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Framing Cultural Landscapes: 1 A Comparative Analysis of Binondo and 2 George Town's Gateways as Mediators 3 of Heritage and Enclave Identity 4 5 6 Abstract 7 In Southeast Asian cities shaped by colonial legacies and diasporic entanglements, 8 ceremonial gateways serve not only as spatial thresholds but also as articulations of 9 cultural identity. This study offers a comparative analysis of symbolic gateways in 10 Binondo, Manila—the world's oldest Chinatown, and George Town, Penang, a 11 UNESCO World Heritage Site known for its characteristic shophouse streetscapes. In 12 Binondo, cultural presence is made visible through monumental Pailous (Paifang) 13 arches strategically erected at key entry points to the district, marking its boundaries, 14 such as the Binondo Welcome Arch, Filipino-Chinese Friendship Arch, and the 15 Ongpin South and North Bridge Arch. In contrast, George Town does not feature 16 boundary-defining gateways; instead, its urban landscape is punctuated by more 17 localized, culturally embedded threshold markers within community enclaves, such as 18 the Little India Arch, Campbell Street Gateway, Zhang Clan Qinghe Hall Entrance 19 Arch, and Lee Jetty Clan Arch. 20 This study looks at how gateways contribute to the character of historic cities, using 21 both visual analysis and spatial measures. These measures include the Green Visual 22 Index, which captures how much greenery is visible; the Road Area Index, which 23 quantifies pavement or foreground coverage; the Sky Open Index, which reflects how 24 open or enclosed a space feels; and the Spatial Enclosure Index, which gauges how 25 much the surrounding buildings create a sense of containment. Together with ideas 26 from Lynch's imageability theory and Tuan's phenomenology of place, these tools 27 help reveal the visual impact these gateways create. 28 While Binondo's gateways serve as focal points that stabilize identity within a 29 fragmented, commerce-driven landscape, George Town's dispersed gateways embody 30 a conservation-oriented approach that prioritizes multicultural coexistence and 31 community-shaped spatial order. This study looks at how monumental gateways—and 32 sometimes their absence—shape the character of historic cities. It considers the roles 33 they can play in cultural landscapes, and how they connect to questions of memory, 34 governance, and identity

over time. Overall, the comparison shows that gateways— 35 and even their absence—do more than just mark thresholds. They express different 36 cultural ways of making places legible, shaping how heritage landscapes carry 37

  identity, governance, and memory through time. 38 Keywords: Chinatown, George Town, Penang, Gateways, Sightlines, Visual Framing 39 Introduction 40 Ceremonial gateways have long served as symbolic and spatial devices in the built 41 environments of many Asian cities. In the Chinese architectural tradition, the Pailou 42 or Paifang functions as a ritualized threshold—marking entries into sacred, familial, 43 or civic spaces and reflecting Confucian values of honor, ancestry, and social order 44 (Knapp, 2005). As Chinese diaspora communities expanded across Southeast Asia, 45 such forms were often reinterpreted in colonial and postcolonial urban landscapes, 46 where gateways came to represent not just heritage, but also claims to space, identity, 47 and continuity in changing political and economic contexts (Tan, 2007). 48 Binondo, officially established in 1594 under Spanish colonial rule, has evolved into a 49 dense, mixed-use district spanning approximately 66 hectares (City of Manila, 2020). 50 It remains a hub of Chinese-Filipino commerce and identity but is also characterized 51 by infrastructure congestion, inconsistent heritage regulation, and visual disarray, 52 making its monumental Pailous tools for cultural recognition. Meanwhile, George 53 Town—formally established in 1786 following British acquisition and named in 54 honour of King George III—has a UNESCO-designated core zone of 109 hectares 55 and a buffer zone of 150 hectares, and it retains a formal heritage management plan 56 that emphasizes multicultural layering, architectural continuity, and community-based 57 conservation (UNESCO, 2008). Unlike Binondo, George Town does not employ a 58 monumental gateway to assert district-wide boundaries. Instead, its urban identity is 59 articulated through a network of dispersed ceremonial markers embedded within 60 specific cultural enclaves. Each gateway is designed uniquely and contextually, 61 reflecting their embeddedness within distinct cultural enclaves and the city's 62 conserved, multicultural fabric. These gateways respond

to their immediate spatial 63 environments, serving as intimate, localized markers rather than grand district-scale 64 placemakers. 65 Study Site 66 This study compares the roles of ceremonial gateways in Binondo, Manila and 67 George Town, Penang, using visual and spatial analysis to investigate how these 68 structures mediate cultural identity in their respective urban contexts. In Binondo, the 69 gateways stand as monumental boundary markers—anchoring visibility in an 70 increasingly vertical and chaotic commercial landscape. In George Town, the 71 gateways are internally embedded within ethnic enclaves, and integrated into the 72 surrounding architectural typologies of late 19th- to early 20th-century shophouses, 73 temples, and clan associations (Yeoh, 2001; Logan, 2002). These differences are 74 reflective not only of architectural traditions but also of divergent governance 75 regimes, urban development pressures, and diasporic strategies for cultural continuity. 76

