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Yellowfield Redevelopment

Identifying latent centralities in Metro Manila's suburban gated residential fabric as opportunities for reconfiguration and suburban retrofitting.

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ABSTRACT

Metro Manila's Epifanio Delos Santos Avenue (EDSA) forms a ring of suburban development that is defined by privately developed, gated communities. This ring is also punctuated by private mixed-use Central Business Districts (CBDs), lifestyle centres and shopping malls. This study uses the quantitative methods of space syntax to understand this suburban fabric of gated residential enclaves. Then, following current discourse/arguments to reduce traffic congestion in Metro Manila, models the effects of opening the spatial network within the exclusive gated villages to the flow of vehicles to help improve access to Metro Manila's commercial mixed-use enclaves/CBDs beside the villages. This illustrates that doing so would instead, probabilistically induce road demand and create more vehicular traffic and congestion around the CBDs. By using the same methods, this study highlights key gated villages for selective "opening" of gates and lifting of village building and land-use restrictions to pedestrianize and induce a (hopefully – more palatable to the village residents) bottom-up "yellowfield" redevelopment. This study hints at the possibility of using space syntax as a means of not only modelling the elusive concept of induced demand; and introduces "yellowfield" redevelopment as a tactical way of reconfiguring the world's growing carpet of suburban gated residential communities to become more liveable, local and sustainable.

KEYWORDS

Induced Demand, Gated Communities, Privatised CBDs, Circumferential Roads, Suburban Retrofit

1 INTRODUCTION

1.1 Background

1.1.1 Suburbanisation, Edge Cities, and their potential for retrofitting

The 2014 Revision of the UN's report on World Urbanization Prospects projects the world to grow toward a 66 percent urban population majority by 2050 (UN, 2015, p. 7). This trend points to increasing pressures on urban centres, with the demand for more space to absorb the populations drawn by the lure of cities.

Worldwide, cities densify and sprawl out, overrunning agricultural land and creating new suburbs (Torrey, 2004). Whilst definitions of what constitutes a suburb are as varied as their differences in character (Vaughan et al, 2009; Forsyth, 2012), there is some consensus that suburbs have become the globally dominant form of the built environment, covering more land area than what would be considered traditional urban cores and downtowns. Locally, Metro Manila's rapid suburbanisation into its rural fringes is documented and described by Ortega (2016, 2018).

Bourne (1996, p. 163-184) proposes that suburbs are not monolithic, sterile, solely residential, nor beneath the urban. This could certainly be said about Metro Manila's post-war suburban developments as documented and discussed by Pante for Quezon City (2017), and Garrido for Makati (2013). These developments are examples of what Garreau (1992, p.7) defines as suburban Edge Cities - privately developed and managed commercial centres rivalling traditional downtowns. These edge cities are accessible primarily through major highways and are usually planned around the scale of the car. It is also these edge cities that have become Metro Manila's contemporary central business districts (CBDs) which become the magnets for employment, business, and opportunities for the expanding blanket of suburban residential developments around them.

Recently, Sultana (2011, p. 1071-1088) questions the environmental and economic sustainability of these edge cities as demographic shifts and lack of transit infrastructure are increasingly turning people off from the suburban lifestyle. Calthorpe (1993), and Duany et al. (2000) both highlight the false allure, and the ills and discontents of the suburban lifestyle which has come to dominate the American built environment. This same aspirational lifestyle – encapsulating the American dream of the single-detached home, the white picket fence, and the garage with a car are exported worldwide via global capitalism. This has constituted much of the landscape built for the new middle class created in most of the developed and developing world after the Second World War. While Calthorpe (1993) and Duany et al (2001) propose similar frameworks in the creation of new suburban developments – in creating urbanity out of the greenfield, both are not able to operationalise these proposals for the existing field of suburban residential development.

Dunham-Jones and Willamson (2008), and Willamson (2013) expound on the various cases of how suburban developments can be retrofitted and remade, but both focus on the 'greyfield' of suburban infrastructure – parking lots, big box malls, and office parks; which Koolhaas (2002) calls 'junkspace.' The outsized detritus created by the push toward modernity and development, enlarged in terms of distance by the scale and speed of the car.

Vaughan et al. (2009) posits that, at least in the British suburban landscape defined by train stations and high streets, there are latent urban centralities that give nuance and detail to belie the perception of the homogenous and monolithic residential suburb. Vaughan et al. (2015) talks about how local suburban high streets are like suburban hedgerows, that create a local ecology of social and commercial exchange. In Manila's 'American-styled' car-centric, gated, and single-family only residential suburbs, these latent centralities and ecologies are supressed within the gated villages and pushed out to the obvious corridors for public flow and interaction. This leads to 'stroads' (Marohn, 2011) or a Frankenstein-like combination of street-road, wherein the flow of vehicles is never smooth as a road or highway, and the social-economic exchange and interaction of a street is scaled up from pedestrians to cars.

Using space syntax and the methods discussed by Vaughan et al (2009 and 2015), one can highlight the latent centralities within the fabric of residential villages – one might call, the 'yellowfield', yellow from the American Planning Association's (2006) use of yellow for residential zones, which can be tactically rezoned, retrofitted and revitalised using targeted urban design and development controls. Yellowfield is coined as a conceptual expansion of greenfield (virgin/new development), brownfield (post-industrial redevelopment), and greyfield (suburban infrastructure redevelopment) as a new form of redevelopment.

1.1.2 Privatisation and Globalisation

Luymes (1997, p. 187-203) discusses the rise of enclave communities throughout North American suburbia. He examines the socio-economic incentives to developers to provide walls and gates to developments, then presents his typologies of contemporary suburban residential enclaves. Luymes (1997, p.198) identifies the typologies of thresholds, then discusses the gradients of access control from the virtual (camera surveillance) to the physical (fences, guardhouses, etc.). He concludes with the effects of these enclaves on communities, and their land values.

Similar gated communities have also recently proliferated in Southeast Asia in the past decades. Mohammed (et al, 2015, p. 567-574) and Hapsariniaty (et al, 2013, p. 394-403) shown how favourable it is for villagers to self-select and form what could be considered mechanical solidarities (Durkheim, 1893) and spatially correspondent communities (Hillier and Hanson, 1984) within their gates. These are similarly present in Manila's exclusive gated villages and have largely remained impervious to the gentrifying and urbanising forces, by virtue of private

property rights and residents choosing to maintain exclusivity, through legislated deeds of restrictions, strict single-family, residential-only land use and design guidelines for each village, in-the-midst of real and perceived disorder and crime outside their gates. Garrido (2019) examines their effects on the socio-economic and political cohesion of Metro Manila's society, and points to Manila as a patchwork city of ordered, privatised territories (villages) interspersed with the open fabric and slums of the open city.

Ortega (2016 and 2018) points at how the gated subdivision is not merely an upper- or middle-class phenomenon in the Philippines, but a result of the growth of the Filipino working-class diaspora. Lack of economic opportunities in the Philippines drive Filipinos to work abroad with a largely blue-collar expat population of seafarers, domestic helpers, nannies, nurses, caregivers, technicians, and a growing number of white-collar service professionals – all driving the expansion of real estate markets back home through their remittance dollars. This is a clear manifestation of what Sassen (1990, 1991) discusses as how cities become engines of global connectivity. Cities transmit and receive global movements of people (Urry, 2016), and are the nodes that form an extranational infrastructure (Easterling, 2014). Both funnel opportunity and economic advantage, making cities a contested territory. With the above discussion of the global flows of capital and people, Ortega (2016 and 2018), effectively points out that the Metro Manila region not just as a global city, but a global suburb as well.

1.2 Statement of the Problem

Metro Manila's built environment is best described as one of interspersion (Garrido, 2019, p. 59-83) by both formal private enclaves (commercial central business districts/CBDs and residential villages), and informal settlements. Both are cheek-by-jowl, with each delineated by the other. These CBDs and their surrounding fabric of gated residential communities are the most evident form of Metro Manila's enclave urbanism today, and while they are its modern service economy's engines, they also exclude and marginalise the larger sum of working-class people who have chosen to live in the interspersed informal settlements for access to jobs and services. The low-density, gated residential communities around these commercial enclaves prevent these centres from housing higher densities of middle and working-class populations in multi-family housing typologies. Apart from condominium towers, the only choice is to live outside the core within similarly gated subdivisions (Ortega, 2016). This form of "trickle-down" enclave urbanism started from these elite exclusive villages and has become the predominant form of new housing production for the middle- and working-class populations outside of Metro Manila. Effectively replicating many of the problems and inequities brought about by car-centric planning.

Because of the attraction of these CBDs and similar commercial enclaves around Metro Manila, its aggregate night-time population of 12.87 million residents (PSA, 2016), swells with commuters from surrounding suburban and exurban fringes, bringing its daytime total to 15 million people. Metro Manila's few rail lines are heavily saturated and do not extend outside its

limits, thereby necessitating the use of private vehicles (as soon as one could afford it) to get from Metro Manila's edges into the urban core. Majority of this influx of vehicular traffic is channelled through the Circumferential Road 4 / Epifanio Delos Santos Avenue (C4/EDSA) corridor, which also connects the various enclaves around the core of Manila. C4/EDSA has reached peak volume capacity ratio (VCR) levels and is expected to get worse without intervention (ALMEC Corp., 2014).

