

Article

Evolution of Public Pedestrian Pathways as Semi-Public Infrastructure in Sejong City, Korea

Minseop Lee ¹ and Twoone Yoon ^{2,*}

¹ Planning and Coordination Division, Korea Planning Association, Multifunctional Administrative City, Sejong 30121, Republic of Korea; sabimin@happycity2030.or.kr

² Department of Urban Engineering, Chungbuk National University, Cheongju 28644, Republic of Korea

* Correspondence: zuzic21@chungbuk.ac.kr

Abstract

Public pedestrian pathways have been widely adopted in planned cities to improve walkability and strengthen connections between residential areas and public spaces. However, existing studies have largely focused on management issues and post-occupancy privatization, with limited attention given to how these pathways evolve throughout the planning and development process. This study investigates the evolution of public pedestrian pathways in Sejong City, Korea, a state-led planned city developed through a phased planning system. Based on district unit plans, design competition guidelines, detailed design documents, as-built drawings, aerial imagery, and field verification of implemented conditions, the study analyzes the changing planning objectives, spatial characteristics, and functional roles of public pedestrian pathways across five planning generations. The results reveal three major trends. First, public pedestrian pathways evolved from lot-level circulation routes into integral components of neighborhood- and city-scale pedestrian networks linking parks, green corridors, schools, and community facilities. Second, planning approaches were continuously refined through district unit planning, housing design competitions, and implementation experience, leading to increasingly integrated and strategic spatial configurations. Third, the growing integration of public pedestrian pathways with community facilities, public open spaces, and green infrastructure transformed them from simple movement corridors into semi-public infrastructure intended to support social interaction and everyday community life. The findings suggest that public pedestrian pathways function not merely as circulation facilities but as planning mechanisms that enhance urban openness, connectivity, publicness, and community integration. The study demonstrates how public pedestrian pathways can evolve into semi-public infrastructure through the cumulative refinement of planning across successive planning generations and provides planning implications for future pedestrian-oriented urban development.



Academic Editor: Thomas Panagopoulos

Received: 14 June 2026

Revised: 21 July 2026

Accepted: 23 July 2026

Published: 28 July 2026

Copyright: © 2026 by the authors.

Licensee MDPI, Basel, Switzerland.

This article is an open access article distributed under the terms and conditions of the [Creative Commons Attribution \(CC BY\)](https://creativecommons.org/licenses/by/4.0/) license.

Keywords: semi-public space; pedestrian pathway; walkability; community integration; connectivity; planned city; Sejong City

1. Introduction

1.1. Research Background

In recent years, increasing attention has been paid to the concept of the walkable city as a key strategy for promoting sustainability, public health, and social inclusion in urban planning. Walkability is no longer understood merely as the provision of pedestrian facilities but as a multidimensional concept encompassing accessibility, connectivity, land-use

diversity, and the activation of public spaces [1]. Consequently, the creation of pedestrian-oriented environments has become a fundamental objective for achieving sustainable urban development. In this study, walkability is interpreted from a spatial-planning perspective, focusing on the continuity, accessibility, and connectivity of the urban pedestrian network rather than on user-specific behavioral characteristics.

Within this context, public pedestrian pathways have emerged as an important planning instrument for enhancing urban walkability. These pathways are generally introduced in large-scale development projects to mitigate pedestrian detours caused by oversized blocks and to improve pedestrian accessibility between residential areas and surrounding urban facilities. Larger urban blocks generally increase pedestrian travel distances, whereas the provision of internal pedestrian pathways can significantly improve pedestrian accessibility and walking environments even within large development blocks [2]. Accordingly, in this study, “oversized blocks” refers to development blocks whose spatial configuration requires pedestrians to make substantial detours because direct pedestrian routes through the block are unavailable, rather than to a fixed dimensional or population-density threshold. According to the Korean Guidelines for District Unit Planning, public pedestrian pathways are intended to secure convenient pedestrian access by providing publicly accessible routes through large development parcels [3]. Beyond their transportation function, public pedestrian pathways can support a variety of urban activities depending on their spatial configuration and relationship with surrounding land uses [4,5]. As such, they contribute to the continuity, permeability, and integration of urban pedestrian networks.

Contemporary urban environments are increasingly characterized by blurred boundaries between public and private spaces. Consequently, growing attention has been directed toward intermediate realms located between these two domains. Such spaces have been conceptualized as semi-public spaces and recognized as important settings for urban connectivity, social interaction, and the formation of public life [6,7]. Urban vitality is increasingly understood to emerge not only through movement but also through opportunities for staying, observing, and interacting [8]. From this perspective, public pedestrian pathways within residential developments can be regarded as a representative form of semi-public space because they are located on privately controlled land while remaining accessible to the public. As a result, they influence urban openness, connectivity, and community formation.

Recent studies have increasingly emphasized the importance of network-level connectivity rather than individual pedestrian facilities. Pedestrian networks are now understood as interconnected systems that structure urban movement patterns and support spatial integration [9]. At the neighborhood scale, pedestrian connectivity has also been shown to facilitate social interaction and strengthen community relationships among residents [10]. Accordingly, public pedestrian pathways should be understood not merely as individual pedestrian facilities but as critical components of broader urban pedestrian networks.

The Multifunctional Administrative City (Sejong City) in South Korea provides a particularly valuable case for examining the evolution of public pedestrian pathways. Planned as a transit-oriented and pedestrian-oriented national new town, Sejong City adopted an integrated pedestrian network strategy from its inception. Unlike many planned cities that were developed within a relatively short timeframe, Sejong City has been implemented sequentially through multiple district unit plans since 2007. This process has allowed the same planning element to be repeatedly applied, modified, and refined across twenty residential districts over nearly two decades. Consequently, Sejong City offers a unique opportunity to investigate how public pedestrian pathways have evolved in response to changing planning objectives, urban conditions, and community needs throughout the phased development process of a planned city.

1.2. Previous Studies and Research Gap

Existing studies on public pedestrian pathways can be broadly categorized into three research streams.

The first stream focuses on legal regulations and institutional governance. Previous studies have examined the legal implications of closing public pedestrian pathways, identified limitations in the existing regulatory framework, and proposed institutional measures to ensure their public function [11].

The second stream addresses privatization and conflicts over pedestrian access rights. Research has reported cases in which public pedestrian pathways within residential developments were partially restricted or closed by residents and management bodies, revealing tensions between public accessibility and private control. Improvement measures based on Crime Prevention Through Environmental Design (CPTED) principles have also been suggested [12].

The third stream examines the social role of public pedestrian pathways within residential environments. Existing studies have highlighted the growing importance of neighborhood-scale pedestrian living areas and emphasized the role of public pedestrian pathways as intermediary spaces connecting privatized residential domains with the broader public realm [13].

Beyond public pedestrian pathways, extensive international research has investigated walkability [1], semi-public space [6], public space [7,8], and pedestrian networks [9,10]. These studies have significantly contributed to understanding the quality of pedestrian environments, the formation of publicness, social interaction, and the spatial structure of urban networks. However, most previous studies have focused on spatial characteristics, management issues, or user behavior at a specific point in time. Consequently, limited attention has been paid to how public pedestrian pathways evolve throughout the long-term development process of planned cities.

Moreover, previous research has generally approached public pedestrian pathways as individual facilities or management objects rather than as components of a broader urban system. As a result, insufficient attention has been given to their role within neighborhood-scale pedestrian networks and community structures. In particular, few studies have examined how public pedestrian pathways function as semi-public spaces where public and private interests intersect, or how they integrate pedestrian connectivity, publicness, and community functions over time.

Furthermore, longitudinal studies tracing the evolution of the same planning element across multiple phases of urban development remain rare. Existing research has seldom explored how the planning objectives, spatial configurations, and functional roles of public pedestrian pathways have changed throughout the development trajectory of a planned city. Despite the growing body of research on walkability, semi-public spaces, and pedestrian networks, little attention has been paid to the long-term evolution of public pedestrian pathways as planning elements within planned cities.

Therefore, public pedestrian pathways should be understood not merely as pedestrian facilities but as evolving planning elements that shape pedestrian networks, publicness, and community structures throughout the urban development process. To address this research gap, this study examines the long-term evolution of public pedestrian pathways across twenty residential districts developed through the phased planning process of Sejong City.

1.3. Research Objectives and Research Questions

The objective of this study is to examine the long-term evolution of public pedestrian pathways in Sejong City and to investigate how they have evolved from pedestrian facilities

into planning elements that organize pedestrian networks and community structures within a planned city.

To achieve this objective, the study addresses the following research questions:

Research Question 1. *How have public pedestrian pathways contributed to the spatial structure and pedestrian network formation of residential districts in Sejong City?*

Research Question 2. *How have the planning objectives, spatial configurations, and functional roles of public pedestrian pathways evolved throughout the phased development process of the city?*

Research Question 3. *How have these changes influenced walkability, accessibility, publicness, and community functions at the neighborhood scale?*

Based on these findings, the study derives planning implications for the development of pedestrian-oriented planned cities.

1.4. Contributions of the Study

This study makes four major contributions to the literature.

First, it provides one of the few longitudinal analyses of public pedestrian pathways within a planned city context, tracing their transformation over nearly two decades of urban development.

Second, by examining all twenty residential districts developed under successive district unit plans in Sejong City, the study moves beyond individual case studies and reveals city-wide patterns of change in planning objectives, spatial structures, and pedestrian connectivity.

Third, the study reconceptualizes public pedestrian pathways as evolving forms of semi-public infrastructure that organize neighborhood-scale pedestrian networks while integrating connectivity, publicness, and community life through successive planning generations.

Fourth, it introduces an evolutionary framework for understanding how a planning element can adapt and transform in response to changing urban conditions and planning priorities throughout the development process of a planned city.

2. Materials and Methods

2.1. Theoretical Background

2.1.1. Semi-Public Space and Publicness

Urban space has traditionally been understood through a dichotomy between public and private domains. However, contemporary cities increasingly contain intermediate spaces characterized by varying degrees of accessibility, openness, use, and control. Consequently, public and private spaces are better understood as positions along a continuum rather than as fixed categories [6].

The character of urban space is determined not only by ownership but also by factors such as accessibility, connectivity, management, and users' perceptions [7]. This perspective is particularly relevant to public pedestrian pathways, which are typically located on privately controlled land while remaining accessible to the public. Accordingly, public pedestrian pathways can be understood as a form of semi-public space where public and private attributes coexist. Previous studies have further argued that publicness is a multidimensional concept shaped by ownership, control, physical configuration, accessibility, and patterns of use [14,15]. In this regard, public pedestrian pathways should not be classified simply as either public or private facilities. Rather, they represent hybrid spaces in which formal openness and practical control often coexist.

Studies on residential environments have similarly shown that the publicness of open spaces is influenced not only by physical openness but also by visibility, accessibility, spatial connectivity, and users' perceptions [16–18]. Pedestrian and open spaces therefore function not merely as circulation facilities but also as settings for everyday activities, social interaction, and community formation. Based on these discussions, this study interprets public pedestrian pathways through the lens of the public–private continuum. As semi-public spaces, they function as spatial interfaces connecting private residential environments with the broader public realm while supporting the continuity and publicness of neighborhood-scale pedestrian networks.

Publicness extends beyond legal ownership and refers to the degree to which people can access, use, and interact within a space. It is therefore understood as a multidimensional concept encompassing accessibility, usability, openness, connectivity, and social inclusiveness [7,14]. Recent studies have increasingly emphasized that publicness is shaped not only by formal spatial arrangements but also by patterns of use and social relationships.

Urban design scholars have long argued that public spaces should be understood not merely as circulation routes but as social settings that support urban life. The vitality and safety of cities are closely associated with everyday activities and social interactions occurring within public spaces [19], while accessibility, opportunities for staying, and activity diversity are widely recognized as key attributes of successful public environments [20]. Accordingly, the value of public space is generated not only through its physical form but also through the activities and interactions it accommodates.

Urban activities have been categorized into necessary, optional, and social activities, with the latter two being strongly influenced by the quality of the pedestrian environment [8]. Well-designed public spaces therefore function not only as movement corridors but also as places that encourage staying, interaction, and community formation.

Studies have further highlighted the close relationship between publicness and walkability. Public space is increasingly viewed as a dynamic arena where multiple forms of publicness emerge [21], while walkability is understood as a spatial structure that supports urban activities and social relationships rather than merely facilitating pedestrian movement [1]. From this perspective, pedestrian networks function as urban infrastructure that organizes urban life and promotes social interaction.

These discussions provide an important theoretical foundation for understanding public pedestrian pathways. Although originally introduced to improve pedestrian connectivity and reduce detours, public pedestrian pathways can evolve into spaces that support everyday activities, social interaction, and community life as neighborhoods mature. Studies of residential environments have similarly demonstrated that semi-public spaces contribute to spatial connectivity, encourage daily use, and facilitate social activities and community formation [16–18].

Therefore, public pedestrian pathways should be understood not merely as circulation facilities but as semi-public spaces that support movement, interaction, and community life. This study consequently interprets public pedestrian pathways as planning elements that contribute to the realization of publicness and urban life within neighborhood-scale pedestrian networks.

Semi-public spaces occupy an intermediate position between public and private domains and combine characteristics of both [6]. Residential communities provide a particularly important setting for such spaces because private residential environments are directly connected to the broader public realm. As a result, various forms of semi-public space emerge within residential developments, including plazas, pedestrian paths, playgrounds, green spaces, and community facilities.