77 Figure 1. Map of Binondo Showing Location of Gateways 78 Binondo is marked by four key gateways that serve as symbolic thresholds into the 79 district. The most prominent, the Binondo Chinatown Welcome Arch, stands at the 80 southern entry via Jones Bridge. It signals the transition from Manila's civic core into 81 Chinatown. Further along Quintin Paredes Street is the Filipino-Chinese Friendship 82 Arch, a more modest structure symbolizing the longstanding relationship between 83 Chinese migrants and Filipino society. Blending cultural motifs from both traditions, 84 it functions as an intermediary threshold guiding visitors deeper into Binondo. 85 Ongpin Street, the cultural spine of the district, is framed by two smaller pailou-style 86 arches that both cross the Estero de la Reina. The Ongpin North Bridge Arch, near 87 Sta. Cruz Church, marks the intersection of Spanish colonial and Chinese cultural 88 zones, symbolizing a confluence of spiritual and historical identities. The Ongpin 89 South Bridge Arch concludes this sequence, reinforcing Binondo's boundary and 90 enhancing spatial orientation. 91 Together, these four gateways offer a narrative of identity, memory, and movement. 92 More than boundary markers, they shape the experience of Binondo as a living 93 cultural

landscape (Yap, 2021). 94 Beyond these core gateways, the Arch of Solidarity in San Nicolas and the Arch of 95 Goodwill near Sta. Cruz also contribute to the broader narrative of Chinatown's 96

  heritage. However, their locations beyond Binondo's traditional boundary distinguish 97 their spatial role. While acknowledging their cultural significance, this study focuses 98 on the four main gateways that directly frame Binondo district's entrances, 99 emphasizing their function as central spatial and cultural thresholds. 100 Unlike Binondo's monumental arches, which function as territorial placemakers 101 asserting visibility and cultural presence amid urban congestion, George Town's 102 gateways operate as internalized, context-sensitive spatial cues. 103 This study focuses on four representative examples—the Campbell Street Gateway, 104 the Little India Arch, the Zhang Clan Qinghe Hall Gateway, and the Lee Jetty Arch— 105 each of which articulates cultural identity at the enclave scale rather than serving as 106 district-wide boundary monuments. 107 108 Figure 2. Map of George Town Showing Location of Gateways 109 Located in the heart of George Town's Indian-Muslim quarter, the Little India 110 Gateway sits within a commercial and religious node characterized by Tamil Muslim 111 businesses, Hindu temples (notably Sri Mahamariamman Temple), and festive street 112 culture (Khoo, 2014). The area lies within the UNESCO Core Zone and is designated 113 a Cultural District under the George Town World Heritage Site Special Area Plan. 114 Situated at the convergence of Chinese trading corridors, this site historically hosted 115 Cantonese and Hokkien commercial activity. Campbell Street was once Penang's red116

  light district and now functions as a vibrant textile and gold retail stretch (Lee & 117 Wong, 2022). The area falls in the Buffer Zone, just outside the UNESCO core, 118 allowing more development flexibility while retaining vernacular shoplots. 119 The Qinghe Zhang Clan Association Hall, built in 1906, serves as a focal point for 120 Hokkien Zhang lineage members. The gateway entrance into the hall complex is 121 deeply internalized,