This state of socio-spatial inequity, congestion, and overall dysfunction has created a sense of resignation at the challenge of fixing Metro Manila. Philippine President Rodrigo Duterte, declaring it a dead city in 25 years (Ranada 2017), is pushing for decentralisation of development away from the capital (Flores, 2018), his administration is proceeding with a new government centre in Clark, Pampanga, a vast former US airbase in the Central Luzon Region to the North of Manila (Schnabel, 2018). To decongest Metro Manila's streets, Palafox (Mayuga, 2016) wants to open the gates of Makati's exclusive villages to allow traffic to flow into the Makati CBD. Echoing this in his 2019 State of the Nation Address, Duterte ordered Metro Manila's local governments to reclaim public roads used for private purposes – including those within gated villages surrounding Metro Manila's business districts (Esguerra, 2019; Talabong, 2019; Adel, 2019). To date, there has been no published study on the possible effects of opening these gates to the public. While clamour for the policy has died-down, no doubt due to push-back from the very powerful, elite residents of these villages, this policy has a habit of resurfacing.

One can posit that the gated residential villages are not only holes in the spatial network preventing through traffic of cars but are also the source of much of the local car traffic themselves. If these gated residential villages could be retrofitted as an example of 'yellowfield' redevelopment, then volumes of local car traffic could be reduced instead. This could be made an example of what could be done elsewhere, trickling change down from the elite exclusive villages to the other gated subdivisions throughout the Philippines.

1.3 Research Intentions / Significance of the Study

The above context of dystopic exclusion and congestion becomes the pretext for analysis of Metro Manila's existing exclusive residential enclaves. Opening the residential enclaves sounds like an intuitive traffic management solution, but by examining existing conditions first, then analysing/simulating the effects of opening village gates to traffic, this study aims to interrogate the premises of this measure, and in the process, offer alternate possibilities for moving forward.

Similarly, the push to decentralise and redistribute populations into new, distant urban centres needs critical reflection. There is a risk of merely reproducing the existing CBD-suburban duality, along with its car-centric dysfunctions, and its underlying patterns of socio-spatial inequity and unsustainability. There is a need to revisit what it means to redistribute and

decongest, even if means, paradoxically, introducing aspects of the urban into the gated, car-centric, single-family residential village.

This study's use of space syntax to highlight the potential areas for 'yellowfield' redevelopment, hints at a possible way to operationalise all the various suburban retrofit and new suburban planning guidelines and design strategies proposed by Calthorpe, Duany et al., and Dunham-Jones and Williamson in the context of existing and mature, or transitioning suburbs, that are seeing their home ownership change. This study posits that planners should be able to at least show what could be, even in the midst of very obvious potential opposition from NIMBY (not-in-my-backyard) residents who will hold fast to their traditional notions of what a gated residential subdivision should be. If majority of the built environment outside of the world's urban cores is suburban, then there is a clear and present need to be able to strategically retrofit them to be more local, sustainable, and less car dependent if we are to change how we live in light of global climate change.

1.4 Research Questions

a. What are the characteristics of the spatial networks within the gated residential communities beside Metro Manila's CBDs?

b. How does opening the gates of these private residential communities affect their spatial network, and that of their nearby/adjacent CBDs?

c. What latent spatial network characteristics could be highlighted by space syntax within these gated residential communities? What opportunities do the analyses point to?

2 THEORY

2.1 Space Syntax – Axial Lines and Graphs

This paper examines Metro Manila's exclusive suburban residential communities using the methods that form space syntax theory's analysis of spatial configuration. Hillier and Hanson (1984) discuss the fundamental derivation of space syntax methodology. They present how settlements have organically developed, and how certain spatial phenomena take shape. They then propose the use of Axial Lines to represent and analyse these settlements as an interconnected network of spaces.

Axial lines represent the longest, straightest lines that pass through any system of spaces, as abstractions, they are useful in simplifying the underlying spatial system through the built environment. Emo (2014), has tested and illustrated the soundness and the cognitive roots of the axial lines as a method of representing space through a city, by testing and showing how humans

visually perceive space, through the axial lines. Each street or path through a public space is represented as an axial line, and is then counted as a node, which, when grouped together according to their adjacent connections, for a network that can be mathematically analysed (Hillier and Hanson, 1984).

2.2 Space Syntax's Key Discourse, Order and Structure

Foundational to Space Syntax is the concept of Natural Movement (Hillier et al, 1993)— in which all things being equal, how space is configured influences its probability to generate pedestrian and vehicular movement, and correspondingly, social copresence and behavior. The potential for movement in cities is categorised according to two kinds of applied graph theory centralities. The closeness centrality, also known as integration, measures the probable capacity of the spatial network to foster movement towards specific close or integrated locations. The second is the betweenness centrality, also known as choice, which measures the probable capacity of the spatial network to generate through movement between any 2 points (Hillier et al, 1993).

These concepts are then used to describe cities as Movement Economies (Hiller, 1996), wherein cities also probabilistically create parts vs. whole relations, by virtue of the variances of activity in (closeness/integration), and movement through (choice/betweenness) certain places which spatial configuration encourages or discourages. Naturally – configuration, creates areas which are more vibrant and active, alongside other areas that are relatively quiet. The city as a whole has these separate areas as unique parts.

This describes the formation of a generic Dual-Network (Hillier and Vaughan, 2007) composed of the foreground network on which generative micro-economic activity fosters exchange and interaction, and the background network, which is conservative in how it maintains social and cultural relations within residential communities. This adds nuance to Hillier's (1999) discussion of Centrality as a Process, wherein he not only relates the relationship between land use and other factors to the idea of configurational centrality in cities, but also highlights that centralities grow, migrate, shift or diffuse over time as the foreground and background networks grow and develop.

Hanson (1998) for London after the great fire of 1666 and Karimi for Persia's ancient cities (2012) discuss how top-down imposed localised Order differs from global, or bottom-up Structure and how the two concepts intertwine and recede as one surfaces. Both discuss how attempts to impose order on seemingly disorderly spatial fabrics fall apart as underlying centralities reemerge, forming a spatial structure to the network that serves to underpin socio-economic phenomena.

In the context of imposed sterile order found in Metro Manila's gated exclusive villages, underlying structure and centralities could be powerful concepts in pointing not just how things are, but how things could potentially be for this dominant mode of producing residential space.

2.3 Use of Space Syntax in analysing Gated Communities

Zhang (2016) uses space syntax to compare the spatial characteristics of a more organic, informal, urban village with that of a gated mid-rise community. Commercial activity correlates with segments having higher integration in the urban village, and interestingly, commercial activity within the gated community is segregated away from the semi-public corridor found to have high integration.

This perhaps hints at the unexploited latent centralities within gated communities, and the tension between the inherent premise of securing and controlling access, with the desire to provide amenities and services close to residents.

From these findings, one may stipulate that the vibrancy and economic success of the commercial spaces within the gated community pale in comparison with areas that are naturally more integrated, not just because of the reduced levels of connectivity, but also because of how the catchment populations served within gated communities are smaller and segregated from the market outside.

Luo-Branch (2014) outlines and discusses how and why space syntax could be used to analyse the gated community of Hot Springs Village (HSV) in Arkansas, which at 156.8 square kilometers in land area is considered the largest gated community in North America. Luo-Branch points out that space syntax could be used to analyse the logic of HSV's main arteries, determine strategic spots for placemaking and development projects, and understand how street layout correlates with real estate values within HSV.

While HSV is a good case for using space syntax in gated communities, Luo-Branch, unfortunately - stops short of actually performing the analysis on HSV and presenting / discussing her findings. What her brief article does is show the potentials for application of space syntax which could be adopted for this study.

Suat's (2015) study of gated communities in Istanbul, Turkey analyses how private enclosure affects the surrounding fabric of streets, by mapping and correlating the graffiti/vandalism of the perimeter walls of gated communities with the accessibility of the street networks outside and surrounding these gated communities. The study shows a high correlation of graffiti/vandalism with streets and gated community edges that have lower integration values, and therefore lower accessibility to the surrounding network of streets.

This approach is interesting because it distills the sense of resentment that arises around gated communities and how these not only spatially disintegrate the urban fabric, but also disintegrate the social relations between close neighbouring communities. It points to the interface of these gated communities with the environment outside them and emphasizes the need to not just look at the edges but at the thresholds and access points between the gated and the ungated.

Kaushik (2019) uses space syntax's quantitative measures of intelligibility and synergy, with a qualitative approach using sketch mapping to analyse three different cases in Gurugram, India. The three cases vary with one being a typical orthogonal open street network, the next a semi-gated public housing development, and the last a predominantly privately developed sector with gated and guarded districts.

The approach analyses the street networks of all three cases using two conditions – the first without gates (opened gates) and the second with gates (closed/secured gates). The findings show that intelligibility and synergy drop consistently, the more privately developed a project is. This indicates that spatial network configuration and connectivity is influenced by the mode of development used. Then synergy and intelligibility drop further when comparing between the ungated vs gated condition of all three cases.