These spaces serve not only as circulation areas but also as settings for everyday activities, social interaction, and community formation. Previous studies have shown that optional and social activities are strongly influenced by the quality of semi-public spaces and that higher levels of accessibility, visibility, and connectivity generally encourage greater use and interaction [8]. Consequently, semi-public spaces are increasingly recognized as important components of neighborhood-scale community environments.

Recent planning approaches have shifted from building-centered residential layouts toward pedestrian-oriented and community-oriented spatial structures. Within this context, open spaces, pedestrian streets, community facilities, and green corridors are regarded not merely as supporting facilities but as key spaces that strengthen publicness and social interaction within residential neighborhoods.

Empirical studies of residential environments have similarly demonstrated that spatial connectivity, visibility, and accessibility significantly influence patterns of use, duration of stay, and community activities within outdoor residential spaces [22–24]. These findings suggest that the physical configuration of semi-public spaces plays an important role in shaping social interaction and community life.

This tendency is also evident in the evolution of residential planning in Sejong City. A longitudinal analysis of apartment design competition guidelines revealed a gradual shift from inward-oriented residential layouts toward neighborhood-scale spatial integration and stronger connections with surrounding urban contexts [25]. Community spaces increasingly evolved from internal residential facilities into integrated networks connected with streets, parks, public facilities, and pedestrian systems.

From this perspective, public pedestrian pathways can be understood as a representative form of semi-public space. Although located within privately developed residential sites, they remain publicly accessible and connect residential environments with broader urban pedestrian networks. By linking open spaces, green corridors, community facilities, and daily service destinations, public pedestrian pathways support not only pedestrian movement but also publicness, social interaction, and community formation at the neighborhood scale.

Therefore, public pedestrian pathways should be interpreted as spatial interfaces between private and public domains and as planning elements that integrate walkability, publicness, and community functions. This perspective provides an important theoretical foundation for understanding the role and evolution of public pedestrian pathways within planned cities.

2.1.2. Public Pedestrian Pathways in Korea

Public pedestrian pathways are planning elements introduced to mitigate pedestrian discontinuities and excessive detours resulting from large-scale development parcels while maintaining the continuity of urban pedestrian networks. According to the Korean Guidelines for District Unit Planning, the designation of public pedestrian pathways should be considered when large development blocks create unnecessary pedestrian detours for pedestrians [3]. In practice, public pedestrian pathways are generally defined as pedestrian routes within private development sites that remain publicly accessible at all times. Accordingly, public pedestrian pathways can be understood as a representative form of semi-public space because they are situated on privately owned land while remaining available for public use.

The primary planning objective of public pedestrian pathways is to improve pedestrian accessibility. In large residential complexes and mixed-use developments, increasing block sizes often lengthen walking distances and reduce the permeability of the urban street network. Public pedestrian pathways help overcome these limitations by providing

direct pedestrian connections between key destinations and enhancing the continuity of neighborhood-scale pedestrian networks.

Public pedestrian pathways also perform an important integrative function within residential communities. By connecting housing areas with schools, parks, green corridors, commercial facilities, and public transport stops, they support the development of pedestrian-oriented neighborhoods. Unlike internal walking trails or resident-only pathways, public pedestrian pathways function as urban pedestrian infrastructure that links private residential developments with the broader urban fabric [26,27].

In addition, public pedestrian pathways contribute to the realization of universal mobility. As publicly accessible facilities, they should accommodate all users, including older adults, children, and persons with disabilities. Therefore, barrier-free design principles, such as minimizing level differences, providing ramps, and securing adequate pathway widths, are essential for ensuring safe and convenient pedestrian movement for all users [28].

Taken together, public pedestrian pathways should be understood not merely as circulation facilities but as planning elements that simultaneously enhance connectivity, accessibility, and publicness. As representative forms of semi-public space, they function as spatial interfaces linking residential environments with broader urban pedestrian networks. This conceptualization provides the theoretical basis for examining how the roles and spatial configurations of public pedestrian pathways have evolved throughout the phased development process of Sejong City (Table 1).

Table 1. Concept and planning functions of public pedestrian pathways.

Analytical Category	Description	Planning Implication
Legal Basis	Designation of public pedestrian pathways is recommended when large sites cause excessive pedestrian detours [3].	Reduction in pedestrian inconvenience and improvement of accessibility
Connectivity	Connects residential complexes with schools, parks, green corridors, commercial areas, and transit facilities.	Enhancement of pedestrian network continuity
Accessibility	Provides shorter and more direct pedestrian routes within neighborhoods.	Improvement of daily mobility and walkability
Publicness	Located on private land but open to the general public on a 24 h basis.	Realization of semi-public space
Inclusiveness	Designed for all users, including children, older adults, and persons with disabilities.	Implementation of universal mobility and barrier-free principles

Public pedestrian pathways were introduced as a planning instrument to enhance pedestrian convenience and strengthen urban pedestrian networks. However, various operational challenges have emerged in practice, including access restrictions imposed by residents and conflicts among management entities. These issues often undermine the publicness and usability of public pedestrian pathways, thereby weakening their intended planning objectives [29].

One major challenge is the formalistic implementation of public pedestrian pathways in the planning process. Because these pathways are typically provided by private developers as part of development approval requirements, they are sometimes treated as regulatory obligations rather than integral components of the urban pedestrian system. Consequently, some pathways are characterized by insufficient width, poor visibility, and weak connections with surrounding spaces. In such cases, public pedestrian pathways may

exist physically but remain largely unnoticed within actual pedestrian movement patterns, limiting their effectiveness as components of the broader pedestrian network [27,29].

Another persistent issue concerns the management and control of public access. Since public pedestrian pathways are frequently located within privately owned residential developments, access restrictions and temporary closures by landowners or management bodies have been repeatedly reported [29]. In some cases, entrances to public pedestrian pathways have been physically blocked or public access has been restricted. Other cases have involved damaged facilities or deliberately neglected entrances that discourage pedestrian use. These situations reveal a structural contradiction whereby pathways that are legally intended for public use are often perceived and managed as private spaces in practice.

A third challenge is the limited contribution of public pedestrian pathways to broader urban pedestrian networks. Because most pathways are planned at the individual parcel level, their connections with surrounding street networks, green corridors, parks, and public transport systems are not always adequately considered. Since the effectiveness of pedestrian movement depends more on network-wide connectivity and continuity than on individual routes, public pedestrian pathways should be planned as components of neighborhood-scale pedestrian networks rather than as isolated facilities [27,30].

A fourth limitation concerns the lack of placemaking and community functions. Many public pedestrian pathways are designed primarily to facilitate movement and therefore have limited integration with public open spaces, community facilities, or green infrastructure. As a result, users often perceive them merely as circulation routes rather than as places that support everyday urban life. Recent urban design studies have emphasized that the value of pedestrian spaces depends not only on physical connectivity but also on place-making, user experience, and opportunities for social interaction [21]. Public pedestrian pathways should therefore be reconsidered from a broader perspective that incorporates these qualitative dimensions of urban space.

Taken together, these discussions suggest that although public pedestrian pathways were institutionally introduced to strengthen pedestrian networks and improve public accessibility, they continue to face challenges related to physical design, operational management, network integration, and placemaking. Existing studies have primarily focused on operational issues and conflicts over access and management, while relatively little attention has been paid to how public pedestrian pathways have changed and evolved throughout the development process of planned cities. To address this gap, this study examines the evolutionary trajectory of public pedestrian pathways in Sejong City and explores their changing roles and planning significance over time.

Public pedestrian pathways have generally been understood as institutional facilities designed to improve pedestrian mobility and accessibility. However, rather than remaining fixed spatial elements, public pedestrian pathways should be viewed as planning components that are continuously modified and refined in response to urban growth and changing social needs. This perspective is particularly relevant in planned cities, where development occurs incrementally over extended periods and where the functions and spatial roles of planning elements may evolve across different development phases and residential districts.

Urban planning theory has increasingly emphasized the city as a dynamic process rather than a completed physical product. Cities are understood as complex and adaptive systems in which spatial structures are continuously reshaped through interactions among planning decisions, socioeconomic changes, and user demands [31]. Similarly, urban design elements are not static entities but are constantly adjusted and reconfigured in response to changing urban conditions and societal expectations [7]. Recent studies have further highlighted that pedestrian networks should be understood not merely as transporta-

tion infrastructure but as spatial systems that support urban life, social interaction, and publicness [1].

From this perspective, public pedestrian pathways can be interpreted as evolving planning elements whose objectives, spatial configurations, and functional roles change over time. Initially, public pedestrian pathways were primarily introduced to reduce pedestrian detours caused by large development blocks and to improve pedestrian connectivity. As cities grow and neighborhood structures become more established, however, their functions may expand beyond circulation. Public pedestrian pathways can increasingly contribute to connections with parks and green corridors, improve accessibility to schools and commercial facilities, support community spaces, and enhance openness at the neighborhood scale. In this sense, they evolve from functional circulation routes into spatial devices that organize publicness, connectivity, and community life.

Despite these evolving roles, previous studies have focused primarily on legal regulations, operational issues, and institutional improvement measures. As a result, existing research has largely been limited to diagnosing management and access-related problems at specific points in time. Relatively little attention has been paid to how the planning objectives, spatial structures, connectivity patterns, and publicness of public pedestrian pathways have changed throughout the long-term development process of planned cities.

Sejong City provides an ideal setting for examining these issues. As a state-led planned city developed through successive district unit plans over nearly two decades, Sejong City offers a unique opportunity to trace how a single planning element has been repeatedly applied, modified, and refined across multiple residential districts. Public pedestrian pathways have likewise undergone continuous adjustments throughout the city's development process, reflecting changing planning priorities and urban conditions.

Accordingly, this study conceptualizes public pedestrian pathways not as fixed institutional facilities but as evolving planning elements. By examining the phased development of Sejong City, the study investigates how the planning objectives, spatial configurations, connectivity characteristics, publicness, and community functions of public pedestrian pathways have changed over time and explores the broader implications of these changes for pedestrian-oriented planned cities.

2.2. Study Area

2.2.1. Overview of Sejong City

Sejong City was developed as part of Korea's national balanced development strategy to decentralize administrative functions from the Seoul metropolitan region and promote regional development. Designed as a self-sufficient city integrating administrative, residential, commercial, and cultural functions, it covers approximately 73 km² and was planned to accommodate a population of approximately 500,000 residents [32,33].

From its inception, Sejong City adopted transit-oriented and pedestrian-oriented planning principles. Its ring-shaped urban structure was designed to enhance accessibility and connectivity among residential districts, while parks, green corridors, pedestrian routes, bicycle paths, and public transport systems were planned as interconnected urban networks. Within this planning framework, public pedestrian pathways were introduced to connect privately developed residential sites with surrounding streets, parks, schools, public facilities, and other components of the broader pedestrian network.

Sejong City consists of six living zones and twenty-three neighborhood units that have been planned and developed sequentially through district unit plans since 2007 (Figure 1). Although the individual districts were prepared and implemented at different times and under varying development conditions, they were developed within a common planning authority, urban structure, and district unit planning system. This sequential development

process provides an opportunity to examine how the same planning element was repeatedly applied, modified, and refined over time.

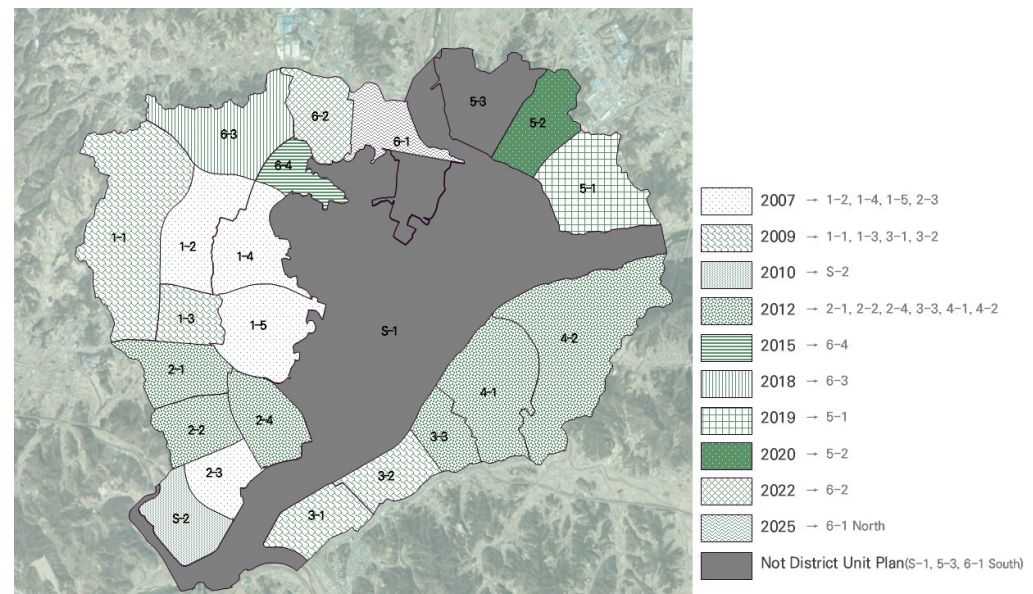


Figure 1. Residential districts analyzed in this study and the year of district unit plan establishment in Sejong City.

Accordingly, Sejong City provides an appropriate setting for a longitudinal investigation of public pedestrian pathways. The phased planning and implementation process allows changes in planning objectives, spatial configurations, network relationships, and public functions to be compared across residential districts developed between 2007 and 2025.

Consequently, Sejong City offers an ideal case for investigating the long-term evolution of public pedestrian pathways. The city's phased development process, combined with the consistent application of district unit planning principles, enables a longitudinal comparison of changes in planning objectives, spatial configurations, connectivity structures, and publicness across multiple residential districts over nearly two decades.