reflecting traditional Southern Chinese courtyard typology. 122 The Lee Jetty is one of six Chinese clan jetties built in the late 19th century by 123 Hokkien settlers. Its entrance arch leads into a floating stilt-house community, where 124 architecture adapts to tidal and fluvial conditions (Logan, 2002; Khoo, 2014). The site 125 is recognized under the George Town SAP as living intangible heritage, vulnerable to 126 tourism pressures and sea-level rise. 127 Rationale 128 Unlike Binondo, which uses monumental pailou arches to mark territorial boundaries 129 and reclaim visibility amid modern congestion, George Town's gateways operate as 130 internalized spatial cues. Their diversity of placement, proportion, and symbolism is a 131 direct outcome of its UNESCO-led conservation model, emphasizing authenticity, 132 continuity, and inclusivity over spectacle (UNESCO, 2008; ICOMOS, 2011). 133 Amid accelerating urban pressures, this study examines how these gateways frame 134 experience, express identity, and negotiate heritage within their distinct contexts. By 135 comparing their design and spatial roles, the research aims to inform sustainable 136 heritage conservation and urban design strategies that balance tradition with 137 contemporary urban realities. 138 1. Review of Related Literature 139 Ceremonial gateways in heritage districts are not merely decorative constructs; they 140 serve as vital spatial and cultural thresholds that mediate identity, guide orientation, 141 and frame collective memory. Scholars across urban morphology, semiotics, and 142 environmental perception agree that the effectiveness of a gateway lies in its ability to 143 articulate symbolic meaning while being legibly embedded within the urban fabric. 144 Stevens and Thai (2024) assert that gateways function most successfully when 145 morphologically aligned with coherent urban patterns—such as axial continuity, 146 consistent façade lines, and rhythmic street interfaces—ensuring that the structure 147 maintains visibility and reinforces wayfinding. This echoes Lynch's (1960) theory of 148 imageability, where distinct urban elements enhance a city's cognitive legibility. 149 Expanding on the symbolic dimension, Ying and Liu (2025) argue that gateways act 150 as ideological signifiers whose meanings are not fixed but evolve alongside 151 sociopolitical contexts. They anchor the intangible aspects of identity—rituals, 152

migration memory, and cultural resilience—within physical thresholds. These insights 153 are particularly relevant in diasporic settings like Binondo and George Town, where 154 hybrid identities emerge through layered architectural signifiers. 155 Tan (2023) foregrounds the perceptual dimension of gateways, noting that spatial 156 enclosure, skyline harmony, and uninterrupted sightlines are necessary for 157 maintaining visual salience—especially in congested heritage districts. This is 158 reinforced by Rui and Cheng's (2023) spatial metrics framework, which empirically 159 demonstrates that lower visual entropy and higher enclosure indices correlate with a 160 stronger sense of place, pedestrian comfort, and symbolic clarity. 161 In Binondo, the symbolic presence of its Pailou arches is diminished by signage 162 saturation, visual clutter, and intrusive modern infrastructure. Such conditions obscure 163 their intended role as cultural landmarks, underscoring the importance of strategic 164 spatial framing to safeguard their legibility within the urban fabric. Conversely, in 165 George Town, Penang, the absence of monumental boundary-marking arches and the 166 preference for embedded, site-specific gateways reflects a different conservation 167 approach—favoring integrative, community-scaled interventions within a UNESCO168 regulated urban core (UNESCO, 2008). 169 Together, these scholarly perspectives highlight a crucial intersection: for gateways to 170 be effective in shaping cultural landscapes, they must balance symbolic meaning with 171 spatial clarity. This research adopts this dual framework—symbolic and spatial—as a 172 lens for comparing how Binondo and George Town articulate heritage through their 173 gateway typologies under differing urban governance regimes and morphological 174 contexts. 175 2. Research Objectives 176 This study aims to examine how ceremonial gateways in Binondo, Manila, and 177 George Town, Penang, function as spatial and symbolic mediators of cultural identity 178 within their respective urban and heritage contexts. Drawing from Lynch's (1960) 179 theory of environmental legibility and Tuan's (1977) phenomenology of place, the 180 research investigates how the design, scale, placement, and framing strategies of 181 Binondo's monumental Pailou arches contrast

with George Town's dispersed and 182 context-specific thresholds. 183 The study examines how these gateways function as cultural markers of identity and 184 memory, shaped by diasporic traditions and differing governance—from Manila's 185 fragmented growth to George Town's UNESCO-guided conservation (ICOMOS, 186 2011). Drawing on Stevens and Thai (2024) and Ying and Liu (2025), it highlights 187 how spatial clarity, symbolic coherence, and contextual integration enhance their role 188 as urban placemakers. 189