These quantitative findings are consistent with the qualitative exercise of mind-mapping the respective communities which shows how spatial configuration directly affects the spatial cognition and understanding of spaces. The more private and gated a development is, the harder it is to way find and understand the whole.

Kaushik's method of using both gated and ungated conditions for space syntax analysis of the street network is similar to what this study does, with this study's expansion of the method by including potential new connections to simulate the government's directive to open all gates and potential connections to through traffic.

3 DATASETS AND METHODS

3.1 Study Area / Historical Timeframes

Metro Manila is characterized by its clusters of commercial and residential enclaves defined by the Epifanio Delos Santos Avenue (EDSA) corridor (See Figure 1, p. 10). These enclave estates are privately planned and managed. Key commercial enclaves of Makati, Bonifacio Global City, Ortigas, and Greenhills are flanked by gated residential villages or condominium communities and have access to restricted amenities/open spaces such as golf courses and country clubs.

These enclaves are shown by Google Streetview's map of surveyed roads as holes in the public-access spatial network of Metro Manila. This study shall be focusing on the Ortigas-Greenhills-

Pioneer Cluster and the Makati-Bonifacio cluster of mixed-use enclaves/CBDs and their respective surrounding residential fabric. The area drawn in Figure 1 constitutes the extent of the analytical model for this study.

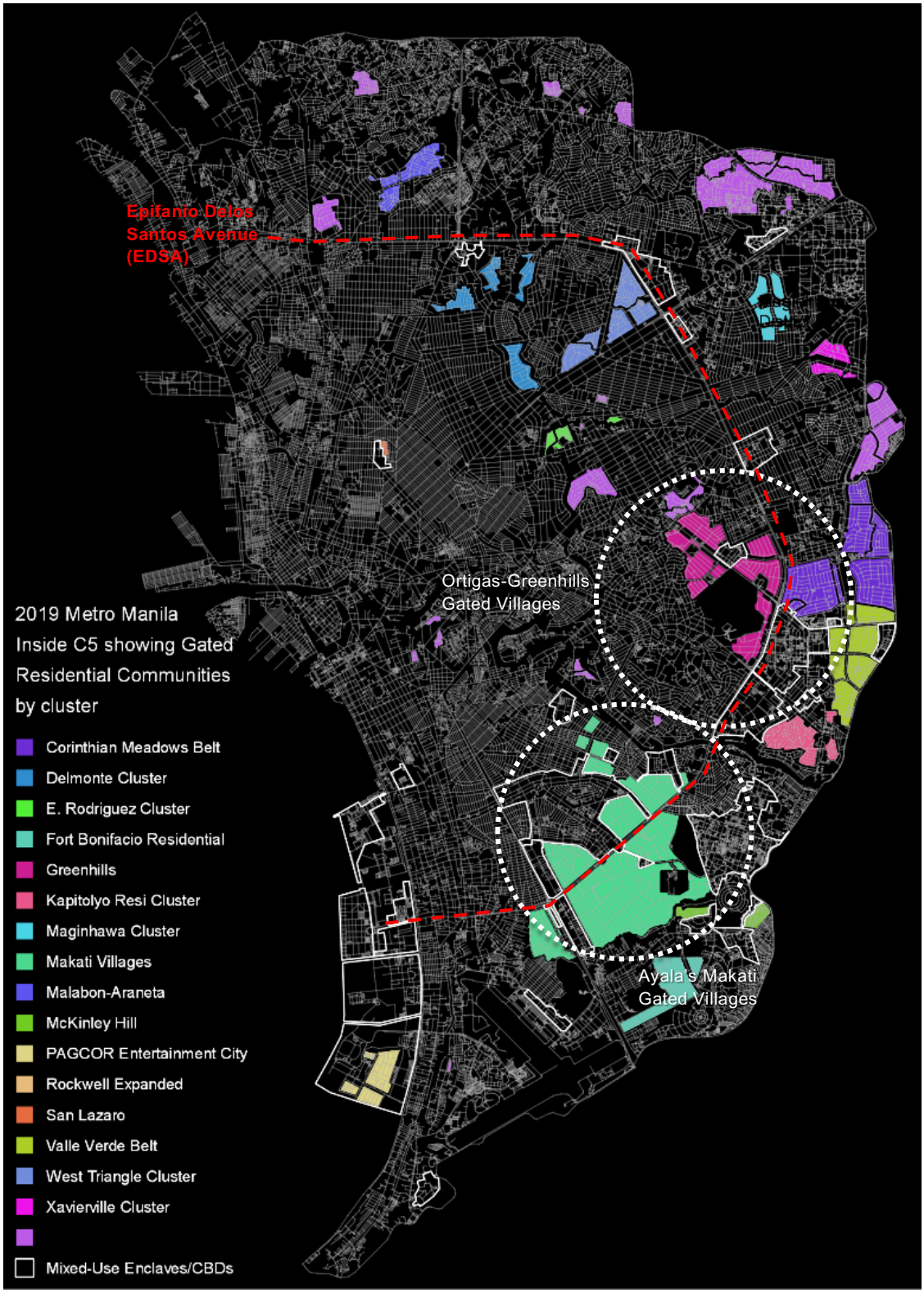

Figure 1: 2019 Metro Manila (inside C5) spatial network, showing Gated Residential Communities, and key clusters around Mixed-Use Enclaves/CBDs.

This study uses space syntax's method of angular segment analysis (Turner, 2000; Turner, 2001; Turner, 2005; Dalton, 2001; Turner, 2007; Charalambous, N. and Mavridou, M., 2012), to produce measures of Normalised Angular Integration (NAIN/closeness centrality) and Normalised Angular Choice (NACH/betweenness centrality) (Hillier et. al, 2012) for the traced contemporary spatial network. These values vary from local/pedestrian (400m, 800m, 1200m) to macro/vehicular (2000m and up) ranges. The values derived from the spatial analysis of of these are to be compared against points-of-interest (Yang, 2015) such as enclave entrances/thresholds and found in maps, verified through a combination of actual and Google Street View surveys of village streets. Part of the process involves classifying the enclave entrances according to level of access and potential for access, with gates for public access, gates reserved for resident access (with stickers to notify guards that vehicles are owned by residents) and closed-off or walled-off streets that could be punch-through interconnections opened-up for through traffic.

In response to the first research question, this study correlates accessibility values within the gated villages with those outside of them. Then the accessibility values of existing public and resident gates of the said villages are correlated with the accessibility of the network outside the villages. These enclave entrance POIs are also used to define the control or baseline condition and become the jump-off point for the experimental methodology in response to the second and third research questions concerning the opening of gates to Metro Manila's exclusive enclaves. This study uses a two-step methodology:

The first step measures and aggregates configurational values (NAIN and NACH) within and outside the identified enclaves, assuming a status-quo, closed condition, with only the identified public gates open for access. For the second research question, the key scale of movement for analysis will be global (using radius N for vehicular circulation). The second step measures and aggregates the same measures and scales of analysis, but simulating an all-open condition, opening all public, resident, restricted, and potential pass-through access gates/thresholds to public traffic. These new values and the delta or change between the two conditions are analysed by aggregating the mean values within the gated villages and comparing them with the values and the change in the values outside the network. Then, the resulting accessibility values within the gated villages are correlated with the spatial network outside. This is to quantify how the spatial network reacts to open gates, and how it could potentially induce demand (signified by the change in NAIN and NACH values) for vehicular movement to and through these roads.

Then for the third research question, to simulate how the gated villages will spatially react to opening gates for pedestrians only, this paper will repeat the two steps discussed above, but using a local range of movement (using 1200m radius for pedestrian circulation) for analysis. This serves to highlight a different range of latent, local, pedestrian centralities which could serve as candidates for tactical yellowfield redevelopment.

4 RESULTS

4.1 Gated Private Realms

Metro Manila's C4/EDSA corridor is also marked by gated villages (See Figure 1 and Figure 2) planned as part of the developer-driven edge cities that came to be after World War 2. Ayala's Makati Villages are paralleled by Ortigas and Greenhills, developed by Ortigas and Co.