2.2.2. Rationale for Case Selection

Sejong City was selected as the study area for three principal reasons.

First, it is a representative state-led planned city in which pedestrian-oriented planning principles have been applied across the overall urban structure. Public pedestrian pathways were introduced from the early stages of development to reduce pedestrian discontinuities within large residential sites and to connect residential areas with schools, parks, green corridors, public transport stops, and neighborhood service facilities.

Second, the city enables a longitudinal comparison because its residential districts were planned and developed incrementally between 2007 and 2025. During this period, public pedestrian pathways were repeatedly addressed through district unit plans, housing design competitions, detailed design, construction, and subsequent site management. The sequential nature of the development process makes it possible to examine how the planning objectives, spatial configurations, and functional roles of public pedestrian pathways changed over time.

Third, Sejong City has accumulated a relatively consistent set of planning, design, and implementation materials, including district unit plans, design competition guidelines, detailed design documents, completion drawings, aerial imagery, and field investigation records. These materials enable the study to compare the planning intentions presented

during the planning and design stages with the spatial conditions realized through detailed design, construction, and subsequent use.

This study examines twenty of the twenty-three neighborhood units in Sejong City in which public pedestrian pathways were planned or constructed: Districts 1-1, 1-2, 1-3, 1-4, 1-5, 2-1, 2-2, 2-3, 2-4, 3-1, 3-2, 3-3, 4-1, 4-2, 5-1, 5-2, 6-1, 6-2, 6-3, and 6-4. These districts include both the earliest and the most recently planned residential areas and therefore provide an empirical basis for tracing changes over nearly two decades.

Sejong City is treated as a single case, while the twenty residential districts are treated as embedded units of analysis [34]. Because the districts were developed within the same overarching planning framework and administrative system, the study can focus on temporal changes in public pedestrian pathways while limiting major institutional and contextual differences among the units of analysis.

To facilitate longitudinal comparison, the twenty residential districts were grouped into five planning generations according to their planning period and major shifts in planning objectives.

2.3. Data Sources

To examine the evolutionary process of public pedestrian pathways, this study collected and analyzed planning and design documents produced throughout the development of Sejong City, from its initial planning stage to the present. Because public pedestrian pathways are conceived during the district unit planning and design competition processes and subsequently refined through detailed design and implementation stages, the analysis incorporates materials covering both planning and implementation phases.

The collected data were classified into four categories: district unit planning documents, design competition materials, design and construction documents, and site investigation materials. First, district unit plan maps, planning guidelines, and planning reports for individual residential districts were reviewed to identify the location, planning objectives, and spatial configurations of public pedestrian pathways. Second, apartment housing design competition guidelines and briefing materials were analyzed to examine the planning intentions and design objectives associated with public pedestrian pathways. Third, detailed design documents and as-built drawings were used to investigate how planning concepts were translated into physical space. Finally, aerial imagery and field investigations conducted between 2024 and 2025 in residential districts were employed to verify the physical implementation and current spatial conditions of public pedestrian pathways, including pathway continuity, spatial configuration, accessibility, and connections with surrounding public facilities.

Rather than analyzing each source independently, the collected materials were systematically compared throughout the study. District unit plans and design competition guidelines were first examined to identify the original planning intentions and design objectives of public pedestrian pathways. These planning intentions were subsequently compared with detailed design documents, as-built drawings, aerial imagery, and field observations to examine how the planned concepts were implemented in practice. This comparative process enabled the identification of changes between planning intentions and built outcomes across different stages of urban development. The findings obtained from these multiple sources were subsequently synthesized according to the five analytical dimensions presented in Section 2.4.1. This study examines 20 residential districts among the twenty-three neighborhood units of Sejong City where public pedestrian pathways were planned or constructed. While the characteristics of individual residential districts were first examined, the primary unit of comparison was the planning generation rather than the individual district. This approach was adopted because residential districts developed

within the same generation generally shared common district unit planning guidelines and planning objectives. Accordingly, the generational classification provided a more appropriate basis for identifying the evolutionary process of public pedestrian pathways over time (Table 2).

Table 2. Data sources and their use in study.

Data Source	Period	Purpose of Analysis
District Unit Plans (planning reports, zoning maps, implementation guidelines)	2007–2025	Identification of the original planning intentions, spatial structure, and designated functions of public pedestrian pathways
Design Competition Guidelines and Briefing Materials	2007–2025	Examination of planning concepts, design objectives, and community-oriented design strategies for public pedestrian pathways
Detailed Design Documents	2007–2025	Analysis of how planning concepts were translated into detailed spatial configurations and design solutions
Completion Drawings	2008–2025	Verification of the physical implementation and built outcomes of public pedestrian pathways
Aerial Images and Site Investigation	2024–2025	Validation of the current physical conditions, spatial characteristics, and operational status of public pedestrian pathways

Considering the phased development process of Sejong City, the evolution of public pedestrian pathways was examined according to planning generations rather than individual residential districts. Residential districts developed within the same planning period generally shared common district unit planning guidelines and planning objectives, making the planning generation a more appropriate unit for identifying longitudinal changes. Individual residential districts were first examined using the collected planning and implementation materials, and the findings were subsequently synthesized according to planning generations. This approach enabled the study to identify common planning characteristics and evolutionary patterns while minimizing differences arising from individual development conditions.

2.4. Analytical Framework

To examine the planning transformation and spatial evolution of public pedestrian pathways, this study employed a qualitative case study approach combined with time-series comparative analysis. The analysis drew upon district unit plans, design competition guidelines, detailed design documents, as-built drawings, and site investigation materials collected from the residential districts of Sejong City. These materials were used to identify changes in planning objectives and spatial characteristics throughout the planning, design, and implementation processes of public pedestrian pathways. The collected materials provided complementary evidence for examining both the planning intentions and the built outcomes of public pedestrian pathways.

Public pedestrian pathways are not merely pedestrian facilities but semi-public spaces in which public and private attributes coexist while also functioning as planning elements within the broader urban pedestrian networks. Accordingly, the analytical framework was developed based on the theoretical concepts discussed in the Theoretical Background, including the public–private continuum, publicness, urban life, and pedestrian networks.

This study treats Sejong City as a single case, with the twenty residential districts in which public pedestrian pathways were planned or constructed serving as embedded

units of analysis. Furthermore, given the differences in development periods and planning characteristics between 2007 and 2025, the residential districts were classified into successive planning generations to facilitate a longitudinal comparison of changes in public pedestrian pathways over time. The generational classification was determined not only by the year of district unit plan establishment but also by major shifts in planning objectives, spatial configurations, and the functional roles of public pedestrian pathways.

For each residential district, the planning intentions identified from district unit plans and design competition guidelines were compared with the corresponding built outcomes identified from detailed design documents, completion drawings, aerial imagery, and field investigations. This comparative process was used to examine how the planning objectives, spatial configurations, and functional roles of public pedestrian pathways evolved throughout the planning and implementation stages. The findings were then interpreted using the five analytical dimensions presented in the following section. The analytical results were subsequently synthesized according to planning generations to identify common planning characteristics and evolutionary patterns of public pedestrian pathways across different stages of urban development. The same analytical framework was consistently applied throughout the analysis to ensure consistency in the interpretation and comparison of public pedestrian pathways across planning generations.

2.4.1. Analytical Dimensions

To systematically analyze the evolutionary characteristics of public pedestrian pathways, this study developed an analytical framework consisting of five complementary dimensions: connectivity, openness, publicness, community integration, and spatial form (Table 3). The framework was established by synthesizing theoretical concepts from previous studies on semi-public space, publicness, pedestrian environments, and urban design. Rather than evaluating individual physical elements independently, the five dimensions were applied collectively to interpret the planning objectives, spatial characteristics, and functional roles of public pedestrian pathways. The same analytical framework was consistently applied to all residential districts, after which the findings were synthesized according to planning generations to enable systematic longitudinal comparison.

Connectivity refers to the extent to which public pedestrian pathways are physically and functionally integrated with surrounding pedestrian networks and key neighborhood destinations, including schools, parks, commercial facilities, green corridors, and public open spaces. Particular attention was given to whether public pedestrian pathways extended beyond internal circulation within residential complexes and contributed to the continuity of neighborhood-scale pedestrian networks.

Openness evaluates the physical and visual openness of public pedestrian pathways. The analysis focused on boundary treatment, visibility, accessibility, and the degree to which pedestrian pathways remained open, continuous, and visually connected with adjacent public spaces and streets. Publicness assesses the extent to which public pedestrian pathways function as publicly accessible spaces despite being located within privately developed residential sites. In this study, publicness was interpreted not solely in terms of legal ownership but also in relation to spatial openness, accessibility, and opportunities for public use identified through planning documents and field investigations.

Community integration examines the extent to which public pedestrian pathways connect residential areas with parks, community facilities, public open spaces, commercial areas, and other neighborhood destinations. This dimension evaluates whether public pedestrian pathways function merely as circulation routes or as integral components of neighborhood-scale public space systems that support everyday community life.

Table 3. Analytical framework for comparative analysis of public pedestrian pathways.

Dimension	Definition	Assessment Focus	Primary Evidence
Connectivity	Degree of physical and functional connection between pedestrian pathways and surrounding urban facilities	Continuity of pedestrian routes and linkage with parks, schools, commercial facilities, green corridors, and adjacent streets	District unit plans, design drawings, field investigation
Openness	Degree of physical and visual openness	Accessibility, visibility, enclosure, relationship with surrounding open spaces	Design drawings, as-built drawings, field investigation
Publicness	Degree to which pedestrian pathways function as publicly accessible spaces	Accessibility, continuity, relationship with adjacent public spaces	Planning documents, design drawings, field investigation
Community Integration	Relationship between pedestrian pathways and neighborhood activities	Connection with community facilities, parks, public open spaces, neighborhood circulation	Planning documents, field investigation
Spatial Form	Physical configuration and organization of pedestrian pathways	Linear, branching, integrated network structure and spatial composition	Design drawings, as-built drawings

Spatial form refers to the physical configuration and spatial organization of public pedestrian pathways. Particular attention was given to changes in pathway structure, including the transition from simple linear pathways in the early planning generations to more integrated, network-based, and spatially complex pedestrian systems in later generations. The five analytical dimensions were not intended as quantitative performance indicators but as qualitative interpretive categories for systematically comparing the planning objectives, spatial characteristics, and functional roles of public pedestrian pathways. Interpretations were derived from documented planning evidence, including district unit plans, design competition guidelines, detailed design documents, as-built drawings, aerial imagery, and field investigations. To improve analytical consistency, both authors independently reviewed the analytical interpretations and resolved any discrepancies through discussion before completing the final synthesis. The detailed qualitative assessment criteria for these analytical dimensions are provided in Appendix A.

2.4.2. Comparative Analysis Procedure

The comparative analysis was conducted through four sequential stages, as illustrated in Figure 2.

First, planning intentions related to public pedestrian pathways were identified by reviewing district unit plans and design competition guidelines for each residential district. These documents were examined to understand the original planning objectives, spatial concepts, and intended functions of public pedestrian pathways.

Second, the identified planning intentions were systematically compared with detailed design documents, as-built drawings, aerial imagery, and field investigation results to examine how the original planning concepts were implemented during the design and construction processes. This comparison identified similarities and differences between planning intentions and built outcomes.

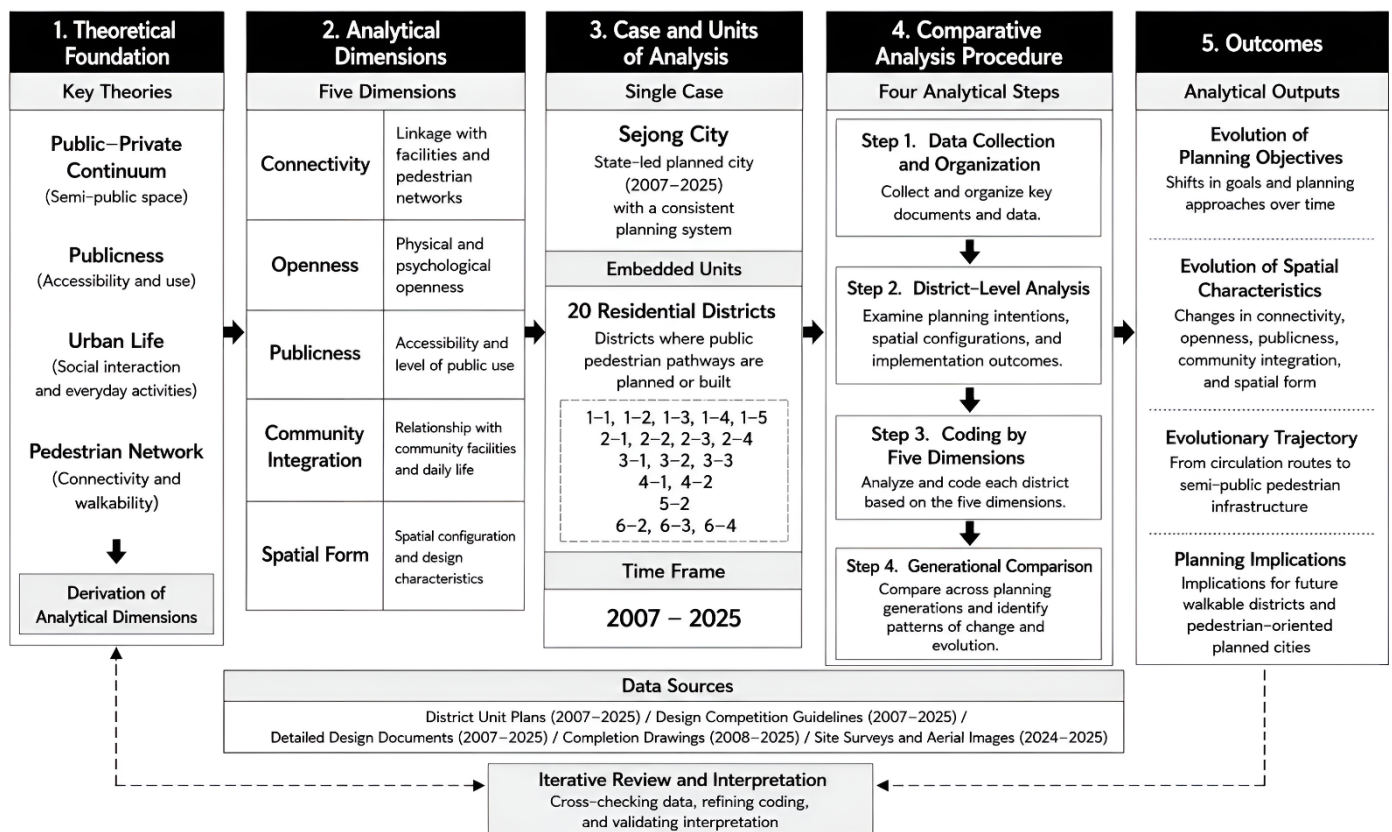


Figure 2. Comparative analysis framework and procedure.