Ultimately, this comparative analysis seeks to develop a spatial-heritage framework 190 that underscores the significance of legibility in understanding how gateways mediate 191 between tradition and modernity within multicultural urban environments. 192 3. Methodology 193 3.1 Spatial Data Acquisition 194 To facilitate the spatial and visual analysis of the selected gateways in Binondo, 195 Manila and George Town, Penang; photographic documentation was undertaken. The 196 gateways were photographed from a standardized eye-level height of approximately 197 1.50 meters, simulating an average pedestrian's perspective. A viewing distance of 198 roughly 8 - 10 meters was maintained from the side of the pedestrian approach, 199 aligning with standard practices in streetscape perception studies where consistent 200 sightlines are critical to comparative analysis (Li et al., 2020). 201 The documentation took place during daylight hours, a temporal setting chosen to 202 reflect typical levels of pedestrian activity and ambient lighting. These spatial and 203 temporal parameters were implemented to ensure that the resulting imagery 204 constitutes a valid and reliable dataset for subsequent visual and spatial index 205 analysis. 206 3.1 Selection of Evaluation Indicators 207 To analyze the spatial and visual characteristics of each gateway, this study employed 208 the Street Landscape Evaluation Index (SLEI). Originally developed from visibility 209 based landscape perception metrics such as the Green View Index (Li, Ratti, & 210 Seiferling, 2015), the framework has since been extended in urban morphological 211 research to include additional indicators of sky, road, and building visibility (e.g., Guo 212 et al., 2025;

Liu et al., 2024). These indices have proven effective in capturing how 213 streetscapes are perceived in terms of openness, greenery, accessibility, and enclosure, 214 making them particularly relevant for assessing heritage gateways situated within 215 dense urban contexts. 216 The following four indices were selected based on their applicability to the acquired 217 photographic data: 218 ● Green Visual Index (GVI): Proportion of visible green elements (primarily 219 vegetation), used as a proxy for environmental quality and visual comfort. 220 221 ● Sky Open Index (SOI): Proportion of visible sky, indicating spatial openness 222 and vertical permeability. 223 224 ● Spatial Enclosure Index (SEI): Proportion of midground built structures 225 (e.g., facades, walls, fences), contributing to the perceived degree of 226

enclosure. 227 228 ● Road Area Index (RAI): Proportion of paved circulation surfaces in the 229 foreground, reflecting accessibility and functional movement space. 230 Each metric was derived from street-view photographs using manual visual 231 classification rather than automated semantic segmentation. This approach ensured 232 accuracy given the modest dataset and the architectural specificity of heritage 233 gateways, aligning with established practices in streetscape evaluation research. 234 0.2 Visual Attribute Quantification 235 Each photographic image was imported into Adobe Photoshop, where a fixed 236 analytical frame was established, demarcated by the openings of the gateway— 237 framing the subject view. Within this frame, the image was segmented into the four 238 primary landscape components: green (vegetation), sky (open air), middleground 239 (built or vegetative enclosures), and road (paved foreground). Each component was 240 quantified by measuring the number of pixels it occupied relative to the total image 241 area. 242 Step 1: Open the image in Adobe Photoshop 243 244 Figure 3. Screenshot of Adobe Photoshop interface displaying the subject gateway image file 245 Step 2: Demarcate the view framed by the arch using a lasso tool 246

247 Figure 4. Screenshot of Adobe Photoshop interface displaying the subject gateway

image file 248 Step 3: On the menu bar above, click image > analysis > record measurements 249 250 Figure 5. Screenshot of the Adobe Photoshop interface displaying the subject gateway image 251 file, and showing the process of visual attribute quantification 252 Step 4: A measurement log panel will appear below the screen where the number of 253 pixels will be displayed. Log down the total area of pixels. 254 255

Figure 6. Screenshot of Adobe Photoshop interface displaying the subject gateway image 256 file, and showing the process of visual attribute quantification 257 Step 5: In the same manner, demarcate all segments composing the frame based on 258 each corresponding index, and record the pixel measurement. 259 260 Figure 7. Screenshot of Adobe Photoshop interface displaying the subject gateway image 261 file, and showing the process of visual attribute quantification 262 These pixel-based measurements recorded were normalized as percentage values to 263 ensure cross-comparability among images. The quantified data were systematically 264 tabulated, 1 with each row representing one gateway and each column corresponding to 265 an individual visual index. 266 3.3 Comparative Synthesis and Interpretation 267 Following data quantification, a comparative synthesis was conducted to analyze 268 variations in spatial composition, environmental quality, and visual structure across 269 the four gateways. This multi-index evaluation provides an evidence-based 270 framework for interpreting the spatial composition created within monumental 271 thresholds that hold key identity of the cultural fabric. 272 4. Results and Discussion 273 In this study, the gateways of Binondo and George Town are examined not just as 274 structures, but as lived spaces shaped by both tradition and modern urban life. Using 275 measures such as the Spatial Enclosure Index (SEI), Green Visual Index (GVI), Sky 276 Open Index (SOI), and Road Area Index (RAI), the analysis shows how each gateway 277 balances heritage symbolism with the practical realities of a changing city. 278 4.1 Binondo 279

