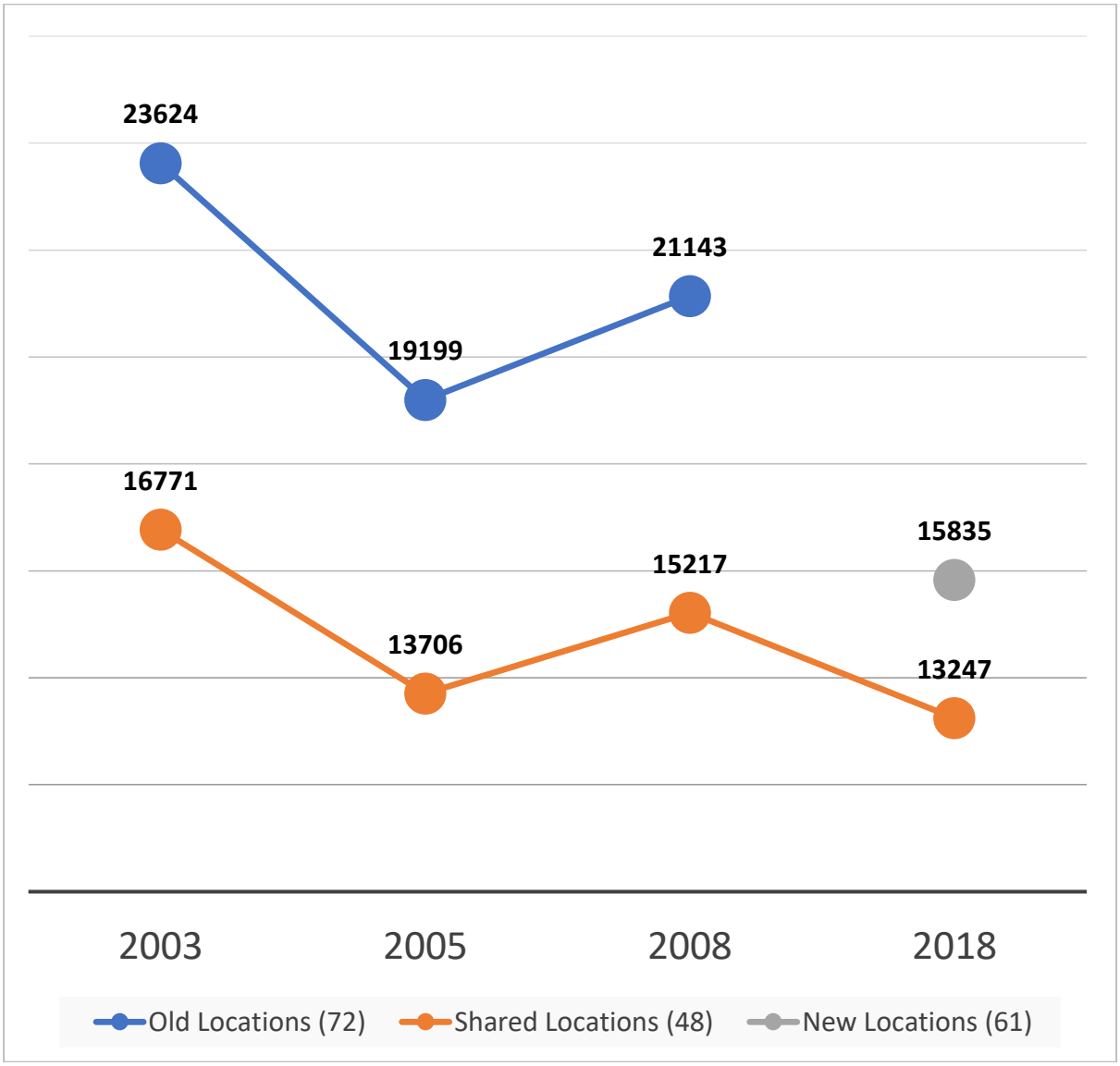