Third, the characteristics of each residential district were interpreted using the five analytical dimensions presented in Table 3: connectivity, openness, publicness, community integration, and spatial form. The same analytical framework was consistently applied to all residential districts to ensure consistency in interpretation and comparability throughout the analysis.

Finally, the analytical findings obtained from individual residential districts were synthesized according to planning generations to identify common planning characteristics and evolutionary patterns of public pedestrian pathways across different stages of urban development. To improve analytical consistency, both authors independently reviewed the analytical interpretations and comparative findings for all twenty residential districts. Any discrepancies in interpretation were discussed and resolved through consensus before the final synthesis was completed.

Through this analytical procedure, the study systematically identified the evolutionary characteristics of public pedestrian pathways across successive planning generations in Sejong City.

3. Results

3.1. Evolution of Planning Objectives

The planning objectives of public pedestrian pathways in Sejong City evolved progressively with the phased development of the city and its residential districts. Initially introduced as functional facilities to address pedestrian detours within large residential complexes, public pedestrian pathways gradually developed into instruments for neighborhood-scale pedestrian network formation and, more recently, expanded their role to support publicness and community development (Table 4).

Table 4. Evolution of planning objectives of public pedestrian pathways.

Generation	Residential Districts	Primary Objective	Spatial Focus	Planning Meaning
G1 (2007–2009)	1-1, 1-2, 1-3, 1-4, 1-5, 2-3	Reduction in pedestrian detours	Individual housing blocks	Functional pathway
G2 (2009–2012)	3-1, 3-2	Improvement of pedestrian connectivity	Residential districts	Network connector
G2.5 (2012–2015)	2-1, 2-2, 2-4, 3-3, 4-1, 4-2	Integration with neighborhood facilities	Neighborhood scale	Transition toward network-based planning
G3 (2015–2018)	6-3, 6-4	Integration with green corridors and public spaces	Green and public space system	Public realm linkage
G4 (2018–2025)	5-1, 5-2, 6-1, 6-2	Community integration and publicness enhancement	District-wide urban system	Semi-public infrastructure

In the G1 generation (2007–2009), public pedestrian pathways were primarily planned to reduce walking distances and improve accessibility within large residential complexes. District unit plans and design competition guidelines consistently emphasized direct pedestrian connections to schools, bus stops, and neighborhood service facilities. These planning characteristics indicate that public pedestrian pathways were primarily conceived as functional circulation facilities intended to improve pedestrian convenience within individual residential complexes.

By the G2 generation (2009–2012), public pedestrian pathways began to be recognized as components of broader pedestrian networks rather than merely circulation routes. District unit plans and design competition guidelines placed greater emphasis on connecting key neighborhood destinations, including schools, parks, and commercial facilities. Consequently, public pedestrian pathways were increasingly utilized as planning devices to ensure the continuity of pedestrian corridors and strengthen neighborhood-scale connectivity. Overall, the G2 generation represents an early transitional stage in which public pedestrian pathways expanded from functional circulation facilities into neighborhood-scale pedestrian network components.

The G2.5 generation (2012–2015) represents a transitional planning stage rather than a completely new generation. Compared with the G2 generation, apartment housing design competitions played a more direct role in shaping the planning of public pedestrian pathways, resulting in stronger integration with parks, public open spaces, and community facilities. However, the planning principles had not yet fully evolved into the integrated public-space strategies that became characteristic of the subsequent G3 generation. For this reason, this period is distinguished as an intermediate planning generation (G2.5).

In the G3 generation (2015–2018), public pedestrian pathways became increasingly integrated with park systems, green corridors, and broader public space networks. The planning emphasis shifted from improving pedestrian convenience toward enhancing the quality of the pedestrian environment and enriching spatial experiences. Consequently, public pedestrian pathways were planned as key connective elements within integrated public space networks.

In the G4 generation (2018–2025), the planning objectives of public pedestrian pathways further expanded to encompass neighborhood integration and community formation. Public pedestrian pathways were increasingly conceived as neighborhood-scale public infrastructure linking residential complexes, parks, community facilities, public open spaces, and commercial areas. Their role extended beyond movement and they were increasingly planned to provide opportunities for staying, social interaction, and everyday community

life. This evolution demonstrates the transformation of public pedestrian pathways from simple pedestrian connections into semi-public urban infrastructure supporting publicness, connectivity, and community integration.

Overall, the planning objectives of public pedestrian pathways in Sejong City evolved from improving pedestrian accessibility within residential complexes to strengthening neighborhood-scale connectivity and, ultimately, to supporting publicness and community life. This progression reflects a broader shift in planning priorities from functional mobility toward integrated and people-oriented urban environments. This evolution reflects the cumulative refinement of district unit planning, housing design competitions, and implementation experience throughout successive planning generations rather than the effect of a single planning intervention.

3.2. *Evolution of Spatial Characteristics*

Based on the five analytical dimensions presented in Figure 2—connectivity, openness, publicness, community integration, and spatial form—the spatial characteristics of public pedestrian pathways evolved continuously throughout the phased development process of Sejong City. The analysis indicates that public pedestrian pathways gradually developed from functional facilities intended to secure pedestrian circulation into semi-public infrastructure connecting neighborhood-scale pedestrian networks and public space systems. Distinct differences were observed among generations across all five analytical dimensions.

3.2.1. G1: Grid-Based Functional Connectivity (2007–2009)

District unit plans and design competition guidelines indicate that the primary planning objective of public pedestrian pathways in the G1 generation (Districts 1-1, 1-2, 1-3, 1-4, 1-5, and 2-3) was to reduce pedestrian detours associated with large-scale residential developments and improve access to key neighborhood destinations, including schools, bus stops, and local service facilities. Accordingly, public pedestrian pathways were mainly designated within residential complexes, between adjacent housing developments, and between residential areas and public facilities, with a strong emphasis on providing direct and efficient pedestrian connections.

A defining characteristic of this generation was the formation of a grid-based pedestrian network that combined pedestrian-only streets, view corridors, and public pedestrian pathways (Figure 3). Public pedestrian pathways played an important role in linking residential complexes with adjacent developments and public facilities. By introducing pedestrian routes through privately developed sites, planners sought to mitigate spatial discontinuities caused by large residential blocks and enhance pedestrian continuity. However, these connections were generally limited to individual residential complexes or nearby facilities. These planning characteristics indicate that public pedestrian pathways primarily functioned as parcel-level circulation facilities rather than as components of an integrated neighborhood-scale pedestrian network.

From a spatial planning perspective, detailed design criteria regarding pathway width, openness, and boundary treatment were largely absent. Planning efforts focused primarily on circulation functions, including the provision of safe routes to schools and the continuity of pedestrian-only streets. Consequently, public pedestrian pathways were typically planned as linear circulation spaces within residential developments rather than as public spaces operating at the urban scale. Accordingly, spatial planning during this period emphasized functional circulation rather than the creation of semi-public spaces supporting broader urban activities.

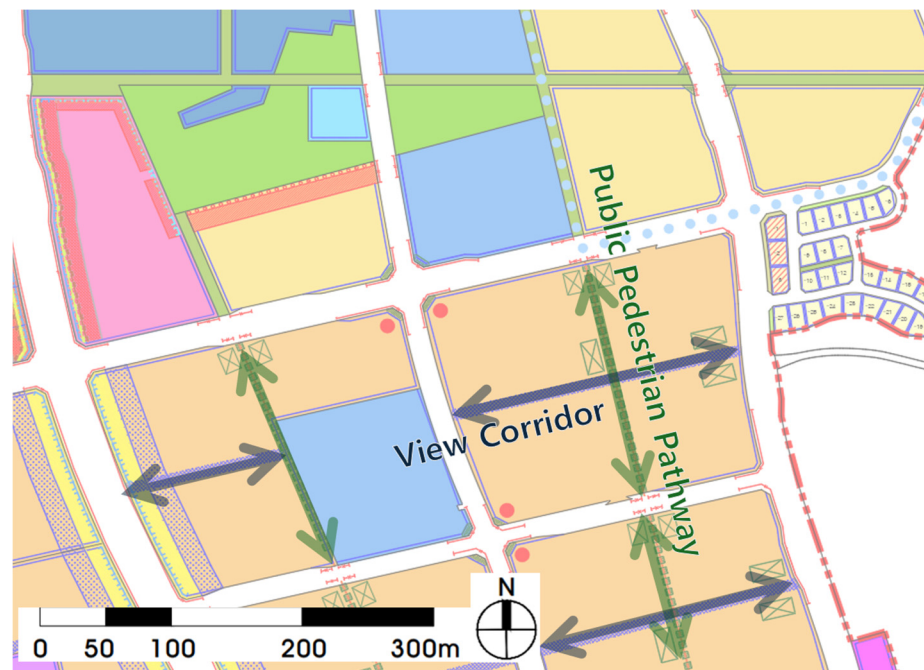


Figure 3. Public pedestrian pathways were introduced to improve pedestrian accessibility by providing direct connections across large residential blocks, thereby reducing the detours that would otherwise occur along surrounding streets (District 1-4). The background colors correspond to the original land-use plan (yellow: residential areas; red: commercial areas; and blue: public facilities).

In terms of openness, public pedestrian pathways were legally designated for public use, but their practical accessibility was often constrained by fences, boundary treatments, and inward-oriented residential layouts. In several cases, barriers such as fences were installed at locations where pathways met public streets, while inadequate connections to crosswalks disrupted pedestrian continuity. Furthermore, some pathways incorporated stairways at entrance and exit points, reducing accessibility for mobility-impaired users. These spatial characteristics reduced practical accessibility and limited the openness originally intended in the planning documents.

Limited efforts were also made to enhance publicness. Public open spaces were encouraged at the intersections of public pedestrian pathways, view corridors, and residential block corners in order to improve both the functionality and visual quality of pedestrian environments. However, in many cases, these spaces were implemented primarily as landscaped areas, which unintentionally reduced visual openness and interrupted the continuity of pedestrian routes (Figure 4). As a result, the implemented spatial configuration only partially achieved the original planning intention of improving pedestrian continuity.

Overall, the G1 generation represents the initial stage in the evolution of public pedestrian pathways, characterized by grid-based functional connectivity. By combining pedestrian-only streets, view corridors, and public pedestrian pathways, planners sought to improve accessibility and reduce discontinuities between residential developments. However, the comparison between planning intentions and implemented spatial conditions indicates that public pedestrian pathways remained primarily parcel-level circulation facilities, with relatively limited openness, publicness, and community functions. Therefore, the G1 generation can be interpreted as the initial function-oriented stage preceding the emergence of neighborhood-scale semi-public infrastructure.

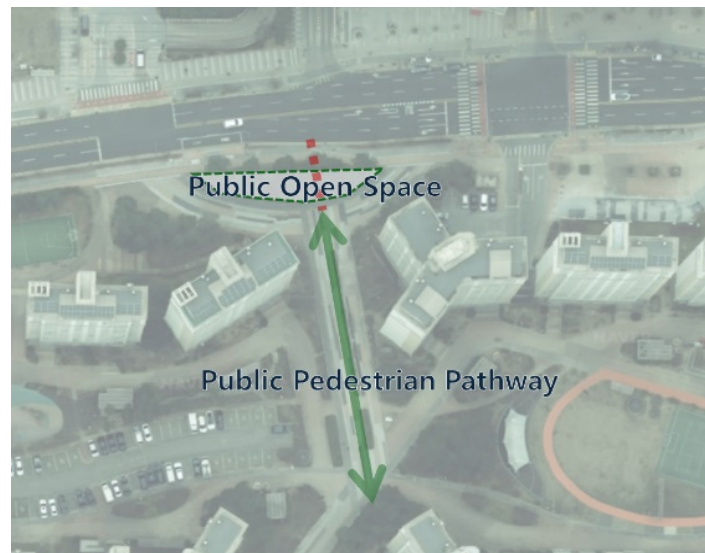


Figure 4. Although a public open space was designated at the end of the public pedestrian pathway, it was developed as a landscaped mound with trees, resulting in limited pedestrian connectivity with the adjacent sidewalk (District 1-3).