The gateways in Binondo reflect the area's role as a commercial and cultural hub, 280

with forms that emphasize visibility and symbolic entry. The following results present 281
their spatial indices, showing how enclosure, greenery, sky openness, and road space 282
shape the experience of Manila's Chinatown. 283 The Chinatown Binondo Welcome Arch
presents a moderately enclosed spatial 284 composition, with a Spatial Enclosure Index of
66%, giving it a strong sense of 285 framed entry typical of ceremonial gateways. The
Green Visual Index at 15% adds a 286 subtle layer of softness to its visual impact,
suggesting some landscape presence— 287 likely from nearby trees or planting strips.
However, with a Sky Open Index of only 288 3%, the background is heavily compressed,
creating a dense urban foreground that 289 may limit visual relief. Its Road Area Index of
16% balances circulation needs with 290 visual massing, closely aligning with the ideal
framing proportions. 291 292 Figure 8. Framing analysis of the Chinatown Binondo
Welcome Arch, illustrating the 293 delineated Street Landscape Enclosure Indices (SLEIs).
294 295 Chinatown Binondo Welcome Arch Pixels Percentage Green Visual Index
371,287.50 15% Road Area Index 396,040.00 16% Sky Open Index 74,257.50 3% Spatial
Enclosure Index 1,633,665.00 66% Total 2,475,250.00 100% Table 1. Quantitative values
and proportional distribution of Street Landscape Enclosure 296 Indices (SLEIs) within the
visual frame of the Chinatown Binondo Welcome Arch. 297 The Filipino-Chinese
Friendship Arch demonstrates a high level of spatial 298 compression, with a 69% Spatial
Enclosure Index and minimal Green Visual (5%) 299

 and Sky Open (4%) Indices. The high degree of enclosure contributes to a dense 300
spatial character, limiting openness and reducing environmental softness. The Road 301
Area Index, at 22%, slightly exceeds the ideal, suggesting a broader foreground space 302
that offsets the tight enclosure of the background and middleground. Overall, the 303
space conveys a rigid, urban character with limited spatial permeability. 304 305 Figure 9.
Framing analysis of the Filipino-Chinese Friendship Arch, illustrating the 306 delineated
Street Landscape Evaluation Indices (SLEIs). 307 308 Filipino-Chinese Friendship
Arch Pixels Percentage Green Visual Index 994,035.50 5% Road Area Index 218,687.81

22% Sky Open Index 795,228.40 4% Spatial Enclosure Index 13,717,689.90 69% Total 19,880,710.00 100% Table 2. Quantitative values and proportional distribution of Street Landscape Enclosure 309 Indices (SLEIs) within the visual frame of the Filipino-Chinese Friendship Arch. 310 The Ongpin North Bridge Arch demonstrates a particularly high level of spatial 311 enclosure at 85%, creating a tightly framed, corridor-like spatial experience. The 312 complete absence of greenery and sky (0% Green Visual and Sky Open Index) 313 reinforces a visually compressed environment, where architectural elements and 314 building edges dominate the experience. The 15% Road Area Index supports this 315 sense of constraint, close to the ideal ratio but reinforcing a narrow, enclosed 316 threshold. 317

318 Figure 10. Framing analysis of the Ongpin North Bridge Arch, illustrating the delineated 319 Street Landscape Evaluation Indices (SLEIs). 320 321 Ongpin North Bridge Arch Pixels Percentage Green Visual Index 3,896,881.80 28% Road Area Index 4,175,230.50 30% Sky Open Index 695,871.75 5% Spatial Enclosure Index 5,149,450.95 37% Total 13,917,435.00 100% Table 3. Quantitative values and proportional distribution of Street Landscape Evaluation 322 Indices (SLEIs) within the visual frame of the Ongpin North Bridge Arch. 323 In contrast, the Ongpin South Bridge Arch presents no measurable GVI and a 324 significantly high Spatial Enclosure Index (SEI), producing a much more confined 325 visual experience. Unlike its northern counterpart, this arch is situated immediately 326 after the crossing, making its approach more compressed and abrupt. 327

328 Figure 11. Framing analysis of the Ongpin South Bridge Arch, illustrating the delineated 329 Street Landscape Evaluation Indices (SLEIs). 330 331 Ongpin South Bridge Arch Pixels Percentage Green Visual Index 0.00 0% Road Area Index 1,914,064.20 15% Sky Open Index 0.00 0% Spatial Enclosure Index 10,846,363.80 85% Total 12,760,428.00 100% Table 4. Quantitative values and proportional distribution of