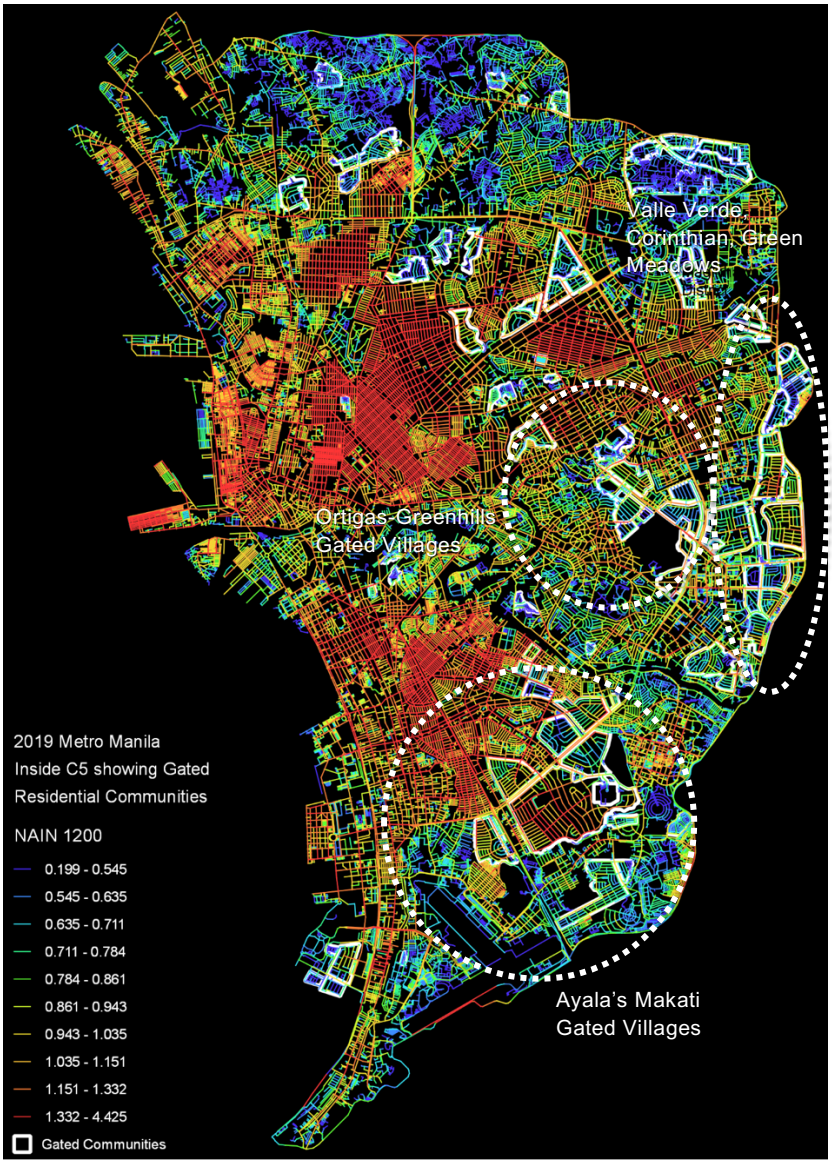

Figure 2: 2019 Spatial Graph of Metro Manila within Circumferential 5 Road, NAIN 1200 showing Gated Residential Communities.

Similar residential subdivisions along the Valle Verde-Corinthian Gardens-Green Meadows Belt followed in the 1980s. These exclusive gated villages around the mixed-use enclaves/CBDs internally have average values for integration (NAIN) and choice (NACH) that are lower / cooler (as shown in Figure 2) and have weak to moderate negative correlations with local to global ranges of movement when compared to the rest of the spatial network (See Table 1 and 2).

Correlations

		Enclaved	gxCH0400	gxCH0600	gxCH0800	gxCH1000	gxCH1200	gxCH1500	gxCH2000	gxCH2500	gxCH3000	gxCH3500	gxCH4000	gxCH4500	gxCH5000	gxCH Rn
Enclaved	Pearson Correlation	1	-.326*	-.330*	-.357**	-.384**	-.403**	-.437**	-.472**	-.492**	-.497**	-.494**	-.493**	-.492**	-.489**	-.458**
	Sig. (2-tailed)		.017	.016	.009	.005	.003	.001	.000	.000	.000	.000	.000	.000	.000	.001
	N	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53

Table 1: Correlations for Average NACH values of Internal Network within Exclusive Gated Villages (access through public gates only). This shows statistically significant, moderate negative correlations vs. systemwide NACH values.

		Enclaved	gxIN0400	gxIN0600	gxIN0800	gxIN1000	gxIN1200	gxIN1500	gxIN2000	gxIN2500	gxIN3000	gxIN3500	gxIN4000	gxIN4500	gxIN5000	gxIN Rn
Enclaved	Pearson Correlation	1	.087	-.059	-.171	-.258	-.306*	-.348*	-.342*	-.296*	-.270	-.248	-.238	-.239	-.237	-.062
	Sig. (2-tailed)		.536	.675	.221	.062	.026	.011	.012	.031	.050	.073	.087	.084	.088	.658
	N	53	53	53	53	53	53	53	53	53	53	53	53	53	53	53

Table 2: Correlations for Average NAIN values of Internal Network within Exclusive Gated Villages (access through public gates only). This shows statistically significant, weak negative correlations vs. systemwide NAIN values.

Like the CBDs they are planned with, the public and resident-only entrance gate locations (See green and yellow points-of-interest/POIs, Figure 3) for these villages have accessibility values that positively correlate with vehicular movement (NACH 2000+ and NAIN 3500+) despite being relatively close to the commercial areas of their respective masterplanned estates (See Table 3 and 4). Resident-only gates (yellow POIs) are enforced through car stickers, while Public-access gates are screened by guards. Each village also has permanently closed gates (red POIs) that are only opened for emergencies. They also have dead-end roads that were initially planned to connect externally but were walled-off completely to localise traffic (blue POIs). All these could be opened-up as alternate routes for access. These gate locations were verified through actual road visual survey and manual Google Street View survey. Because of segregated and car-centric spatial configuration, residents are still more likely to use their cars to get to their neighbouring commercial areas than walk – likely compounded by the heat of Manila and the perceived safety within the air-conditioned bubble of a private vehicle.

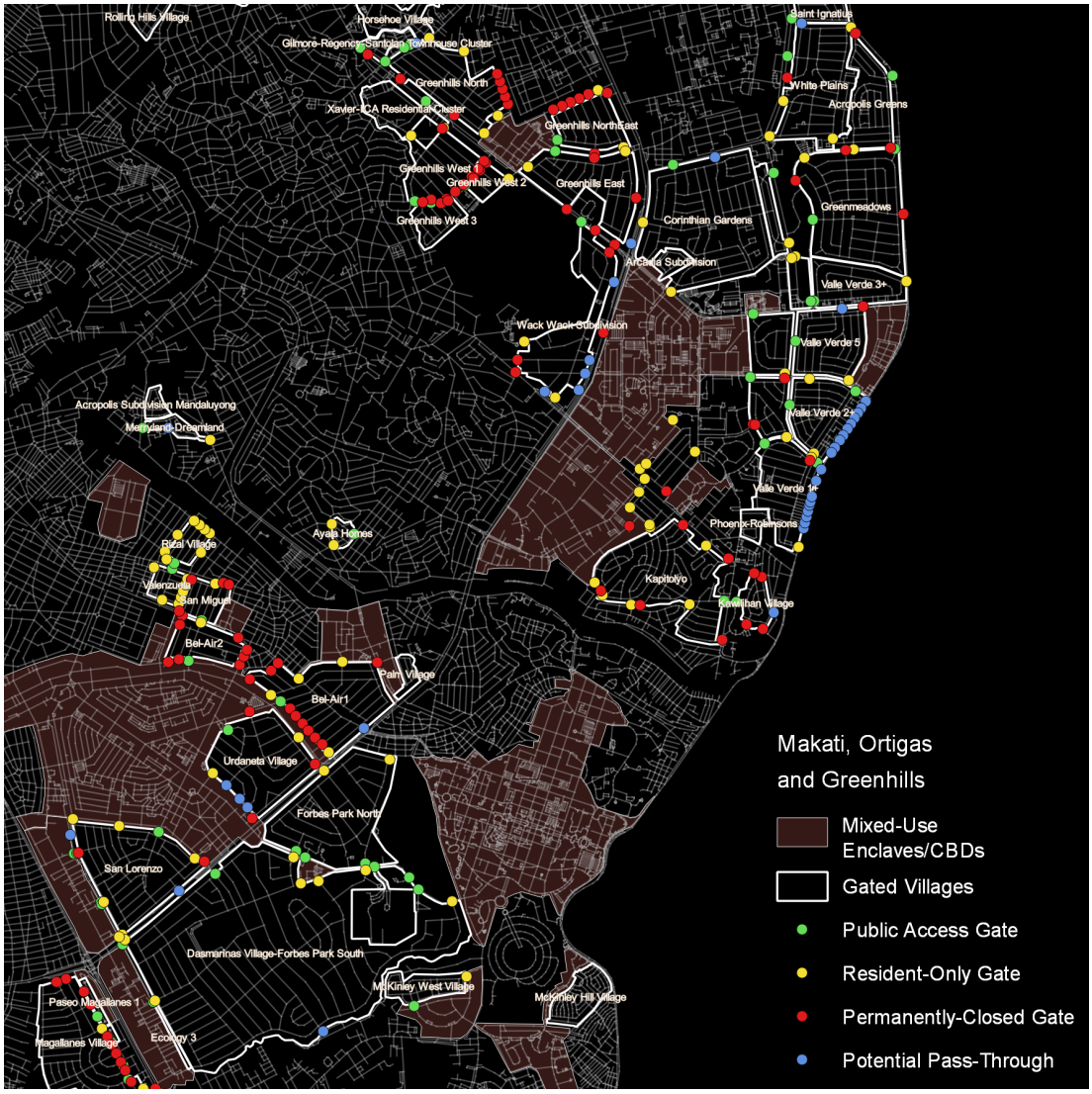

Figure 3: 2019 Makati-Ortigas-Greenhills spatial graph, showing exclusive Gated Villages around Mixed-Use Enclaves/CBDs. Gates located by author from manual Google Street View survey

Correlations

		EntryPOI	gxCH0400	gxCH0600	gxCH0800	gxCH1000	gxCH1200	gxCH1500	gxCH2000	gxCH2500	gxCH3000	gxCH3500	gxCH4000	gxCH4500	gxCH5000	gxCH Rn
EntryPOI	Pearson Correlation	1	.340**	.435**	.480**	.499**	.503**	.516**	.522**	.524**	.522**	.519**	.522**	.521**	.520**	.489**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

Table 3: Correlations for exclusive gated village public entrance and resident-only entrance POIs with their corresponding location's NACH Values. This shows statistically significant, moderate positive correlations with global/vehicular NACH values.