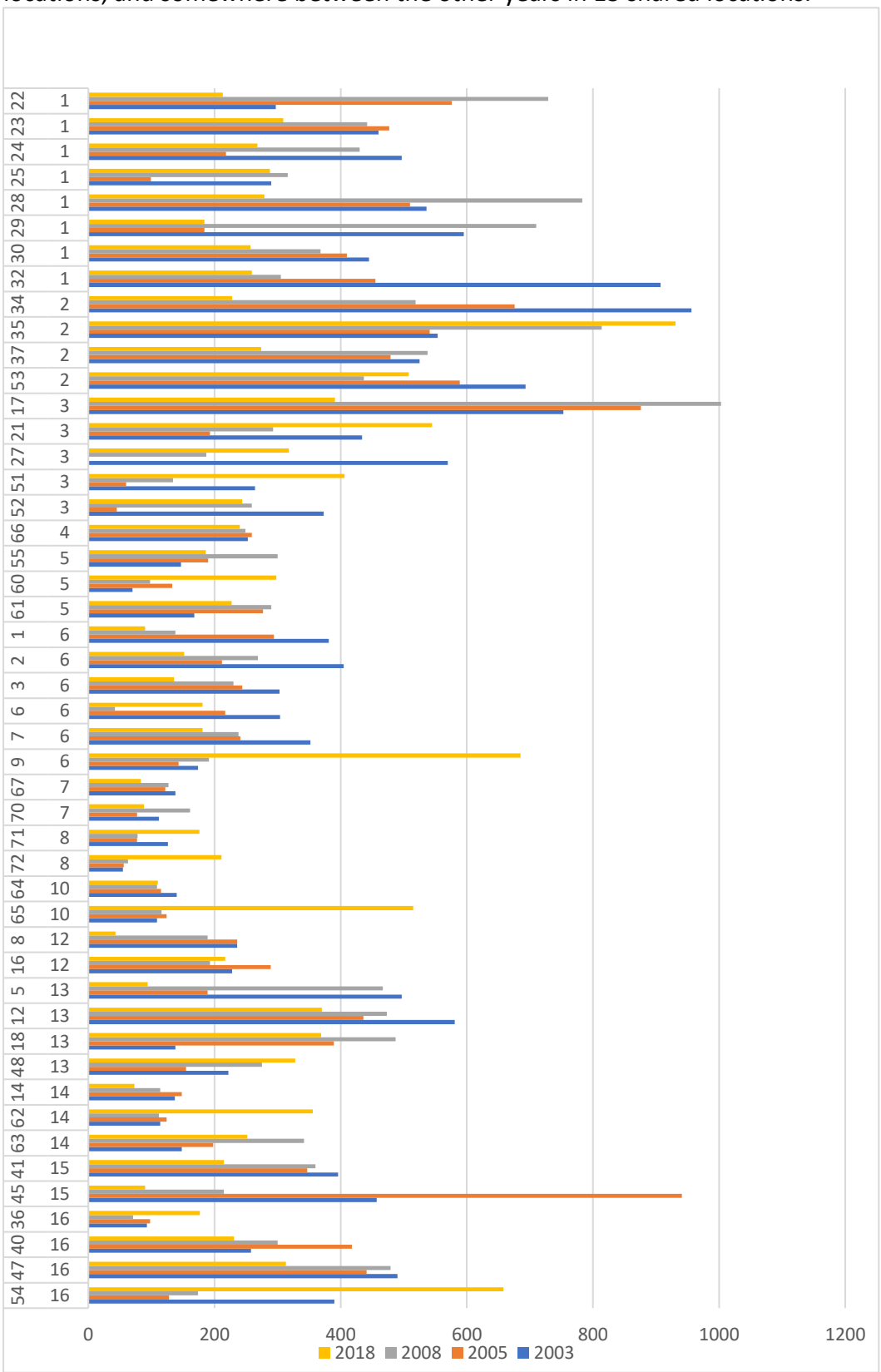