Street Landscape Evaluation 332 Indices (SLEIs) within the visual frame of the Ongpin South Bridge Arch. 333 334 4.2 George Town 335 In George Town, the gateways are smaller in scale and integrated into the conserved 336 streetscape. The following data highlights how their spatial indices capture variations 337 in enclosure, vegetation, openness, and circulation within the city's heritage setting. 338 The Little India Gateway offers a well-balanced spatial experience, aligning closely 339 with ideal framing values. The 10% Green Visual Index reflects the presence of 340 modest vegetation—enough to soften the urban environment and symbolically anchor 341 the gateway to the vibrant, sensory landscape of Little India. Its high Sky Open Index 342 (40%) suggests a generous vertical openness, enabling the gateway to visually project 343 against the skyline. 344 Meanwhile, the moderate Spatial Enclosure Index (35%) and relatively low Road 345 Area Index (15%) foster a pedestrian-friendly and culturally engaging threshold. In 346 George Town's multicultural context, this spatial openness allows the gateway to 347

  represent Indian-Malay identity without overt monumentality. It aligns with urban 348 theories that value visual access and human-scale openness in pluralistic cities 349 (Madanipour, 1996). As an urban threshold, it enhances identity without exclusion, 350 echoing the spirit of George Town's UNESCO World Heritage designation that 351 celebrates layered cultural expressions (UNESCO, 2008). 352 353 Figure 12. Framing analysis of the Little India Arch, illustrating the delineated Street 354 Landscape Enclosure Indices (SLEIs). 355 Little India Pixels Percentage Green Visual Index 311,035.10 10% Road Area Index 465,403.00 15% Sky Open Index 1,244,140.40 40% Spatial Enclosure Index 1,088,622.85 35% Total 3,110,351.00 100% Table 5. Quantitative values and proportional distribution of Street Landscape Enclosure 356 Indices (SLEIs) within the visual frame of the Little India Arch. 357 This gateway demonstrates the closest alignment with ideal framing proportions, 358 acting as a quiet but effective urban threshold. The 10% greenery and 17% road index 359 reflect a tightly controlled urban environment—visually structured but not overly 360 dominated by infrastructure. Its 34% Sky Open Index

provides sufficient upward 361 visibility, offering a sense of openness without diminishing the urban enclosure. With 362 a Spatial Enclosure Index of 39%, nearly ideal, the gateway strikes a strong balance 363 between containment and openness. 364

365 Figure 13. Framing analysis of the Medan Lebuh Campbell Arch, illustrating the delineated 366 Street Landscape Evaluation Indices (SLEIs). 367 368 Medan Lebuh Campbell Pixels Percentage Green Visual Index 238,353.20 10% Road Area Index 396,900.00 17% Sky Open Index 810,400.88 34% Spatial Enclosure Index 929,577.48 39% Total 2,383,532.00 100% Table 6. Quantitative values and proportional distribution of Street Landscape Evaluation 369 Indices (SLEIs) within the visual frame of the Medan Lebuh Campbell Arch. 370 Unlike other gateways, the Zhang Clan Qinghe Hall Arch exhibits extreme values that 371 suggest a highly introverted, enclosed spatial character. With 0% green and 0% sky 372 visibility, the space reads more like an internal courtyard or cloistered heritage 373 enclave. The 33% road area further reinforces this hard-surfaced, possibly ceremonial 374 spatial quality. The defining feature is its very high Spatial Enclosure Index (67%), 375 making it the most enclosed space of the four. 376 This spatial logic reflects traditional Chinese clan hall architecture, where gateways 377 are designed to protect, mark lineage, and preserve memory, rather than to invite 378 public interaction or frame large urban views. This arch functions as an inward-facing 379 cultural marker, more about lineage and heritage preservation than urban wayfinding 380 or boundary declaration. 381

382 Figure 14. Framing analysis of the Zhang Clan Qinghe Hall Arch, illustrating the delineated 383 Street Landscape Evaluation Indices (SLEIs). 384 385 Zhang Clan Qinghe Hall Arch Pixels Percentage Green Visual Index 0.00 0% Road Area Index 768,940.26 33% Sky Open Index 0.00 0% Spatial Enclosure Index 1,561,181.74 67% Total 2,330,122.00 100% Table 7. Quantitative values and proportional distribution of Street Landscape Evaluation 386 Indices (SLEIs) within the visual frame of the Zhang Clan