3.2.2. G2: Reinforcement of Neighborhood Pedestrian Networks (2009–2012)

The G2 generation (Districts 3-1 and 3-2) represents a transitional stage in which public pedestrian pathways evolved from parcel-level pedestrian facilities into components of neighborhood-scale pedestrian networks. Compared with the G1 generation, district unit plans and design competition guidelines introduced more explicit planning strategies to integrate public pedestrian pathways into the broader spatial structure of residential districts, moving beyond the primary objective of improving accessibility within individual residential complexes.

The master plan for Sejong City proposed a wedge-shaped park and green corridor system extending from the urban periphery toward the central green core. District 3 was particularly suitable for implementing this concept because of its relatively short distance between the urban edge and the city center and its east–west spatial structure. Within this planning framework, public pedestrian pathways were no longer intended solely to overcome pedestrian detours within large residential parcels but also to function as neighborhood-scale pedestrian corridors connecting the urban periphery with the city center. Consequently, they increasingly served as components of neighborhood-scale pedestrian networks linking schools, parks, and commercial facilities.

This shift indicates that public pedestrian pathways evolved from parcel-level planning elements into mechanisms for extending neighborhood- and city-scale pedestrian networks into privately developed residential areas. In districts where commercial and business functions were concentrated, public pedestrian pathways were increasingly planned in conjunction with public open spaces, creating environments that supported not only pedestrian movement but also opportunities for staying and public activities (Figure 5). These planning characteristics indicate that public pedestrian pathways were beginning to expand beyond their original circulation function and gradually assume broader public-space roles.

Improvements were also observed in terms of openness and publicness. Public pedestrian pathways connected to public open spaces were planned to enhance pedestrian accessibility and visual openness, while their intended users expanded from residents of individual housing complexes to the broader neighborhood population. Nevertheless, these improvements remained relatively limited, and public pedestrian pathways had not yet developed into spaces capable of actively supporting community activities.



Figure 5. Although a public open space was designated at the end of the public pedestrian pathway, it was developed as a plaza, facilitating pedestrian movement and improving connectivity with the surrounding pedestrian network (District 3-2).

Efforts were also made to improve pedestrian continuity. At locations where public pedestrian pathways intersected with streets, pedestrian-priority design principles were introduced to enhance safety and create more continuous neighborhood walking environments. These measures indicate efforts to address the discontinuity issues observed in the G1 generation. However, an examination of planning documents and implemented outcomes indicates that limitations remained. As shown in Figure 6, some pathways were not directly aligned with crosswalks, resulting in discontinuous pedestrian routes and reducing network efficiency. Although pedestrian detours were less severe than those observed in the G1 generation, detailed design measures to support intuitive pedestrian movement were still insufficient. In terms of spatial form, public pedestrian pathways began to move beyond simple linear configurations and adopt network-based structures with multiple connections. As pathways became increasingly integrated with green corridors, public open spaces, and commercial areas, they started to function as planning elements that helped organize neighborhood spatial structures. These developments laid the planning foundation for the more integrated pedestrian network strategies that became fully established during the subsequent G2.5 generation.



Figure 6. A case where the public pedestrian pathway is not directly aligned with the crosswalk, resulting in discontinuous pedestrian routes and reduced pedestrian continuity (District 3-1).

Overall, the G2 generation represents the stage at which public pedestrian pathways expanded from functional circulation facilities within residential developments into neighborhood-scale pedestrian network components. Connectivity was strengthened through closer integration with parks, public open spaces, and commercial areas, while openness and publicness also gradually improved. Nevertheless, limitations remained in terms of pedestrian continuity and spatial utilization. Therefore, the G2 generation can be interpreted as an early transitional stage linking parcel-level pedestrian circulation with

the more integrated neighborhood-scale pedestrian networks that became fully developed in the G2.5 generation.

3.2.3. G2.5: Community-Oriented Network Planning (2012–2015)

The G2.5 generation (Districts 2-1, 2-2, 2-4, 3-3, 4-1, and 4-2) represents the most significant transitional stage in the evolution of public pedestrian pathways in Sejong City. Compared with the G2 generation, apartment housing design competitions began to exert a direct influence on the planning of public pedestrian pathways, extending planning approaches beyond the conventional district unit planning framework. As a result, public pedestrian pathways evolved from neighborhood-scale pedestrian connectors into integrated networks supporting social interaction and community activities. However, these planning principles had not yet fully developed into the comprehensive public-space strategies that became characteristic of the subsequent G3 generation.

The most notable examples can be found in District 2 (Districts 2-1, 2-2, and 2-4). With the exception of District 2-3, public pedestrian pathways were not formally designated in the district unit plans of these residential districts. Instead, the concept of a neighborhood loop trail was introduced through the housing design competition process (Figure 7), resulting in the creation of an integrated pedestrian network that performed functions similar to those of public pedestrian pathways. Introduced during the master planning stage following the preparation of district unit plans, the loop trail concept was further reinforced through design competition guidelines that required continuity between adjacent residential complexes, pilotis adjacent to major pedestrian routes, and integration with open spaces. These planning strategies indicate a clear shift from inward-oriented residential layouts toward community-oriented neighborhood spaces.



Figure 7. A representative G2.5 case in which public pedestrian pathways were not designated in the district unit plan but were induced through apartment housing design competition guidelines, demonstrating a transition in the planning instrument used to secure equivalent pedestrian functions (District 2-2).

From the perspective of connectivity, the G2.5 generation differed substantially from earlier generations. Public pedestrian pathways and neighborhood loop trails were no longer conceived merely as routes passing through individual residential complexes. Instead, they were planned as integrated neighborhood-scale networks connecting residential areas, parks, schools, community facilities, and public spaces. The planning intention was

to organize the entire neighborhood as a coherent pedestrian system that encouraged every-day walking and social interaction, extending pedestrian connectivity beyond individual residential developments.

Changes were also evident in terms of openness. Design competition guidelines promoted the use of pilotis and open spaces to strengthen pedestrian continuity and emphasized visual openness rather than physical enclosure. In District 4-1, for example, public pedestrian pathways designated in the district unit plan were reinterpreted through the design competition process as a loop greenway. Rather than functioning as a simple passage through residential blocks, this greenway integrated visual corridors, community spaces, and school routes into a continuous pedestrian landscape.

The expansion of publicness was another defining characteristic of this generation. The Urban Atrium project in District 2-4 (Figure 8) provides a particularly illustrative example. In this case, the public pedestrian pathway was not primarily introduced to reduce pedestrian detours within a large development parcel. Instead, it functioned as a strategic spatial device intended to promote architectural creativity, spatial diversity, open access, and vertical circulation, as encouraged by the design competition guidelines. Given its location within a major commercial district, the pathway evolved beyond a circulation facility and was planned as a pedestrian attractor intended to provide opportunities for public use, gathering, and lingering activities.

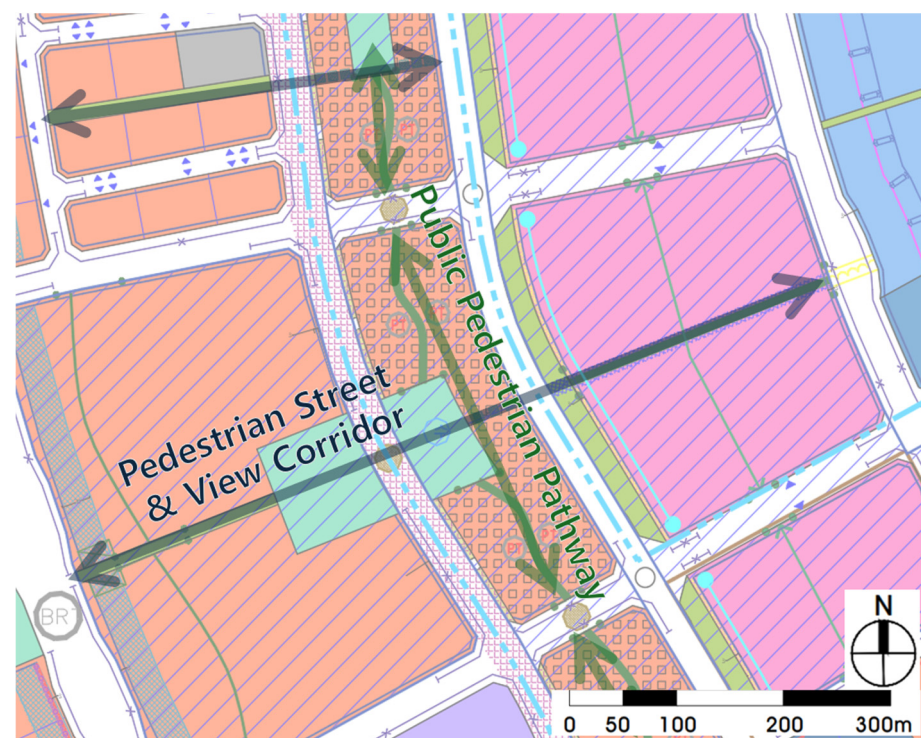


Figure 8. A case illustrating the designation of a north-south public pedestrian pathway to reduce pedestrian detours while enhancing the vitality of adjacent commercial areas. A plaza was introduced at the intersection of the public pedestrian pathway and the adjacent pedestrian-only street, strengthening pedestrian connectivity, commercial vitality, and public activity (District 2-4). The background colors correspond to the original land-use plan (red: commercial areas; pink: mixed-use residential and commercial areas; blue: public facilities).

Community integration emerged as the defining characteristic of the G2.5 generation. Design competition guidelines actively encouraged the integration of public pedestrian pathways and neighborhood loop trails with community facilities, playgrounds, plazas, open spaces, and shared residential amenities. As a result, public pedestrian pathways

were increasingly planned and designed as spaces intended to support meeting, interaction, and everyday community activities rather than merely as routes for movement. Their role expanded from connecting individual residential developments to organizing social activities at the neighborhood scale.

The spatial form of public pedestrian pathways also diversified considerably. Whereas the G1 and G2 generations were dominated by linear pathways and simple network connections, the G2.5 generation introduced a variety of spatial configurations, including loop greenways, community-oriented pedestrian corridors, and internal pedestrian passages within commercial developments. This diversification demonstrates that public pedestrian pathways were no longer treated as a single facility type but rather as flexible planning elements capable of responding to different neighborhood contexts and functional requirements.

However, new challenges also emerged. As shown in Figure 9, some design competition proposals integrated public pedestrian pathways directly with the main entrances of residential complexes. While this approach improved physical accessibility by locating pathways in highly visible and easily accessible locations, it also reinforced the perception that these spaces belonged to private residential domains. In addition, the hierarchy between public pedestrian pathways and ordinary internal walking routes was not always clearly defined, reducing the visibility and public identity of public pedestrian pathways in some developments.

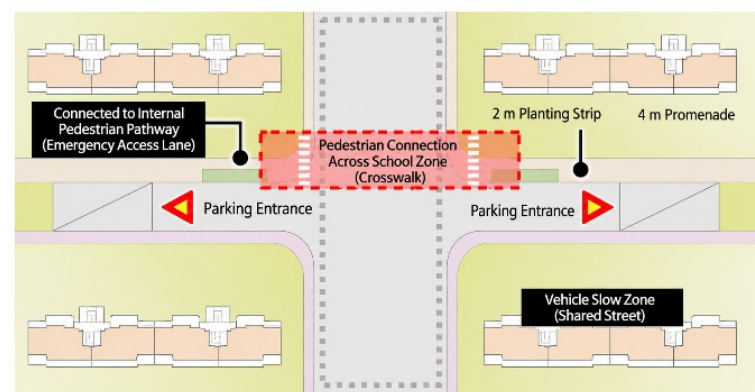


Figure 9. A case illustrating how apartment housing design competition guidelines encouraged the main residential entrance, where pedestrian movement is concentrated, to be directly connected to the public pedestrian pathway (design competition guidelines for District 2-1).

Overall, the G2.5 generation represents the critical transitional stage in the evolution of public pedestrian pathways. Their role expanded from neighborhood-scale pedestrian connectors to integrated community-oriented networks. Within residential developments, they increasingly supported social interaction and community activities, while in commercial and mixed-use districts they functioned as public spaces that attracted and organized urban activities. Consequently, planning approaches shifted from parcel-based circulation strategies toward integrated neighborhood-scale network planning. This transitional stage established the planning foundation for the more comprehensive public-space strategies that emerged in the G3 generation.

3.2.4. G3: Strategic Substitution and Public Realm Integration (2015–2019)

The G3 generation (Districts 6-3 and 6-4) represents a period in which the role and function of public pedestrian pathways were reinterpreted rather than expanded quantitatively. While the preceding G2.5 generation had developed public pedestrian pathways into neighborhood-scale community networks, the G3 generation responded to emerging

conflicts and management issues associated with their operation. Consequently, this period can be understood not simply as a stage of continuous evolution but as a phase of planning adaptation and modification.

In Districts 6-3 and 6-4, public pedestrian pathways were designated far less frequently than in previous generations, and the pathways that were introduced served different purposes. Only two public pedestrian pathways were planned, both focusing on improving connections between specific destinations rather than reducing pedestrian detours. One example was designed as a nodal space linking two public open spaces rather than as a conventional linear corridor (Figure 10), while the other was planned as an access route connecting the Wonsusan Trail with the surrounding residential district. These examples indicate a shift in the role of public pedestrian pathways from simple circulation routes toward connectors within broader public space networks.