Figure 3 shows counts across individual shared locations (1-61) ordered by their location grouping (1-16) discussed above. The 2018 counts were the lowest compared with other years in 23 of the shared individual locations, highest in 12 of the shared locations, and somewhere between the other years in 13 shared locations.



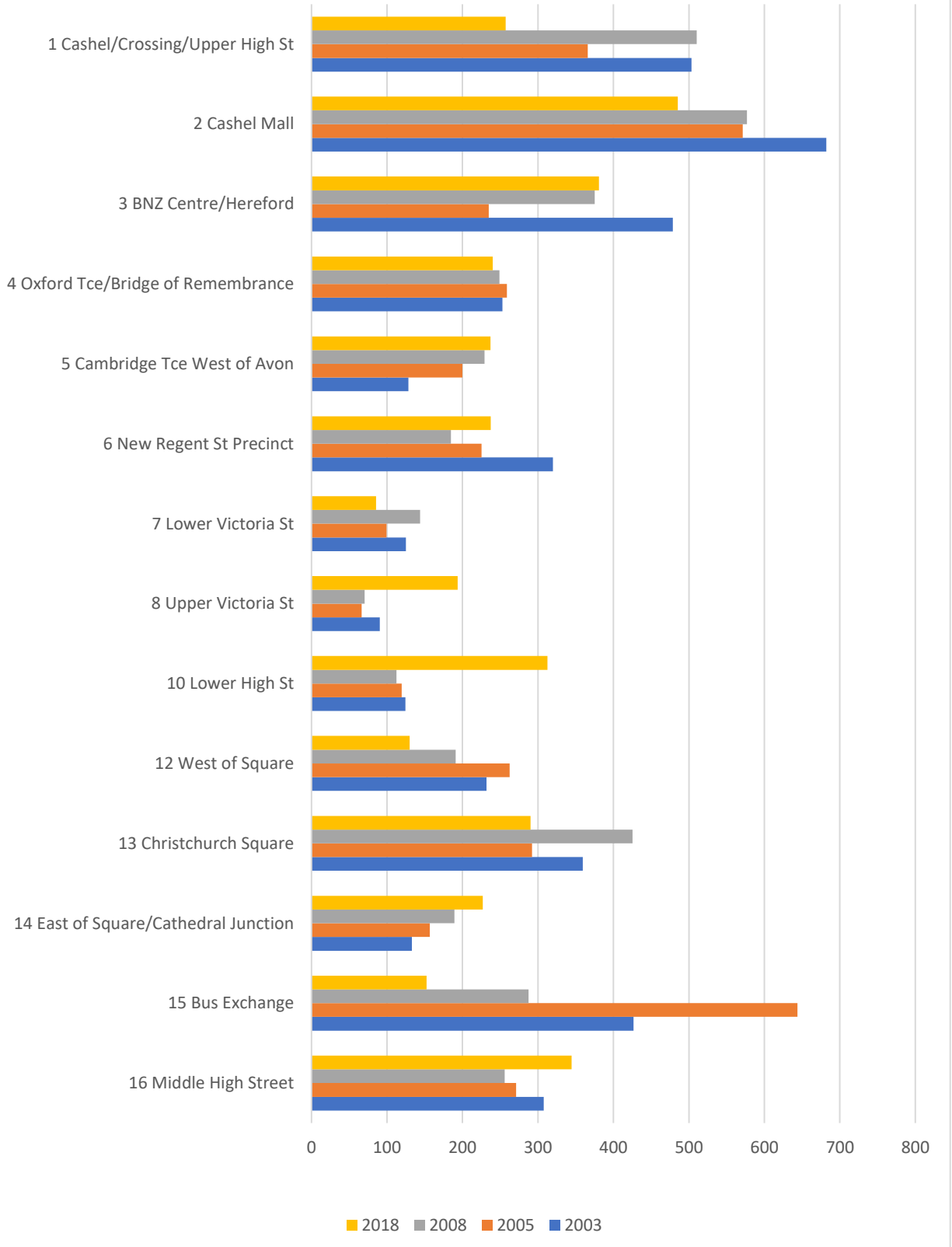
Some of the individual locations were dramatically different, for example, location 9 (within group 6) on Gloucester St near New Regent St was under 200 from 2003-2008 and almost 700 in 2018. This could be the result of an important tourist hotel (the Rendezvous) being constructed in this location in 2010 and this being one of the few central city hotels to survive the earthquakes. In addition, nearby New Regent Street is one of the few concentrations of heritage buildings to survive the earthquakes relatively intact and this street also contains boutique businesses that re-opened relatively quickly and are highly differentiated from suburban mall offerings.

Other individual locations had pedestrian count changes just as dramatic in the other direction. For example, location 8 (within group 12) on Oxford Terrace, west of the square had counts of around 200 from 2003-2008 and less than 50 in 2018. This is likely to be due to the area remaining a demolition/construction site since the earthquakes.