Qinghe Hall Arch. 387 The Lee Jetty Arch, situated within the Chinese clan jetty settlement, blends cultural 388 specificity with organic spatiality. With 11% greenery, it slightly exceeds the ideal, 389 softening the jetty's entrance and connecting it to the waterfront. The Sky Open Index 390 of 29% suggests a moderately framed vertical view—important for emphasizing the 391 arch and signifying entry into a unique semi-public space. 392 The Road Area Index (27%) is relatively high, reflecting the utilitarian nature of jetty 393 settlements, where pedestrian and logistical uses coexist in a compact space. Yet the 394 Enclosure Index (33%) remains within comfortable bounds, creating a sense of 395 closeness. The archway leads to a series of arches, leading to a wooden dock that 396 extends toward the sea. 397

398 Figure 15. Framing analysis of the Lee Jetty Clan Arch, illustrating the delineated Street 399 Landscape Evaluation Indices (SLEIs). 400 401 Lee Jetty Clan Arch Pixels Percentage Green Visual Index 540,272.81 11% Road Area Index 1,326,124.17 27% Sky Open Index 1,424,355.59 29% Spatial Enclosure Index 1,620,818.43 33% Total 4,911,571.00 100% Table 8. Quantitative values and proportional distribution of Street Landscape Evaluation 402 Indices (SLEIs) within the visual frame of the Lee Jetty Clan Arch. 403 4.3 Synthesis 404 The comparison of Binondo and George Town's gateways through the Street 405 Landscape Evaluation Indices (SLEIs) highlights two different urban logics—one 406 rooted in monumentality and compression, the other in proportionality and 407 permeability. 408 4.3.1 Spatial Enclosure Index (SEI) 409 Binondo's gateways register consistently high SEIs, from 66% up to 85% (figures 8, 410 9, 10 and 11). This creates dense, corridor-like thresholds, where legibility is partially 411 compromised by visual clutter. The effect, however, is a compressed urban 412 environment that often overwhelms pedestrian scale. In George Town, by contrast, the 413 SEI ranges from 33% to 67%, producing thresholds that are enclosed enough to 414 signify identity yet open enough to maintain accessibility and comfort (figures 12, 13, 415 14 and 15). The more moderate values reflect George Town's sensitivity to human 416 scale and its integration

into heritage streetscapes. 417

   4.3.2 Green Visual Index (GVI) 418 Greenery is minimal in the four Binondo gateways, rarely exceeding 15% and in some 419 cases disappearing altogether (figures 8, 9, 10 and 11). This absence reinforces a hard, 420 urban quality where vegetation plays little role in shaping the experience. George 421 Town's gateways, meanwhile, consistently register around 10–11% GVI (figures 12, 422 13, 14 and 15). Though modest, this layer of greenery softens the built environment, 423 offering visual comfort and a sense of cultural connection without disrupting 424 architectural rhythm. 425 4.3.3 Sky Open Index (SOI) 426 Perhaps the sharpest contrast appears in sky openness. As shown in figures 8, 9, 10 427 and 11, Binondo's gateways record very low SOIs—typically between 0% and 4%— 428 which reinforces their heavy enclosure and compresses upward views. This visual 429 density heightens monumentality but limits perceptual relief. George Town, by 430 comparison, demonstrates far greater openness, with SOIs ranging from 29% to 40% 431 (figures 12, 13, 14 and 15). This vertical breathing space allows gateways to project 432 against the skyline, improving legibility, orientation, and pedestrian recognition. 433 4.3.4 Road Area Index (RAI) 434 Binondo's road indices fall within a narrow range of 15%–22%, aligning with 435 circulation requirements but functioning largely as utilitarian forecourts to 436 monumental structures (figures 8, 9, 10 and 11). In George Town, the RAI varies 437 more widely from 15% to 33%, reflecting adaptation to different cultural settings— 438 from clan halls with ceremonial forecourts to jetty settlements where circulation is 439 both functional and symbolic (figures 12, 13, 14 and 15). These variations highlight 440 George Town's flexibility in embedding gateways within lived environments rather 441 than staging them as isolated monuments. 442 443 Taken together, Binondo's SLEIs highlight patterns of enclosure and compression, 444 where spatial thresholds are shaped by dense urban fabric. This density reinforces 445 cultural identity by intensifying the experience of passage and emphasizing gateways 446 as symbolic anchors within the crowded landscape. George Town, by contrast, relies 447 on balance—moderate enclosure,

modest greenery, generous openness, and adaptive 448 circulation—to create gateways that are less about monumental assertion and more 449 about permeability, contextual integration, and pedestrian experience. 450 4. Conclusion and Recommendations 451 The comparative spatial analysis of gateways in Binondo and George Town reveals 452 profound insights into how architectural framing mediates cultural identity, legibility, 453 and spatial experience in heritage districts. 454 In Binondo, the dominant spatial language of its gateways—exemplified by the 455 Chinatown Binondo Welcome Arch and the Filipino-Chinese Friendship Arch—is 456 marked by high enclosure, limited sky openness, and minimal greenery. This results 457 in dense, compressed visual fields that emphasize monumentality but often 458 compromise perceptual clarity and environmental comfort (figure 16). 459