		EntryPOI	gxIN0400	gxIN0600	gxIN0800	gxIN1000	gxIN1200	gxIN1500	gxIN2000	gxIN2500	gxIN3000	gxIN3500	gxIN4000	gxIN4500	gxIN5000	gxIN Rn
EntryPOI	Pearson Correlation	1	.127	.143	.154	.157	.150	.156	.163	.175	.195*	.226*	.236*	.233*	.235*	.243**
	Sig. (2-tailed)		.172	.123	.098	.091	.107	.094	.079	.059	.035	.014	.010	.011	.011	.008
	N	117	117	117	117	117	117	117	117	117	117	117	117	117	117	117

Table 4: Correlations for exclusive gated village public entrance and resident-only entrance POIs with their corresponding location's NAIN Values. This shows statistically significant, weak positive correlations with global/vehicular NAIN values.

4.2 Opening the Exclusive Villages

4.2.1 Opening Gates and Induced Vehicular Demand

Simulating the opening of these gated villages, to see the effects on the surrounding network, one can see how opening gated villages increases mean route choice values for the spatial network within the villages (See Figure 4 and Table 5-6), indicating increased route choice for the spatial network. As intended, this has a high probability of decongesting the main roads by offering alternate routes leading into the adjacent business districts. But since Metro Manila's enclaves have thresholds configured for long-range vehicular movement, opening the gates to these villages also increases the probability of vehicular congestion within these business districts, because their road capacity essentially remains the same but the roads within the villages and CBDs (encircled) induce more pass-through traffic through higher route choice, thereby increasing congestion, not to mention disrupting the internal order within the villages.

Figure 4: 2019 Enclave Bounds of Makati, Bonifacio, Ortigas, and Greenhills. Showing average difference of NACH Rn value between closed and opened village gates, per enclave. This is used to represent potential to generate more through traffic in and around the encircled CBDs/commercial enclaves.

Correlations

		EntryPOI	aoxCH0400	aoxCH0600	aoxCH0800	aoxCH1000	aoxCH1200	aoxCH1500	aoxCH2000	aoxCH2500	aoxCH3000	aoxCH3500	aoxCH4000	aoxCH4500	aoxCH5000	aoxCH Rn
EntryPOI	Pearson Correlation	1	.337**	.520**	.614**	.678**	.710**	.734**	.743**	.744**	.745**	.746**	.746**	.744**	.746**	.736**
	Sig. (2-tailed)		.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	87	85	85	85	85	85	85	85	85	85	85	85	85	85	85

Table 5: Correlations for Mixed-Use Enclave/CBD Entrance POIs with their corresponding location's NACH Values for all-open gates. This shows statistically significant, strong positive correlations for these locations across local to global ranges of movement.

		EntryPOI	aoxIN0400	aoxIN0600	aoxIN0800	aoxIN1000	aoxIN1200	aoxIN1500	aoxIN2000	aoxIN2500	aoxIN3000	aoxIN3500	aoxIN4000	aoxIN4500	aoxIN5000	aoxIN Rn
EntryPOI	Pearson Correlation	1	.251*	.328**	.401**	.453**	.486**	.514**	.531**	.533**	.534**	.521**	.506**	.509**	.545**	.721**
	Sig. (2-tailed)		.020	.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	87	85	85	85	85	85	85	85	85	85	85	85	85	85	85

Table 6: Correlations for Mixed-Use Enclave/CBD Entrance POIs with their corresponding location's NAIN Values for all-open gates. This shows statistically significant, moderate to strong positive correlations for these locations across local to global ranges of movement.

This is accompanied by increased mean integration centrality values (See Figure 5) in the gated villages. This effectively transitions parts of these villages from the suburban conservative/passive background network into the foreground network. This indicates an increase in the probability that said opened village streets become destinations themselves, thereby inducing traffic not just through the surrounding villages, but into the villages as well, thereby congesting the roads surrounding the CBDs, while the road capacity within the business districts themselves essentially remains the same. The net projected effect is to choke the existing CBDs white (as shown in Figure 5). The increased probability of vehicular configuration is correlated for entrances/thresholds to the business districts and villages (See Table 7 and 8, red borders showing vehicular range movement).

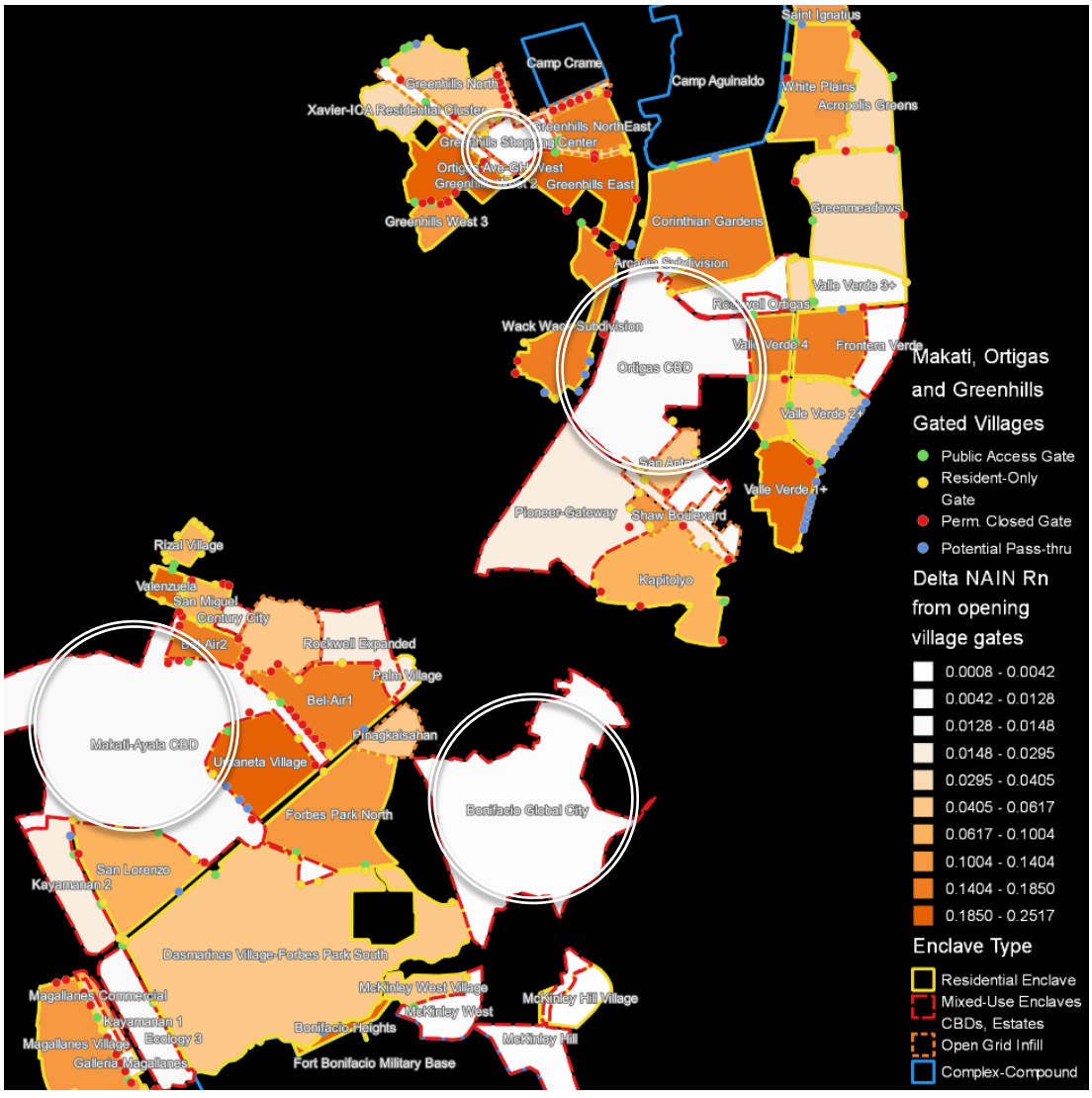

Figure 5: 2019 Enclave Bounds of Makati, Bonifacio, Ortigas, and Greenhills. Showing average difference of NAIN Rn value between closed and opened village gates, per enclave. This is used to represent potential to generate more movement/activity into the formerly gated villages around the encircled CBDs/commercial enclaves.