Despite these dramatic examples of specific locational changes, the post-earthquake pedestrian counts overall were not as low as expected.

Figure 4 depicts the pedestrian count changes for the 16 area concentrations or groups identified earlier. Aggregation of individual counts into groups representing specific retail concentrations helps reduce variation introduced by individual count local circumstances, such as footpath blockages or construction. As a result, table 3 may be the best visual representation to show the pedestrian count winners and losers in the CBD over time.

Figure 4 - Average Adult Weekday Pedestrians/Hour by Location Groups 2003-2018



The traditional retail centre of the CBD along Cashel Mall and Upper High Street (areas 1 and 2) have pedestrian counts significantly down on pre-earthquake figures.

The Oxford Terrace/Bridge of Remembrance location (area 4) has remained remarkably consistent whereas areas along middle (area 16) and especially lower High St (area 10), upper Victoria St (area 8), and east of the square (area 14) have increased pedestrian counts whereas lower Victoria St (area 7) and west of the square (area 12) have decreased counts.

Interpretation of the causes of these pedestrian count changes can vary. In many cases significant new office buildings, for example in lower High Street and Upper Victoria Street and also west of the Avon may be responsible for increases. In other cases, ongoing construction or unattractive vacant lots, with consequent interruption in continuous retail frontage may be to blame for reductions.

It is too early to determine if these are permanent shifts or transitional effects, but the data collected here is interesting in itself, and can at least serve as a base for future trend analysis.

Breakdown of Current Pedestrian Counts:

Figure 5 shows the average pedestrian count (per hour) broken down into pedestrian types for each of the 16 CBD location groups. Counts were averaged across the individual count points in each location group because these groups did not have the same number of individual count locations. The counts were also averaged across the three different collection days and times.

This breakdown gives some indication of the different types pedestrians that were found in different locations. For example, location group 6 (New Regent Street) and location group 12, 13, & 14 (Cathedral Square and Worcester Boulevard) all had more tourists than any other type of pedestrian, including young and old shoppers combined.

Conversely, the locations along Cashel St (groups 1, 2, & 3) and High St (groups 9, 10, & 16) were dominated (50% or more) by shoppers. Within those groups, we can see that young shoppers outnumber older shoppers on the eastern side (groups 1, 9, 10, and 16) and older shoppers are more prevalent in the western (groups 2 & 3).

To illustrate the most common type in each group, the groups depicted in the Figure 1 map above have been coloured to match the type with the highest concentration.