460 Figure 16. Comparative analysis of the Street Landscape Enclosure Indices (SLEIs) of the 461 Binondo Gateways 462 In contrast, the gateways of George Town—exhibit a more calibrated spatial 463 composition that foregrounds permeability, cultural legibility, and environmental 464 balance. The Little India Gateway, for example, achieves a well-proportioned Spatial 465 Enclosure Index (35%) while offering generous vertical openness (Sky Open Index of 466 40%) and a modest but effective layer of greenery (10%). This spatial configuration 467 supports not only symbolic legibility but also pedestrian comfort and ecological relief 468 (figure 17). 469 470 Figure 17. Comparative analysis of the Street Landscape Enclosure Indices (SLEIs) of 471 George Town's Gateways 472

Such proportionality reflects Madanipour's (1996) notion of urban thresholds that 473 prioritize human-scale accessibility and multisensory engagement. 474 Importantly, the spatial legibility of George Town's gateways does not rely on 475 monumental scale but on contextual alignment, architectural rhythm, and the capacity 476 to mediate transitions—both physical and symbolic—between different zones of 477 identity. In contrast to Binondo, where gateways are strategically placed at boundary 478 thresholds

to signify entry, George Town's island geography naturally defines its 479 spatial boundaries, reducing the necessity for a monumental marker. 480   481 Figure 18. Combined Radar Chart comparing the Street Landscape Enclosure Indices 482 (SLEIs) of Binondo's and George Town's Gateways 483 Figure 18 presents a radar chart comparing the Street Landscape Evaluation Index 484 (SLEI) values of gateways in Binondo (red hues) and George Town (blue hues) 485 against the ideal framing proportions (dashed black line). The axes represent four key 486 spatial components—green visual index, road area, sky openness, and spatial 487 enclosure. Binondo's gateways tend toward high spatial enclosure with limited sky 488 openness, emphasizing density and compression, while George Town's gateways 489 show greater balance across indices, more closely approximating the ideal framing 490 conditions. The figure highlights contrasting spatial logics that shape cultural 491 legibility and placemaking in these heritage districts. 492

The findings in this study thus reinforce a broader theoretical proposition: that 493 gateways in multicultural heritage landscapes should be evaluated not just for their 494 aesthetic or symbolic content, but for their spatial performativity—how they guide 495 perception, and support orientation in built form. It also underlines the value of 496 quantitative spatial metrics, such as the Street Landscape Enclosure Indices (SLEIs), 497 1 in the context of environmental coherence, especially in cultural districts. 498 Building on the findings of this study, future research should adopt a reverse visual 499 corridor analysis to examine how these gateways are perceived from key vantage 500 points within and around the district. This approach shifts the focus from viewing 501 outward to the gateways to assessing how they function as visible spatial markers 502 when approached from key public spaces, nodes, and peripheral streets. Such analysis 503 can provide valuable insights into the legibility and symbolic anchoring of these 504 gateways within the broader urban landscape (Lynch, 1960; Nasar, 1998). 505 Longitudinal and ethnographic studies are recommended as it is essential to unravel 506 how the symbolic meanings and social functions of these gateways evolve amid 507 shifting political,

economic, and social landscapes (Ying & Liu, 2025). Archival 508 research combined with oral histories could contextualize these transformations, 509 offering critical insights into the contested processes of heritage preservation and 510 urban change. 511 Finally, the development of participatory design toolkits tailored to multicultural 512 heritage contexts can empower local communities and planners to collaboratively 513 shape gateway spaces that balance monumental visibility with contextual sensitivity, 514 fostering urban thresholds that are meaningful, inclusive, and resilient (Stevens & 515 Thai, 2024). 516 In sum, this comparative study not only advances the spatial and cultural 517 understanding of heritage gateways but also challenges all stakeholders to enact more 518 accountable, culturally grounded, and environmentally responsive urban design 519 strategies. The future of these gateways lies in their capacity to be simultaneously 520 iconic and inhabitable—spaces that are not only framed visually but lived, 521 remembered, and continually reinterpreted by the communities they serve. 522 523 References 524

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