Correlations

		EntryPOI	aoxCH0400	aoxCH0600	aoxCH0800	aoxCH1000	aoxCH1200	aoxCH1500	aoxCH2000	aoxCH2500	aoxCH3000	aoxCH3500	aoxCH4000	aoxCH4500	aoxCH5000	aoxCH Rn
EntryPOI	Pearson Correlation	1	.281**	.370**	.409**	.430**	.430**	.438**	.438**	.440**	.438**	.437**	.439**	.438**	.438**	.412**
	Sig. (2-tailed)		.002	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	117	115	115	115	115	115	115	115	115	115	115	115	115	115	115

Table 7: Correlations for Exclusive Village Entrance POIs with their corresponding location's NACH Values for all-open gates. This shows statistically significant, moderate positive correlations for these locations across local to global ranges of movement.

		EntryPOI	aoxIN0400	aoxIN0600	aoxIN0800	aoxIN1000	aoxIN1200	aoxIN1500	aoxIN2000	aoxIN2500	aoxIN3000	aoxIN3500	aoxIN4000	aoxIN4500	aoxIN5000	aoxIN Rn
EntryPOI	Pearson Correlation	1	.156	.171	.182	.175	.167	.160	.153	.156	.173	.207*	.217*	.216*	.219*	.215*
	Sig. (2-tailed)		.096	.068	.052	.062	.075	.088	.101	.095	.064	.027	.020	.021	.019	.021
	N	117	115	115	115	115	115	115	115	115	115	115	115	115	115	115

Table 8: Correlations Table 5.10b (under 5.11a): Correlations for Exclusive Village Entrance POIs with their corresponding location's NAIN Values for all-open gates. This shows statistically significant, weak positive correlations for these locations with global ranges of movement.

4.2.2 Opening Gates to Pedestrian Movement Ranges only

The correlations indicate a possibility that if streets are opened to local movement – say, to pedestrians and cyclists only – using lower-range measures from 400-1500m (see Table 5-6, Table 7, blue-bordered values), connectivity could be improved in a less disruptive manner. Opening-up the villages to pedestrian/local movement presents a less disruptive increase in integration values in the surrounding spatial network. This shows the localised effect of pedestrianisation on the system, thus minimising the probability of induced vehicular demand disrupting these opened areas. The differences in gated and open pedestrian/local integration values is visually summarised and averaged per village (See Figure 6).

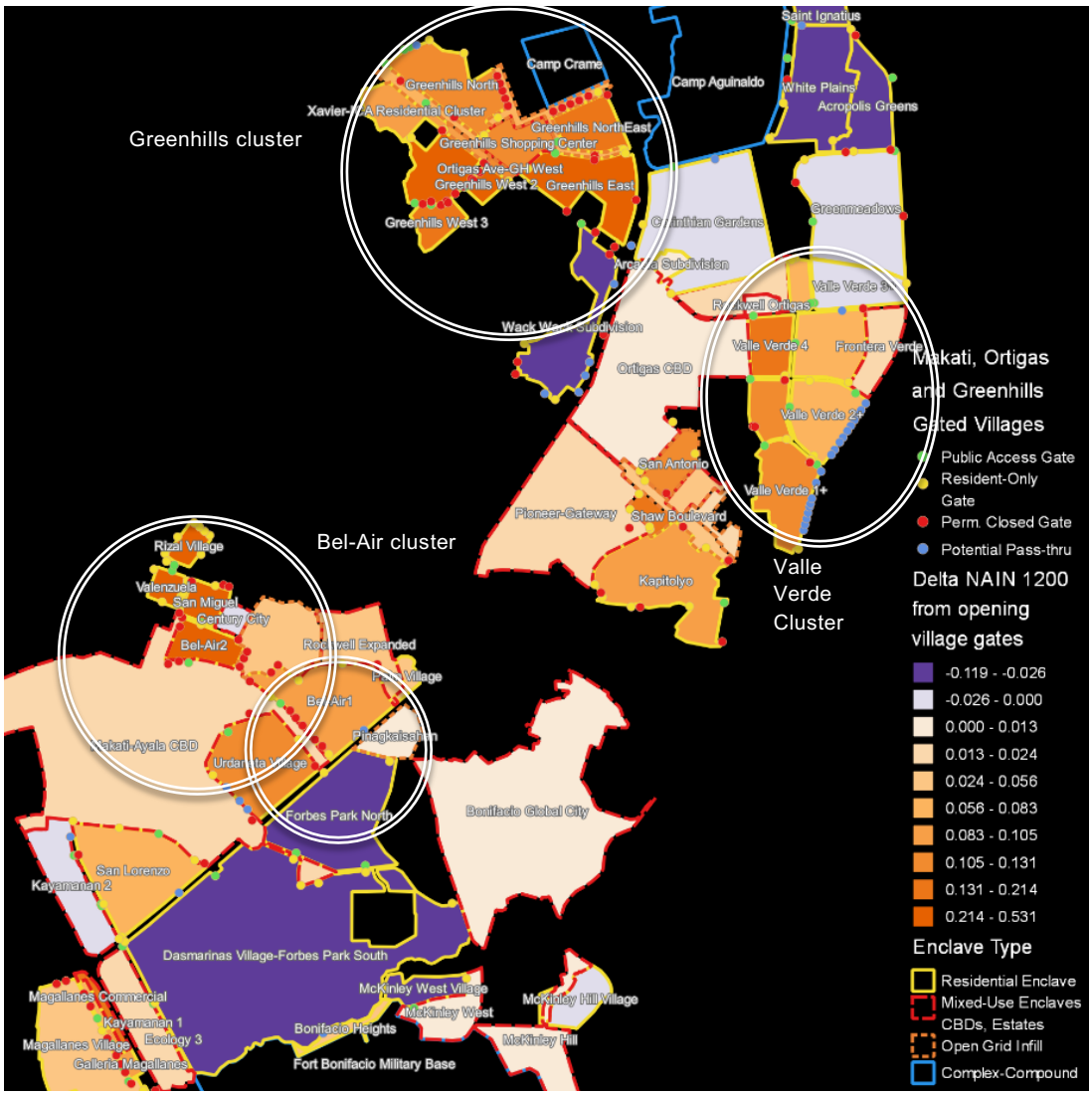

Figure 6: 2019 Enclave Bounds of Makati, Bonifacio, Ortigas, and Greenhills. Showing average difference of NAIN 1200 value between closed and opened village gates, per enclave. Presents how localised integration values favor smaller, more compact – and thereby shallower configurations closer to their thresholds.

The following are revealed to have significant increases in pedestrian/local integration values relative to the system: the Bel-Air-Poblacion cluster (See Figure 7) in Makati, and the Greenhills cluster (See Figure 8) in San Juan, and the Valle Verde cluster in Ortigas (See Figure 9).

4.3 Finding the "Yellowfield": Embedded Suburban Centralities

Spatial network analysis as used in this study uncovers embedded, potential re-developable local centralities that the village gates hold back from naturally occurring. The following cases presents a different mode of "yellowfield" redevelopment as a form of typological classification.

4.3.1 Gridded Districts: Bel-Air and Greenhills Clusters

The first typology of these embedded suburban centralities are the gridded districts that were originally part of the open street grid but were eventually gated/closed off for security. These are found in Greenhills in San Juan (See Figure 7) and Bel-Air Village in Makati (See Figure 8).