Figure 5 Average pedestrian count (per hour) broken down into pedestrian types

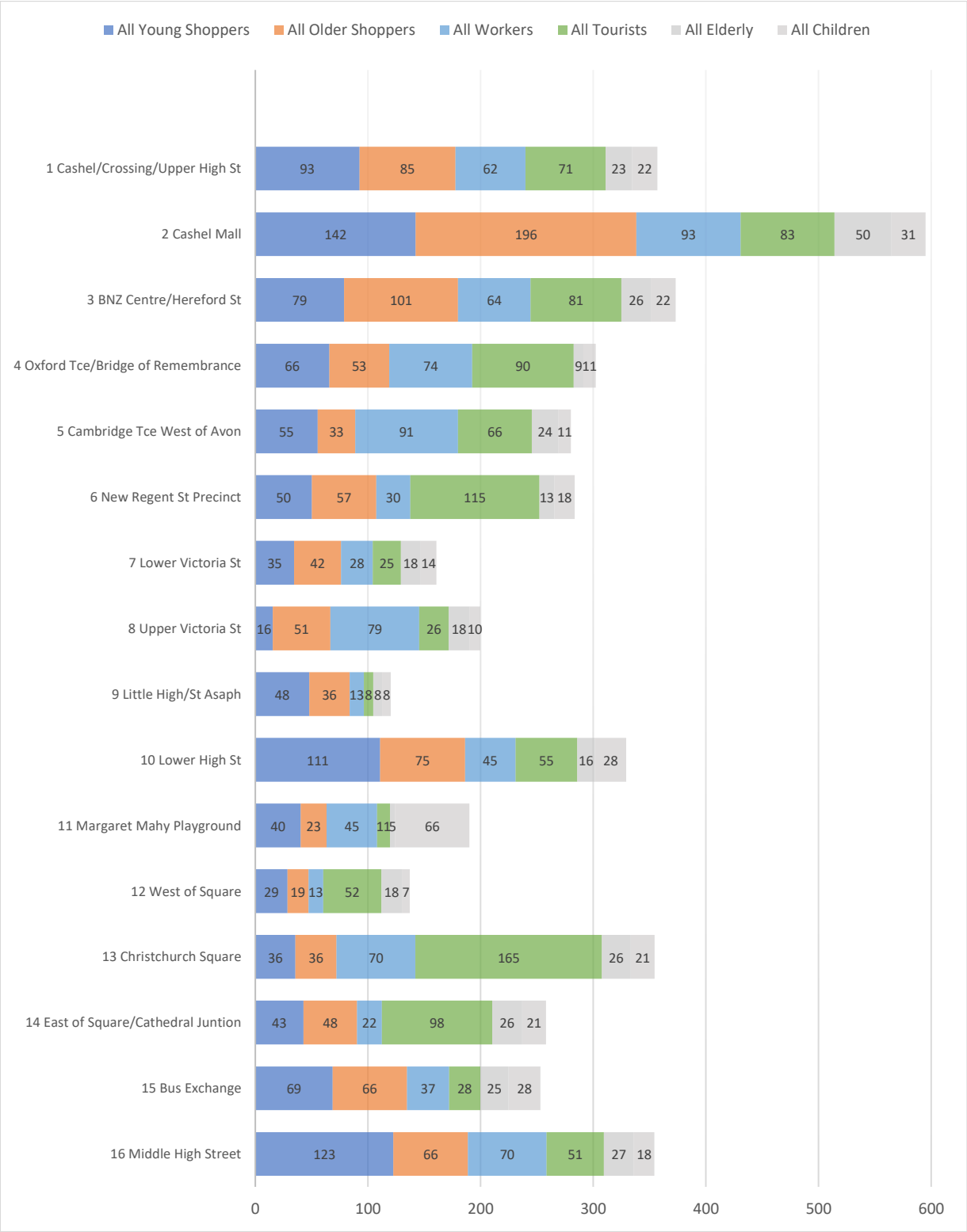
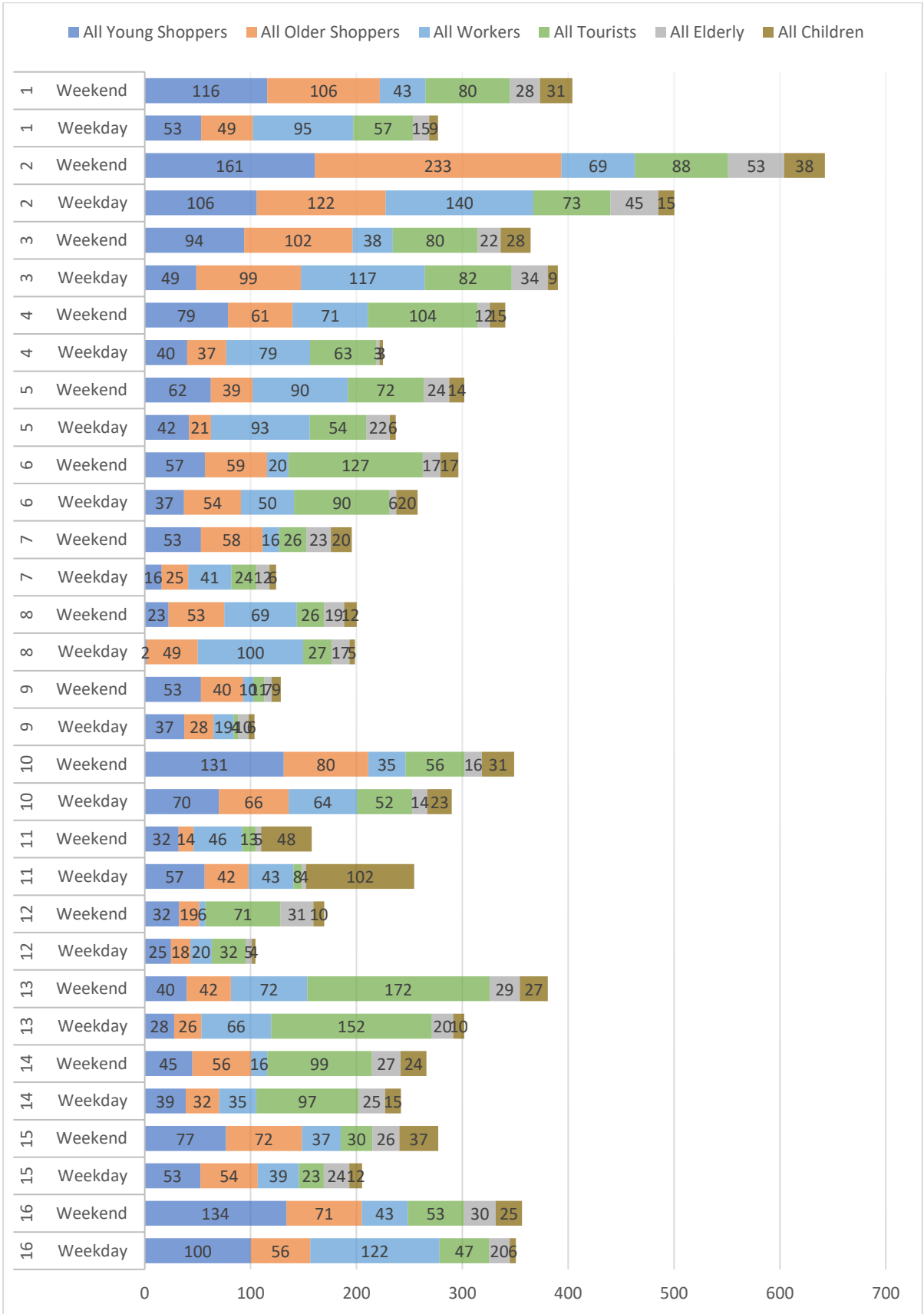