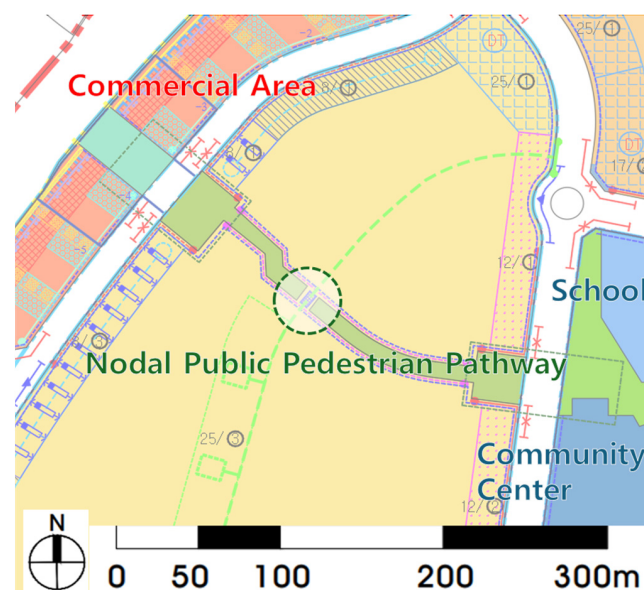


Figure 10. A representative G3 case illustrating the transfer of the connectivity function of public pedestrian pathways from privately owned land to a publicly managed pedestrian-only street. In this case, the pedestrian-only street connects previously discontinuous pedestrian routes that would otherwise have required a public pedestrian pathway (District 6-4). The background colors correspond to the original land-use plan (yellow: residential areas; red: commercial areas; green: public open space; and blue: public facilities).

From the perspective of connectivity, the G3 generation emphasized connections between specific destinations and activity nodes rather than the construction of neighborhood-wide pedestrian networks. In particular, pathways linking natural assets such as the Wonsusan Trail with residential districts expanded the role of public pedestrian pathways beyond internal urban circulation, enabling connections between urban environments and surrounding natural landscapes. This represents a clear departure from the neighborhood-centered connectivity strategies of earlier generations.

Changes in openness and publicness were more complex. On the one hand, the integration of pathways with public open spaces strengthened their relationship with the public realm. On the other hand, the designation of public pedestrian pathways within residential complexes became less common. This trend suggests an effort to maintain public accessibility while simultaneously reducing conflicts between public use and private residential environments.

A particularly notable development during this period was the emergence of the concept of the internal pedestrian corridor as an alternative to conventional public pedestrian

pathways. Internal pedestrian corridors were introduced to organize circulation within residential complexes and connect major community facilities, including playgrounds, open spaces, and community centers. Although these corridors were physically similar to public pedestrian pathways, they differed institutionally because they functioned as internal residential facilities and were not intended to accommodate unrestricted public access.

The emergence of this alternative approach appears to have been influenced, at least in part, by social conflicts associated with the operation of public pedestrian pathways. Previous research reported disputes in 2015 concerning the use of public pedestrian pathways by residents from neighboring residential complexes in District 1-3. Notably, the district unit plan for District 6-4 was prepared later that same year. Although a direct causal relationship cannot be established, it is possible that such conflicts contributed to the adoption of internal pedestrian corridors as an alternative to permanently open public pedestrian pathways.

Changes were also evident in terms of community integration. Whereas the previous generation sought to strengthen neighborhood-scale community networks through connections between residential complexes, the G3 generation placed greater emphasis on fostering community activities within individual developments. Pedestrian corridors were designed to connect community facilities, playgrounds, and recreational spaces, thereby supporting internal social interaction and community life.

The spatial form of public pedestrian pathways also became more diverse. In contrast to the predominantly linear configurations of earlier generations, the G3 generation introduced a wider variety of spatial forms, including nodal public spaces, pathways integrated with public open spaces, and internal community-oriented pedestrian corridors. These changes demonstrate that public pedestrian pathways were no longer applied as a uniform planning element but were increasingly adapted to specific neighborhood contexts and social demands.

Overall, the G3 generation represents a period in which public pedestrian pathways were reconfigured in response to operational realities, social conflicts, and management challenges. Public pedestrian pathways increasingly functioned as connectors within broader public space systems, while internal pedestrian corridors emerged as an alternative model within residential developments. Accordingly, the G3 generation can be interpreted as an adaptive stage in which public pedestrian pathways evolved from community-oriented networks into adaptive public realm linkages, reflecting a growing emphasis on balancing public accessibility with residential management and community needs.

3.2.5. G4: Spatial Expansion Toward Semi-Public Infrastructure (2019–2025)

The G4 generation (Districts 5-1, 5-2, 6-1, and 6-2) represents the stage at which public pedestrian pathways evolved into semi-public infrastructure that organizes the spatial structure of entire neighborhoods. Building upon the planning evolution observed in the previous generations, the G4 generation reflects a more fundamental consideration of how public pedestrian pathways should be positioned within neighborhood-scale pedestrian systems and public space structures. Several districts belonging to this generation remain under development. Consequently, their significance lies not only in their physical implementation but also in demonstrating the future direction of public pedestrian pathway planning. In this sense, the G4 generation can be regarded as an experimental phase in which alternative pedestrian network strategies were explored in response to the achievements and limitations of earlier generations. District 5-2 provides a representative example of the continued use of public pedestrian pathways as an important planning element. Public pedestrian pathways are integrated with visual corridors within residential developments to form a grid-based pedestrian system. They are planned to

minimize pedestrian detours along school routes, neighborhood streets, and other every-day walking paths. By linking adjacent residential complexes, parks, and neighborhood facilities, these pathways function not as parcel-level circulation routes but as components of a neighborhood-wide connectivity system. Compared with earlier generations, in which public pedestrian pathways primarily served to improve accessibility within residential developments, the G4 generation demonstrates a clearer recognition of their role as neighborhood-scale network infrastructure.

From the perspective of connectivity, the G4 generation exhibits the highest degree of spatial integration among all generations. Public pedestrian pathways are planned to connect residential complexes, schools, parks, commercial facilities, and public institutions within a unified network structure. Rather than merely providing direct pedestrian shortcuts, they function as planning elements that integrate the major spatial and functional systems of the neighborhood. An even more significant transformation can be observed in District 6-2. Instead of distributing public pedestrian pathways within individual development parcels, the district adopts a pedestrian network structured around a neighborhood-scale linear park (Figure 11).

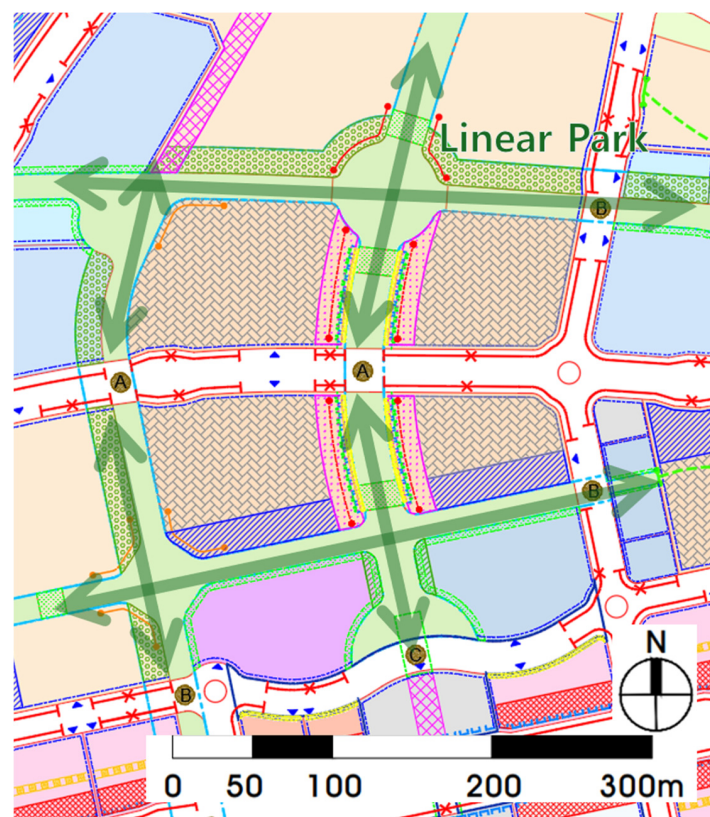


Figure 11. A representative G4 case illustrating the transfer of the connectivity function of public pedestrian pathways from privately owned land to a publicly managed park, where the park provides pedestrian connections that would previously have been achieved through a public pedestrian pathway (District 6-2). The background colors correspond to the original land-use plan (yellow: residential areas; red: commercial areas; blue: public facilities; purple: welfare facilities; and green: parks and open spaces).

Most residential complexes and major public facilities are directly connected to this linear park, which serves as the primary organizing spine of the pedestrian network. This planning approach represents an alternative response to the operational conflicts and management limitations associated with public pedestrian pathways located within privately owned developments. Whereas earlier generations relied partly on privately

managed public pedestrian pathways to provide neighborhood-scale connectivity, District 6-2 incorporates these functions into a publicly owned and managed open-space system. Rather than representing a reduction in the role of public pedestrian pathways, this approach reflects an expansion of the underlying planning concept into a broader public infrastructure framework.

Further advances are evident in terms of openness and publicness. Pedestrian corridors are increasingly integrated with parks, public open spaces, community facilities, and green corridors, emphasizing spatial continuity rather than physical boundaries. As the functions traditionally associated with public pedestrian pathways become combined with linear parks, public open spaces, and neighborhood pedestrian corridors, the range of users expands beyond residents of individual housing complexes to encompass the broader neighborhood population. Community integration also reaches a new scale in the G4 generation. Whereas previous generations focused primarily on connections between residential complexes and community facilities, the G4 generation seeks to connect public spaces and community nodes across the entire neighborhood. Public pedestrian pathways are therefore understood not merely as circulation routes but as infrastructure supporting social interaction, community activities, and everyday urban life.

The spatial form of pedestrian infrastructure likewise becomes increasingly complex. Following the linear pathways of the G1 generation, the loop greenways of the G2.5 generation, and the nodal linkage structures of the G3 generation, the G4 generation introduces multi-layered spatial systems that combine linear parks, integrated pedestrian corridors, public open spaces, and green infrastructure. These developments demonstrate that public pedestrian pathways have evolved from independent facilities into components of a comprehensive neighborhood-scale spatial system.

Overall, the G4 generation represents the stage at which public pedestrian pathways are no longer understood as parcel-level circulation facilities or simple connectors between residential developments. Instead, they function as neighborhood-scale semi-public infrastructure integrating connectivity, publicness, and community activities. Although District 5-2 and District 6-2 adopt different planning approaches, both pursue the common objective of establishing neighborhood-scale pedestrian networks. Therefore, the G4 generation represents the culmination of the evolutionary process identified in this study, in which public pedestrian pathways became integral components of the broader spatial structure of planned neighborhoods.

Table 5 summarizes the generational evolution of public pedestrian pathways across the five analytical dimensions used in this study.

Table 5. Evolution of spatial characteristics of public pedestrian pathways across generations.

Generation	Connectivity	Openness	Publicness	Community Integration	Spatial Form
G1	Lot-level linkage	Limited openness	Resident-oriented use	Minimal	Linear pathway
G2	Neighborhood linkage	Improved visibility	Expanded accessibility	Emerging	Multiple connections
G2.5	Integrated network	Reduced boundaries	Enhanced public use	Strengthened	Network structure
G3	Green-public space linkage	High openness	Public realm integration	Active community linkage	Integrated structure
G4	District-wide network	Spatial continuity	Semi-public use	Community-oriented	Complex multi-layered structure

3.3. Evolutionary Trajectory of Public Pedestrian Pathways

Synthesizing the findings presented above, public pedestrian pathways in Sejong City have undergone a continuous process of transformation and refinement over nearly

two decades, evolving from functional circulation facilities into semi-public pedestrian infrastructure. This transformation represents not merely a change in spatial form but a gradual process through which planning objectives, connectivity, openness, publicness, and community integration interacted and developed over time. In the G1 generation, public pedestrian pathways were primarily introduced as functional pathways designed to minimize pedestrian detours within residential complexes and improve accessibility to daily facilities. During this stage, they functioned mainly as components of internal circulation systems, and their spatial scope and role were largely confined to individual development parcels.

In the G2 generation, the role of public pedestrian pathways expanded as greater emphasis was placed on connecting key destinations within residential districts. As a result, they evolved into neighborhood connectors that linked schools, parks, commercial facilities, and other everyday destinations. During this period, the concept of neighborhood-scale pedestrian networks began to emerge, and the spatial influence of public pedestrian pathways extended beyond individual housing complexes. The G2.5 generation represents a critical turning point in this evolutionary process. Public pedestrian pathways were no longer conceived merely as connecting facilities but increasingly became components of integrated pedestrian networks serving entire neighborhoods. Planning efforts focused on strengthening connections among residential complexes, green corridors, public facilities, and community spaces. Consequently, public pedestrian pathways emerged as important elements in organizing neighborhood spatial structures and supporting everyday social interaction. During the G3 generation, public pedestrian pathways became more closely integrated with parks, public open spaces, and community facilities, evolving into public realm linkages. Planning priorities shifted from movement efficiency toward user experience, spatial quality, and the enhancement of publicness. As a result, public pedestrian pathways increasingly functioned as neighborhood public spaces capable of accommodating a variety of public activities and everyday uses.

In the most recent G4 generation, public pedestrian pathways evolved into semi-public pedestrian infrastructure that connects residential complexes, public facilities, commercial areas, and community nodes within an integrated spatial system. Their role expanded beyond facilitating movement to supporting staying, social interaction, and community activities. Public pedestrian pathways therefore became multifunctional spaces that contribute to neighborhood-scale spatial integration and community formation.