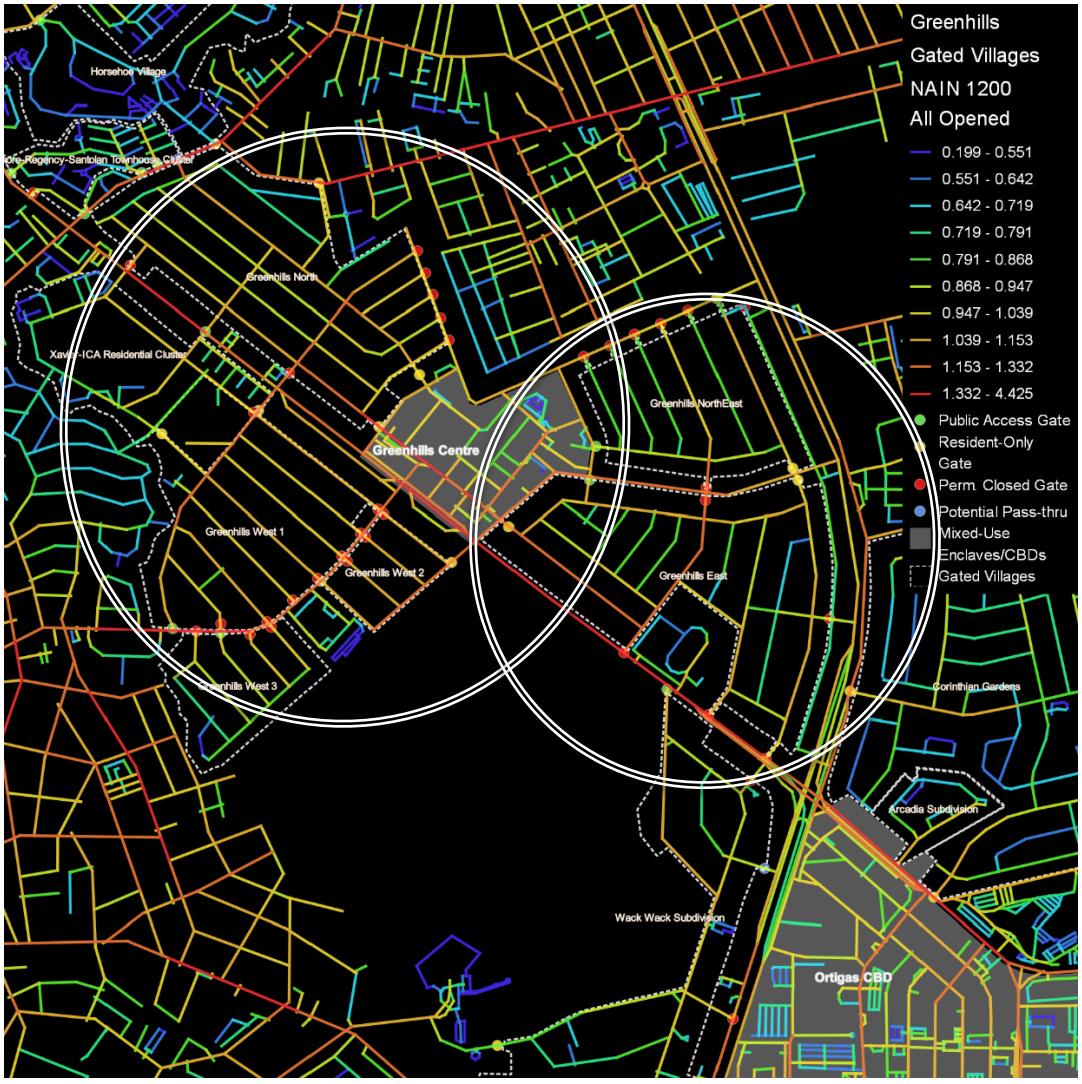

Figure 7: 2019 Spatial Graph of Greenhills Cluster. NAIN 1200 showing opened village gates. This presents local pedestrian potential centralities held back by the village gates.

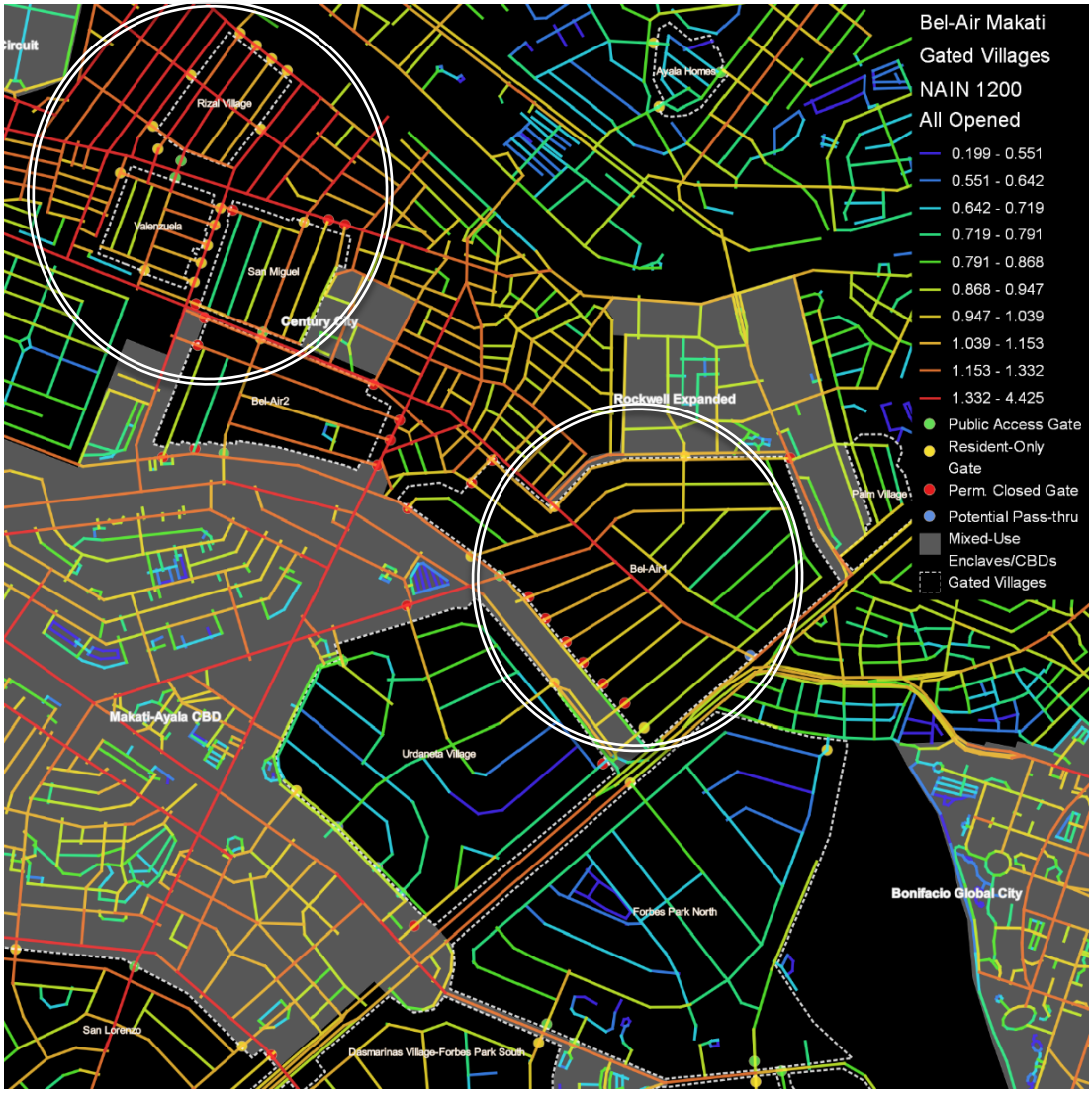

Figure 8: 2019 Spatial Graph of Bel-Air Cluster. NAIN 1200 showing opened village gates. This presents local pedestrian potential centralities held back by the village gates.

Both these gridded districts could be opened-up to pedestrians and bicycles using a combination of measures: bollarded streets, CCTV surveillance, sidewalk improvements, protected bike lanes, easing of ground floor use or accessory building restrictions for community retail, escalating to the change of village design guidelines allowing increased densities and multi-family mid-rise typologies, or mixed-use typologies like shophouses.

These could gradually thaw the frozen centralities in these villages. With increasing land values, wealthy landowners in these villages may consider these gradual moves, rather than the drastic and top-down measure to open their gates to traffic. These gated subdivisions, when opened-up to pedestrians and cyclists could lead to a new form of fine-grained, bottom-up “yellowfield” redevelopment, allowing organic processes, not unlike those discussed by Vaughan et al (2009), to take hold and urbanise the suburban.

4.3.2 Main Streets: Valle Verde, Corinthian Gardens, and Greenmeadows

On the other hand, introverted road networks having few entrances, tree-like branching roads and cul-de-sacs, and grid patterns that go against the grain of traffic create configurations with lower integration (NAIN) levels. Metro Manila's Valle Verde-Corinthian and Greenmeadows cluster has this introverted configuration (See Figure 9).

But even within these introverted communities, there are opportunities to create localised strips or main streets of activity (good for a local convenience store, bakery, coffee shops, commodity/supply shops, daycare or nursery, etc). When managed well, these strips could cater to their respective internal pedestrian markets and replace car journeys with pedestrian or cycling trips. This would be a paradigm shift in how residents within these gated villages would operate, reducing dependence on cars for local supply trips would possibly contribute to reducing congestion leading into the nearby CBDs.

Figure 9: 2019 Spatial Graph of Valle Verde cluster. NAIN 1200 showing opened village gates. This presents locally integrated streets/strips or segments which could be activated with localised retail/activity.

Curiously, even with closed gates, Dasmarinas Village (See Figure 2) in Makati has high levels of pedestrian/local integration (NAIN 1200). Opening its gates to local movement strengthen its integration centralities (See Figure 10). One may conclude that this is like the gridded districts discussed earlier because of the loose grid within the village, but the most intriguing and contentious prospect for Dasmarinas Village is in the size and spacing of its coarse street grid, which could lead to consolidation of individual lots that could produce larger building footprints that would permit taller buildings and higher densities. This opens the doors to densification into mixed-use, mid-rise buildings instead of the single-use, single-family villas presently onsite. Could this area (maintaining its affluence) become a denser, more pedestrianised, yet still upscale, neighbourhood similar to the Upper East Side or Chelsea in Manhattan?