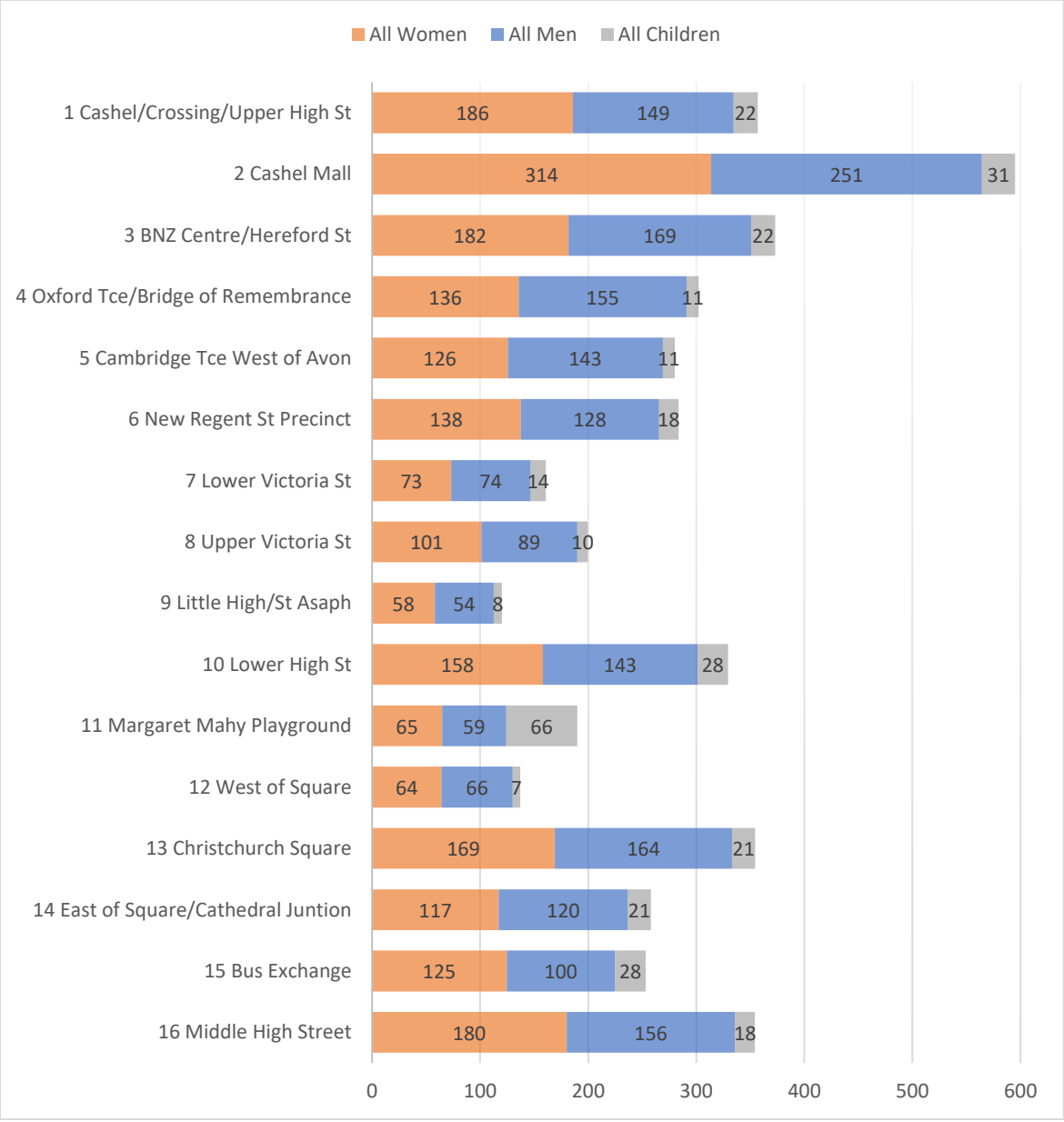
Figure 6 shows the overall numbers of pedestrians in each location and how the type of pedestrian changed from weekend to weekdays.