This evolutionary process demonstrates that public pedestrian pathways developed from facilities primarily intended to secure pedestrian circulation into urban infrastructure that organizes neighborhood-scale pedestrian networks and connects public spaces and community activities. Importantly, connectivity, openness, publicness, community integration, and spatial form did not evolve independently; rather, these dimensions interacted and reinforced one another throughout the development process. The findings suggest that the role of public pedestrian pathways expanded from providing physical connectivity to facilitating social connectivity, indicating that pedestrian spaces increasingly function as planning mechanisms through which urban publicness and community life are realized. Overall, the evolution of public pedestrian pathways in Sejong City can be summarized as a sequential trajectory from Functional Pathway → Neighborhood Connector → Integrated Pedestrian Network → Public Realm Linkage → Semi-Public Pedestrian Infrastructure. This trajectory demonstrates that, as the planned city matured, the role of pedestrian space expanded from supporting mobility to organizing urban openness, connectivity, publicness, and community integration. Public pedestrian pathways should therefore be understood not merely as pedestrian facilities but as evolving planning elements that mediate relationships between urban structure and everyday urban life (Figure 12). More

broadly, this evolution reflects a gradual shift from movement-oriented planning toward network-oriented, community-oriented, and ultimately infrastructure-oriented approaches to pedestrian planning.

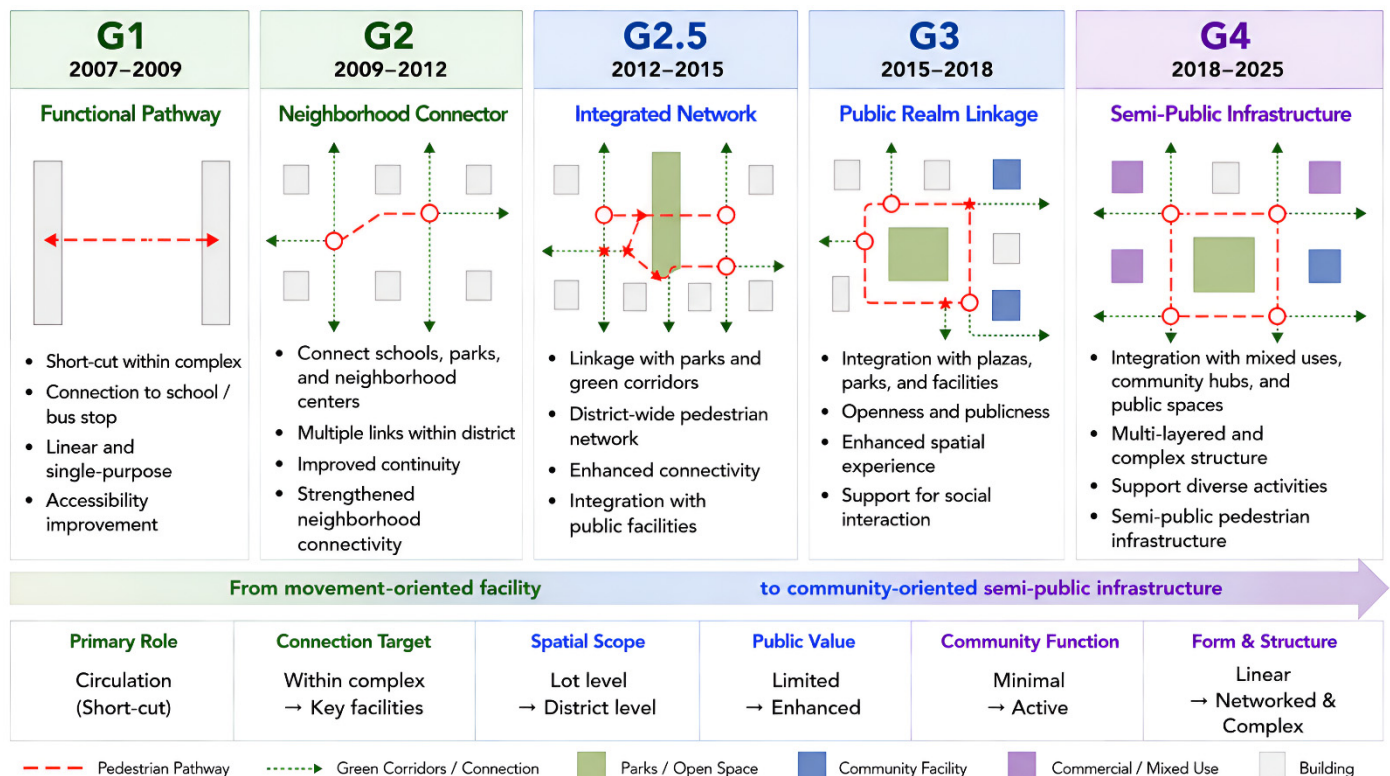


Figure 12. Evolutionary trajectory of public pedestrian pathways in Sejong City. Public pedestrian pathways evolved from functional circulation routes within residential complexes to semi-public pedestrian infrastructure integrating connectivity, publicness, community activities, and urban spatial networks.

4. Discussion

4.1. Drivers of the Evolution of Public Pedestrian Pathways

The findings of this study indicate that public pedestrian pathways in Sejong City gradually evolved from functional circulation facilities into semi-public pedestrian infrastructure over nearly two decades. This transformation cannot be explained solely by advances in design techniques or by the passage of time. Rather, it resulted from the cumulative refinement of district unit planning, apartment housing design competitions, and implementation experience in response to changing planning priorities and social demands throughout the phased development of Sejong City.

During the early stages of development, the primary planning challenge was to secure pedestrian accessibility within large residential complexes. Consequently, public pedestrian pathways were introduced as functional facilities intended to reduce walking distances and improve access to everyday destinations. As successive residential districts were developed under district unit plans, planning objectives gradually expanded beyond parcel-level accessibility toward neighborhood-scale connectivity, resulting in the progressive integration of public pedestrian pathways into broader pedestrian networks.

The phased development process of Sejong City also played an important role in this evolution. Because residential districts were developed sequentially, planning experience and design innovations accumulated over time and were incorporated into subsequent districts. This cumulative planning process enabled lessons learned from earlier residential

districts to be systematically reflected in subsequent district unit plans and apartment housing design competitions. As a result, both the spatial structure and the functional roles of public pedestrian pathways were progressively refined throughout successive planning generations.

In the later planning generations, increasing emphasis was placed on community development, public open spaces, and pedestrian-oriented urban environments. As a result, public pedestrian pathways evolved beyond their original circulation function to support social activities and everyday community life. This transition demonstrates that, as planned cities mature, the role of pedestrian space can expand from facilitating physical movement to fostering social connectivity and community interaction.

Overall, the evolutionary process identified in this study suggests that the transformation of public pedestrian pathways was not the result of a single planning intervention or a simple consequence of urban growth. Rather, it reflects a cumulative planning process in which district unit planning, apartment housing design competitions, implementation experience, and changing community needs continuously influenced subsequent planning generations.

4.2. Public Pedestrian Pathways as Semi-Public Infrastructure

The findings of this study demonstrate that public pedestrian pathways in Sejong City should be understood not merely as pedestrian facilities but as forms of semi-public infrastructure.

Previous studies describe semi-public spaces as environments where public and private attributes coexist and overlap [5,13]. Publicness, in this context, is determined not simply by ownership but by the degree of accessibility and actual opportunities for public use [13]. Public pedestrian pathways examined in this study exhibit these characteristics because they are typically located within privately developed sites while remaining publicly accessible and serving broader public functions.

In recent residential districts, public pedestrian pathways have become increasingly integrated with parks, public open spaces, community facilities, and commercial areas. As a result, they perform functions that extend beyond pedestrian movement alone. Public pedestrian pathways now contribute to the organization of public space systems and provide spatial conditions intended to support social activities and community interactions.

These findings suggest that public pedestrian pathways should no longer be understood solely as pedestrian facilities. Rather, they have evolved into forms of semi-public pedestrian infrastructure that simultaneously support connectivity, publicness, and community integration. This evolution reflects a broader shift in the role of pedestrian space from facilitating movement to organizing social and spatial relationships within planned urban environments. Accordingly, public pedestrian pathways should be regarded not only as circulation infrastructure but also as strategic planning elements that mediate relationships between urban structure, publicness, and everyday community life.

4.3. Implications for Planned Cities

The findings of this study provide several planning implications for the design and long-term management of pedestrian systems in planned cities.

First, public pedestrian pathways should be considered not merely as facilities that improve circulation within residential developments but as strategic planning elements that organize neighborhood-scale pedestrian networks. As demonstrated in this study, stronger integration with parks, schools, commercial facilities, and public institutions can enhance both accessibility and network continuity while strengthening the overall spatial structure of planned neighborhoods.

Second, planning approaches should address not only movement efficiency but also publicness and the quality of the pedestrian experience. The later planning generations in Sejong City demonstrate that spatial openness and integration with public spaces improve not only usability and place identity but also the social functions of pedestrian environments.

Third, public pedestrian pathways can function as social infrastructure supporting community development. When integrated with community facilities, public open spaces, plazas, and parks, they can provide spatial settings for everyday social interaction and community activities rather than serving solely as circulation routes. These findings suggest that pedestrian planning should be integrated with broader public-space and community planning strategies.

Fourth, the phased development of planned cities requires mechanisms for continuously incorporating planning experience and design innovations into subsequent development stages. The case of Sejong City demonstrates how district unit planning, apartment housing design competitions, and implementation feedback can collectively support the long-term refinement of planning elements through iterative planning processes. This planning approach may provide a useful reference for future pedestrian-oriented planned cities.

Taken together, these findings suggest that public pedestrian pathways should be planned not as isolated pedestrian facilities but as long-term planning elements that integrate connectivity, publicness, and community life. The evolutionary process observed in Sejong City demonstrates that continuous planning refinement can transform public pedestrian pathways into an important component of neighborhood-scale public space systems in planned cities.

4.4. Limitations and Future Research

This study contributes to the literature by examining the long-term evolution of public pedestrian pathways in Sejong City over nearly two decades. Nevertheless, several limitations should be acknowledged.

First, the study focuses on a single case. Although Sejong City provides a valuable setting for longitudinal analysis, caution should be exercised when generalizing the findings to other planned cities. Future studies could strengthen the external validity of the findings through comparative analyses of planned cities in different national and institutional contexts.

Second, the study primarily relies on planning documents and spatial analysis and does not directly examine user behavior or perceptions. Future research incorporating surveys, behavioral observations, and spatial analysis techniques could provide a more comprehensive understanding of the social impacts of public pedestrian pathways.

Third, the analysis focuses on planning intentions and spatial characteristics. Additional research is needed to investigate operational and performance-related aspects, including pedestrian volumes, usage patterns, and the effectiveness of public pedestrian pathways in supporting everyday urban activities.

Despite these limitations, this study systematically analyzed the evolution of public pedestrian pathways across twenty residential districts developed over nearly two decades. By demonstrating how public pedestrian pathways evolved from functional circulation facilities into semi-public pedestrian infrastructure, the study contributes to a deeper understanding of pedestrian networks as evolving planning elements within planned cities.

5. Conclusions

This study examined the evolutionary trajectory of public pedestrian pathways in Sejong City, Korea, a state-led planned city developed through a phased planning process over

approximately two decades. By analyzing district unit plans, design competition guidelines, detailed design documents, and built outcomes across 20 residential districts, the study explored how public pedestrian pathways changed in terms of planning objectives, spatial characteristics, and urban functions throughout successive stages of urban development.

The findings reveal that public pedestrian pathways underwent a gradual yet substantial transformation over time. During the early development stage (G1), pathways primarily functioned as circulation facilities intended to reduce pedestrian detours and improve accessibility within large residential blocks. In the G2 stage, they evolved into neighborhood-scale connectors linking residential areas with schools, parks, commercial facilities, and other daily destinations. The G2.5 stage represented a critical transition, in which public pedestrian pathways became increasingly integrated with neighborhood circulation systems, community spaces, and design competition strategies. In the G3 stage, pathways were more closely connected to parks, green corridors, public open spaces, and community facilities, expanding their role beyond simple movement corridors. Finally, the G4 stage demonstrated the emergence of a broader planning perspective in which pedestrian pathways became integrated components of district-wide public space systems and semi-public urban infrastructure.

The analysis further demonstrates that this evolution was not limited to physical connectivity alone. Across successive generations, public pedestrian pathways became increasingly open, publicly accessible, community-oriented, and spatially integrated. Their role expanded from facilitating movement to being increasingly planned and designed to support social interaction, neighborhood cohesion, and everyday public life. As a result, public pedestrian pathways can be understood not merely as circulation facilities but as spatial interfaces that connect public and private realms while mediating relationships between mobility, publicness, and community life within planned urban environments.

A particularly important finding is that the evolution of public pedestrian pathways was closely associated with the phased development process of Sejong City. Rather than applying a fixed planning model throughout the development period, planners continuously modified pathway concepts in response to changing urban conditions, planning philosophies, design competition outcomes, implementation experiences, and emerging community needs. This suggests that pedestrian infrastructure should be understood as an evolving planning element rather than a static regulatory requirement. This finding is consistent with previous research emphasizing that high-quality pedestrian environments depend on the integration of pedestrian networks with surrounding public spaces and urban functions [35]. The present study further demonstrates how these planning principles evolved through successive planning generations. The findings demonstrate that the development of pedestrian infrastructure is shaped not only by technical planning standards but also by broader social, spatial, and institutional changes occurring throughout the urban development process.