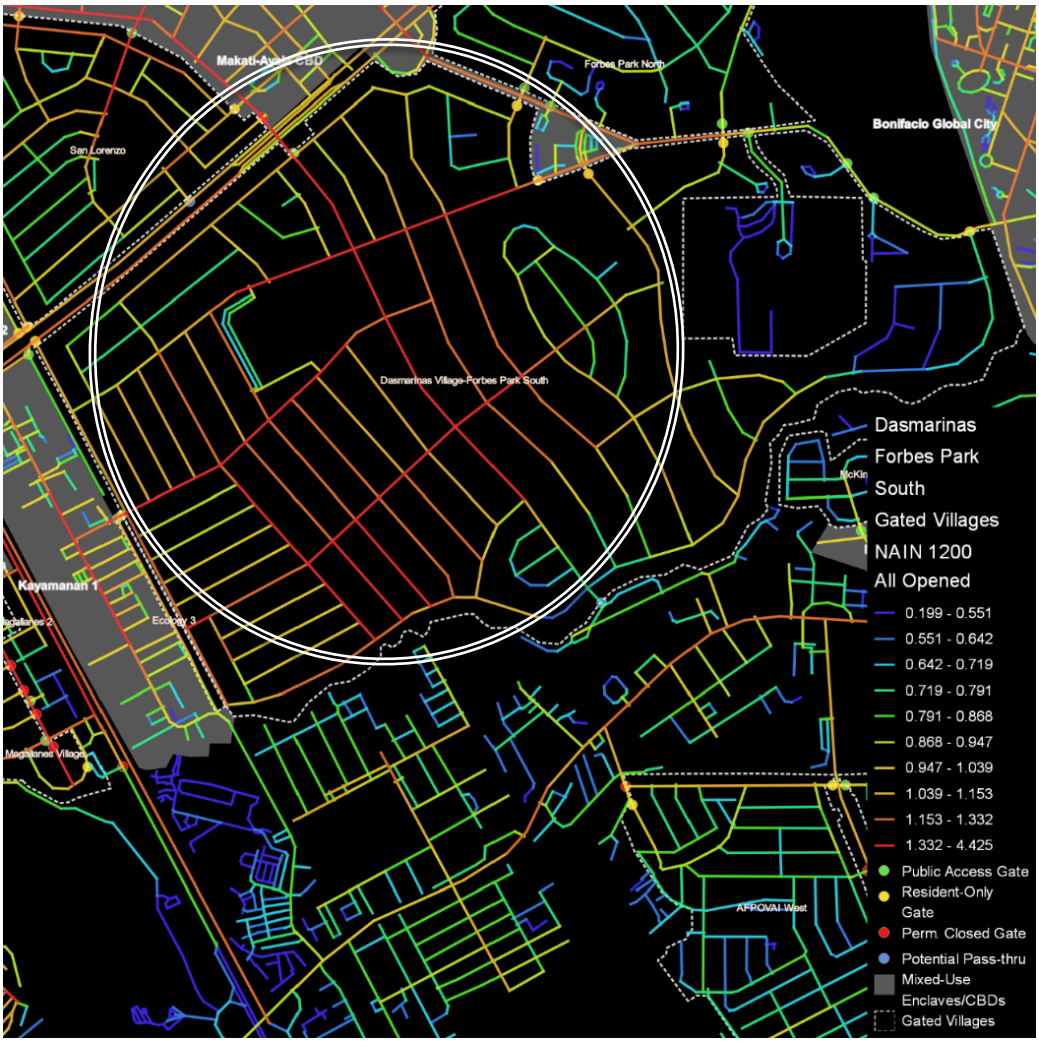

Figure 1: 2019 Spatial Graph of Dasmarinas Village. NAIN 1200 showing opened village gates. This presents local pedestrian potential centralities within Dasmarinas Village.

The findings for Dasmarinas and the other villages discussed, points to the need for further study, understanding the nuances of these latent centralities within the villages and perhaps moving forward with community engagement to understand the different factors and objections that village residents would raise against these “yellowfield” retrofitting methods.

5 DISCUSSION / CONCLUSIONS

5.1 Responses to Research Questions

In response to the first research question, this study finds that the gated residential communities surrounding these commercial enclaves have their main entrances along routes that are used for vehicular circulation. Their internal street layouts are also less integrated with the exterior network and apart from rare instances, are internally less integrated for pedestrian movement. This is evidence that shows how Metro Manila's current car-oriented suburban residential real estate markets are spatially exclusive and segregated, and not mere market or brand narratives.

In response to the second research question, opening the gates of the exclusive villages surrounding Metro Manila's mixed-use enclaves/CBDs generates new vehicular routes into the CBDs passing through these villages. While temporarily alleviating traffic congestion by providing more road capacity, the increase in global integration values within the villages could induce demand by creating traffic to these villages, and not just passing through them. This could further congest the roads in and around these commercial and residential enclaves. This effectively suffocates the roads within the CBDs as the CBDs themselves do not see an increase in road capacity, whilst their surrounding roads feeding into the CBDs increase in road capacity with the opening to through traffic.

Responding to the last research question, by simulating the opening of the exclusive gated villages around Metro Manila's key CBDs, this study highlights embedded pedestrian centralities within these residential enclaves. These could be tapped by opening roads to local movement for pedestrians and cyclists only.

Whilst residents will undoubtedly argue for the status-quo, the external public's clamor for opening these gates places the imperative on them to consider this measure, on their terms, rather than as an imposed or top-down directive from the National Government, over which they have no control of.

One can also see the potential of how this could improve the quality of life for residents by reducing local car-use, and when paired with closer analysis and study with community engagement in planning and design, improving amenities through specific permitted commercial activities. These could lead to mobilising the high land values within the enclaves by allowing for higher densities on streets with higher integration levels. These could be strong incentives for their respective communities to consider these tactical changes as an alternative to opening their gates fully to public traffic.

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5.2 Limitations

All spatial accessibility analysis is undertaken using a combination of QGIS and Depthmap X software (depthmap X development team, 2017), with statistical analysis using IBM SPSS software. Majority of this study was undertaken offsite in the United Kingdom (based in London), for a period of approximately five months. It relies on available historical maps from archival sources online and from the British Library; and remotely collected data sourced from: Open Street Map, Google Earth, and the Philippine Geoportal for checking against the present-day spatial network.

Regarding spatial network analysis, it is a probabilistic method based on applying graph centralities to analyse the spatial configuration of cities. As this is a historical assessment of spatial configuration, this study does not weigh these graphs for historical land use, density, road right-of-way width, and actual vehicular or foot traffic counts. This study instead uses parallel data as proxies for historical socio-economic behaviour and human interaction (enclave boundaries, contemporary points-of-interest from current maps and actual patterns of use) to form a broader methodology in line with space syntax theory. It is by comparing these data with configurational values using descriptive and analytical statistics that this study is able to not only analyse and present existing latent properties of these exclusive residential villages, but also to test/experiment how these villages change and affect their surroundings when their gates are opened.

5.3 Conclusions and Reflections

The legacy of enclaved development in the Philippines echoes around the world in more contemporary cases of large-scale privatised development. It is an unavoidable aspect of Metro Manila's Sub/Urban condition. Enclaves are not necessarily a bad thing, nor are the thresholds and fences that secure them. The lack of peace and order, and the high rates of violent crime in Manila are an omnipresent risk not just to the residents of these gated villages, but to everyone as well.

What is needed is a reassessment of the scale and accessibility of these enclaved developments. Planned for the scale of cars and vehicles, these need to be localised for walking (with other modes of public transport, personal mobility, and better infrastructure) to address the many socio-spatial dysfunctions (large carbon footprints, poor health, lost productivity, and quality of life due to traffic and congestion, etc.) that spring from this vehicle-first orientation.

The concept of yellowfield redevelopment also needs to be explored further. What spatial findings in gated communities could lead to actionable redevelopment? How can these be codified as a planning toolkit for bottom-up densification, pedestrianisation, and activation of the typical sterile gated residential suburb into a vibrant urban village? How can the imposed order

of gated, single-family, residential villages be shifted towards a more organic structure of permeable pedestrian access and nuanced land use and community that British suburbs inherently have (Vaughan et al, 2009)?

Also, as transport engineering and economics has difficulty in modelling and evaluating induced demand, could a relationship be found between induced demand with the differences in spatial integration or route choice values of the spatial network and their land uses?

The 15-minute city is a model that rose in popularity with the lockdowns brought about by the pandemic. It will remain an elusive ideal without a nuanced understanding of how to implement and change our communities. The explosion in suburban residential areas throughout the world, makes it imperative to methodically map out, understand, and analyse how to change these sterile residential suburbs as the world moves on from the pandemic and transitions due to the crisis of climate change, demographic shifts, networked commerce, and rising socio-economic inequity.

Space syntax as a methodology could bring this nuanced understanding. Whilst taught as a non-normative methodology for analysis, this study points to what space syntax could be in localised Philippine practice. By surfacing the configurational properties of spatial networks, it could be used to inform regulation and oversight, focus investment, and become a fair dealer that will help mediate amongst uneven power balances and interests. Hopefully, space syntax could be a tool to cultivate the ground and help grow and reinforce open markets, and with them, the common good.

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