In all but two locations there were significantly more pedestrians overall on the weekend than on weekdays and also more of each type of pedestrians on the weekend except, as would be expected, for workers, which were found in higher numbers on weekdays. There was no significant difference for tourist numbers at the weekend. Significance was tested with independent samples t-tests with $p<.05$.

Across all of the data collection locations, the average pedestrian was count 150.71 women, 137.16 men, and 20.65 children.

Figure 7 shows the counts of men, women, and children across the location groups. While there is some variation across the groups, for example, more children at the Margaret Mahy playground, all of the groups seem to show a gender balance.



Discussion.

Judging by media reports, retailers in the central business district of Christchurch still appear to be struggling post-earthquake, with a large number of business failures reported and an apparent dearth of shoppers in the central city. These comments seem to be supported by the findings of this research, in that overall pedestrian counts are only now approaching those experienced in the CBD in 2008 and the distribution of those counts is significantly different.

In many ways this is only to be expected given the city is still rebuilding from the earthquakes and specific locations are yet to find their place in the retail hierarchy. The competing suburban retail locations have also expanded and refined their offering considerably during the eight years when they have faced reduced competition from the traditional CBD. The reduced attractiveness of the CBD, and Christchurch more generally, as a tourist destination, along with capacity constraints in this sector have additionally limited visitor numbers in the city.

Local consumer shopping patterns have also been disrupted, not only by the lack of an attractive CBD, but also by the earthquake driven rearrangement of the spatial layout of residential areas in greater Christchurch, and the capacity of the transport infrastructure connecting those areas.

Not surprisingly, given the amount and scale of new development in the traditional prime city centre retail pitch of Cashel Mall, this location continues to be the dominant location in the CBD with the highest pedestrian flow counts when the recent survey was undertaken . However, the pedestrian flow count in Cashel Mall is still lower compared to pre-earthquake levels, suggesting it has not yet re-established its comparative position relative to other options such as the suburban malls and big box retailing.

At the time of the survey, the rebuild was still in 'full swing' and there were (and remain) substantial areas in the CBD where rebuilding had not been completed, or, in some cases started. Large areas of 'dead frontage' existed as a result. This situation remains today, and with most significant developments now complete, or close to completion, the problem of 'dead frontage', and spatially separated nodes of activity remains a concern to retailers.

It is difficult at this stage, therefore, to divine whether the CBD will establish itself as the premier retailing location of the city as the new retail mix attracts additional shoppers, or at least, return to the levels of pedestrian flow seen immediately prior to the earthquakes.

Replication of this survey on a regular basis therefore seems appropriate to independently monitor progress and establish longer-term trends.

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