Beyond its empirical findings, this study contributes to the literature in several ways. First, it provides one of the few longitudinal analyses of public pedestrian pathways within a planned city context, tracing their transformation over approximately twenty years of urban development. Second, it extends discussions on semi-public space by demonstrating that public pedestrian pathways can function as semi-public infrastructure that is intended to simultaneously enhance pedestrian connectivity, publicness, and community interaction. Third, it introduces an evolutionary planning perspective to the study of pedestrian infrastructure, showing that planning elements are continuously adapted and refined rather than remaining fixed throughout the development process. In this regard, the study broadens existing understandings of public pedestrian pathways from individual

facilities to strategic planning mechanisms that organize urban openness, connectivity, and community integration.

From a planning perspective, the findings provide several implications. First, public pedestrian pathways should be planned as components of integrated neighborhood-scale pedestrian networks rather than as isolated facilities within individual development parcels. Second, enhancing publicness requires not only legal accessibility but also spatial legibility, visual openness, psychological accessibility, and meaningful connections to everyday destinations. Third, pedestrian pathways should be integrated with parks, green corridors, community facilities, public open spaces, and commercial areas to create multifunctional semi-public infrastructure designed to support both mobility and social interaction. Finally, the findings suggest that pedestrian-oriented planned cities should adopt adaptive and flexible planning approaches that allow pedestrian infrastructure to evolve alongside changing urban conditions and community needs.

More broadly, this study demonstrates that the success of pedestrian-oriented planned cities depends not only on the provision of pedestrian facilities but also on the continuous adaptation of those facilities to changing social, spatial, and institutional conditions. The evolutionary trajectory identified in Sejong City illustrates how pedestrian pathways can gradually transform from functional circulation facilities into semi-public urban infrastructure that organizes connectivity, publicness, and community life. This perspective may provide useful insights for future planned cities seeking to strengthen walkability, public space systems, and neighborhood integration.

Nevertheless, this study has several limitations. The analysis focused primarily on planning documents, spatial characteristics, and planning outcomes, with field investigations serving to verify the implementation of planning intentions rather than to examine user behavior or pedestrian movement patterns. In addition, the research examined a single planned city case, which may limit the generalizability of the findings. Future studies should incorporate behavioral observations, pedestrian flow analysis, and comparative investigations of other planned cities to further examine how evolving pedestrian infrastructure influences patterns of movement, social interaction, and community formation. Such efforts would contribute to a more comprehensive understanding of the relationship between pedestrian networks, urban form, and urban life.

Author Contributions: Conceptualization, T.Y.; methodology, T.Y.; validation, M.L. and T.Y.; formal analysis, M.L. and T.Y.; investigation, M.L.; resources, M.L. and T.Y.; data curation, M.L.; writing original draft preparation, M.L.; writing review and editing, T.Y.; visualization, M.L.; supervision, T.Y. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Data Availability Statement: The data presented in this study are available from the corresponding author upon reasonable request.

Acknowledgments: During the preparation of this manuscript, the authors used ChatGPT (GPT-5.5, OpenAI) to assist with language editing and improving the clarity and organization of the manuscript. All outputs were reviewed, revised, and validated by the authors, who take full responsibility for the content of this publication.

Conflicts of Interest: The authors declare no conflicts of interest.

Abbreviations

The following abbreviations are used in this manuscript:

CPTED Crime Prevention Through Environmental Design
MOLIT Ministry of Land, Infrastructure and Transport

Appendix A

The qualitative ratings represent relative interpretations derived from the analytical dimensions defined in Section 2.4.1. For connectivity, the ratings reflect the progression from parcel-level links to district-wide network integration. For openness and publicness, they reflect increasing physical and visual openness and opportunities for public access. For community integration, they indicate the extent of linkage with parks, public open spaces, community facilities, and neighborhood activities. These ratings are intended for systematic qualitative comparison rather than quantitative measurement.

Assessment Criteria for Qualitative Ratings.

- Basic: Basic pedestrian connectivity with limited integration across the five analytical dimensions.
- Improved: Improvement over the previous generation in one or more analytical dimensions, although overall integration remains limited.
- Moderate: Balanced improvement across several analytical dimensions, with partial integration into the surrounding pedestrian network and public spaces.
- High: Strong performance across most analytical dimensions, characterized by well-integrated pedestrian networks and close connections with surrounding public facilities and open spaces.
- Very High: Comprehensive integration across all five analytical dimensions, functioning as a well-connected semi-public pedestrian system that supports connectivity, openness, publicness, community integration, and spatial form.

Table A1. Comparative summary of twenty residential districts based on the five analytical dimensions.

Planning Generation	Residential District	Connectivity	Openness	Publicness	Community Integration	Spatial Form	Major Planning Characteristics
G1	1-1	Basic	Moderate	Limited	Limited	Linear	Internal circulation, reduced pedestrian detours
	1-2	Basic	Moderate	Limited	Limited	Linear	Internal circulation, school connection
	1-3	Basic	Moderate	Limited	Limited	Linear	Accessibility improvement
	1-4	Basic	Moderate	Limited	Limited	Linear	Parcel-level pedestrian routes
	1-5	Basic	Moderate	Limited	Limited	Linear	Internal circulation
	2-3	Basic	Moderate	Limited	Limited	Linear	Neighborhood accessibility
G2	3-1	Improved	Moderate	Moderate	Limited	Network	Neighborhood network connection
	3-2	Improved	Moderate	Moderate	Limited	Network	Park and school linkage
G2.5	2-1	High	High	Moderate	Moderate	Integrated	Design competition, community linkage
	2-2	High	High	Moderate	Moderate	Integrated	Public open space integration
	2-4	High	High	Moderate	Moderate	Integrated	Green corridor connection
	3-3	High	High	Moderate	Moderate	Integrated	Community-oriented layout
	4-1	High	High	Moderate	Moderate	Integrated	Park-centered network
	4-2	High	High	Moderate	Moderate	Integrated	Public space integration
G3	6-3	High	High	High	Moderate	Adaptive	Management-oriented refinement
	6-4	High	High	High	Moderate	Adaptive	Improved pedestrian continuity
G4	5-1	Very High	High	High	High	Integrated	Public infrastructure approach
	5-2	Very High	High	High	High	Integrated	Community-oriented public space
	6-1	Very High	High	High	High	Integrated	Public open-space system
	6-2	Very High	High	High	High	Integrated	Publicly managed pedestrian network

References

1. Dovey, K.; Pafka, E. What Is Walkability? The Urban DMA. *Urban Stud.* **2020**, *57*, 93–108. [\[CrossRef\]](#)
2. Lee, S.; Kang, J.; Hwang, K. A Study on Appropriate Size of Pedestrian-Friendly City Blocks. *KSCE J. Civ. Environ. Eng. Res.* **2007**, *27*, 179–187.
3. Ministry of Land, Infrastructure and Transport (MOLIT). *District Unit Planning Guidelines*; MOLIT: Sejong, Republic of Korea, 2024.
4. Jeon, S.H.; Kwon, Y.C. A Study on the Planning Characteristics of Public Pedestrian Pathways—Focused on the District Unit Plan in New Towns. *J. Urban Des. Inst. Korea Urban Des.* **2013**, *14*, 111–124.
5. Lee, M.; Yoon, T.O. Changes in Meanings of Public Pedestrian Passages as a Planning Element in Urban Design and Their Walking Environment Characteristics. *J. Korea Inst. Spat. Des.* **2025**, *20*, 691–704.
6. Madanipour, A. *Public and Private Spaces of the City*; Routledge: London, UK, 2003. [\[CrossRef\]](#)
7. Carmona, M. *Public Places Urban Spaces: The Dimensions of Urban Design*, 3rd ed.; Routledge: London, UK, 2021.
8. Gehl, J. *Life Between Buildings: Using Public Space*, 6th ed.; Island Press: Washington, DC, USA, 2011.
9. Jabbari, M.; Fonseca, F.; Smith, G.; Conticelli, E.; Tondelli, S.; Ribeiro, P.; Ahmadi, Z.; Papageorgiou, G.; Ramos, R. The Pedestrian Network Concept: A Systematic Literature Review. *J. Urban Mobil.* **2023**, *3*, 100051. [\[CrossRef\]](#)
10. Boniface, S.; Scantlebury, R.; Watkins, S.J.; Mindell, J.S. Health Implications of Transport: Evidence of Effects of Transport on Social Interactions. *J. Transp. Health* **2015**, *2*, 441–446. [\[CrossRef\]](#)
11. Lee, J.G. Legal Issues of Through-block Pedestrian Links and Case Studies from the Administrative City. *J. Urban Adm.* **2016**, *29*, 243–264.
12. Lee, S.J. Improvements of the Public Pedestrian Passages in the Apartment Complex from Crime Prevention Through Environmental Design Aspect. *J. Archit. Inst. Korea Plan. Des.* **2018**, *34*, 135–142. [\[CrossRef\]](#)
13. Choi, J.H. The Role of Public Pedestrian Passages in Contemporary Residential Complexes. *J. Archit. Inst. Korea* **2026**, *42*, 161–171. [\[CrossRef\]](#)
14. Varna, G.; Tiesdell, S. Assessing the Publicness of Public Space: The Star Model of Publicness. *J. Urban Des.* **2010**, *15*, 575–598. [\[CrossRef\]](#)
15. Németh, J.; Schmidt, S. The Privatization of Public Space: Modeling and Measuring Publicness. *Environ. Plan. B Plan. Des.* **2011**, *38*, 5–23. [\[CrossRef\]](#)
16. Park, E.J.; Han, K.G.; Son, S.-K. A Study on the Connectivity of Semi-Public Spaces in Urban Apartment Complexes. In *Proceedings of the Annual Conference of the Architectural Institute of Korea*; Architectural Institute of Korea: Seoul, Republic of Korea, 2007; pp. 207–222.
17. Choi, S.H.; Seok, H.T. A Study on the Facility Utilization and Residents' Cognition of Public Open Spaces in Apartment Housing. *J. Korean Hous. Assoc.* **2002**, *13*, 93–101.
18. Baik, H.S.; Park, Y.K. A Study on Residents' Cognition and Behaviors in Outdoor Living Spaces of Multi-family Housing. *J. Archit. Inst. Korea* **2002**, *18*, 87–94.
19. Jacobs, J. *The Death and Life of Great American Cities*; Random House: New York, NY, USA, 1961.
20. Whyte, W.H. *The Social Life of Small Urban Spaces*; Project for Public Spaces: New York, NY, USA, 1980.
21. Carmona, M. Re-Theorising Contemporary Public Space: A New Narrative and a New Normative. *J. Urban. Int. Res. Placemak. Urban Sustain.* **2015**, *8*, 373–405. [\[CrossRef\]](#)
22. Baek, H.S.; Park, Y.K. A Study on the Use Characteristics of Outdoor Living Spaces in Apartment Housing Complexes. *J. Archit. Inst. Korea Plan. Des.* **2002**, *18*, 113–120.
23. Jang, D.H.; Park, S.B. A Study on Apartment Residents' Space Use Behavior Responding to Layouts of Outdoor Living Space. *J. Archit. Inst. Korea Plan. Des.* **2012**, *28*, 105–114. [\[CrossRef\]](#)
24. Kim, T.W.; Jang, M.S. An In-Depth Case Study on User Behaviors and Spatial Configuration for Utilization of Outdoor Spaces in an Apartment Complex. *J. Korean Hous. Assoc.* **2022**, *33*, 23–30. [\[CrossRef\]](#)
25. Yoon, T.W.; Kim, Y.-J.; Yoon, M.-N.; Hwang, J.-H. A Longitudinal Analysis of the Structural Evolution of Apartment Housing Design Competition Guidelines in Sejong: Based on the Design Competition Guidelines for Apartment Housing Development Sites in the Multifunctional Administrative City (2013–2024). *J. Urban Des. Inst. Korea Urban Des.* **2026**, *27*, 25–39. [\[CrossRef\]](#)
26. Woo, H.J.; Hwang, S.W. Public Pedestrian Passages in Seoul Apartment Complexes. *J. Archit. Inst. Korea* **2026**, *42*, 347–358.
27. Lee, J.; Park, S. Investigating Pedestrian Connectivity within Apartment Complexes: A Case Study of Seoul and Singapore. *Local Environ.* **2022**, *27*, 697–711. [\[CrossRef\]](#)
28. Steinfeld, E.; Maisel, J. *Universal Design: Creating Inclusive Environments*; Wiley: Hoboken, NJ, USA, 2012.
29. Heo, H. The Necessity for Amendment of Article 47 Clause 1 of Housing Act Enforcement Decree about the Regulation of Pedestrian Roads. *Korean Lawyers Assoc. J.* **2014**, *63*, 33–73. [\[CrossRef\]](#)
30. Marshall, S. *Streets and Patterns*; Spon Press: London, UK, 2005.
31. Alexander, C. A City Is Not a Tree. *Archit. Forum* **1965**, *122*, 58–62.

32. National Agency for Administrative City Construction (NAACC). *Master Plan for the Multifunctional Administrative City*; NAACC: Sejong, Republic of Korea, 2007.
33. National Agency for Administrative City Construction (NAACC). *2023 Administrative City Planning Report*; NAACC: Sejong, Republic of Korea, 2023.
34. Yin, R.K. *Case Study Research and Applications: Design and Methods*, 6th ed.; SAGE Publications: Thousand Oaks, CA, USA, 2018.
35. Belge, Z.S.; Belge, B.; Saf, H.O.; Özdemir, E.E. Evaluation of Pedestrian Movement and Sustainable Public Realm in Planned Residential Areas, Mersin, Türkiye. *Sustainability* **2025**, *17*, 8205. [[CrossRef](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.