SHENZHEN

Green Mobility-Led Urban Development:

Shenzhen's Transport Practices for Building a City of Symbiosis

Shenzhen's green mobility-led approach shows how transport can shape urban structure, support liveability and strengthen connections between people, the city and nature.





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Gangxia North Hub: An underground urban living room at the heart of Shenzhen.
Image: vcg.com



Introduction: What Kind of Mobility Does a Fast-Growing High-Density City Need?

Shenzhen is a city shaped by rapid transformation. Over the past four decades, this small border town—which sits on less than 2,000 km^2 of land—has grown into a megacity with over 18 million permanent residents. This extraordinary pace of urbanisation has created new transport challenges—ranging from a growing call to support urban expansion and improve connectivity across a polycentric city, to making efficient use of limited land to meet rising expectations for greener and more liveable urban environments.

In response, Shenzhen has progressively developed an approach to green mobility-led urban development, in which transport is not treated simply as infrastructure for moving people, but as an important tool for shaping the city itself. This approach can be understood through three interrelated dimensions: using transport networks to shape urban structure and guide spatial development; integrating transport infrastructure with urban functions and public space; and using green mobility to support more liveable, healthy and sustainable urban life.

Viewed through the Urban Index of Shenzhen (UIS), these practices also reflect a broader evolution in the relationship between transport and the city—one that goes beyond transport efficiency alone to consider how mobility can contribute to a city's capacity to evolve, coexist with nature and urban life, and, ultimately, improve people's everyday experiences.

Using Mobility to Shape Urban Structure: From Road Structure to Rail-Oriented Development

A Mobility Backbone for Supporting Urban Expansion

In the early stages of its development, Shenzhen faced the key challenge of supporting rapid urban growth within a limited land area. In 1985, the *Master Plan for the Shenzhen Special Economic Zone (1985–2000)* was developed, taking into account the city's mountain-and-sea topography and east–west linear form to establish a polycentric, cluster-based urban structure. Three major east–west arterial roads—Shennan, Beihuan and Binhe—formed the backbone of the city's expansion, with Shennan Avenue designated as a major public transport corridor. Together, these networks helped shape Shenzhen's early urban growth.

As the Special Economic Zone expanded to cover the entire city in 2010, demand for longer-distance travel between urban clusters continued to grow, making further road expansion increasingly unsustainable. This led Shenzhen to establish rail transit as the backbone of its comprehensive transport system—marking a shift from road-supported expansion to rail-led development. Through successive rounds of rail planning and construction, the city built a network aligned with its polycentric, cluster-based spatial structure. In particular, rail express lines strengthened connections between peripheral clusters and the central city. This brought outlying areas within a 45-minute commuting catchment and enabled previously separated clusters to function as a connected urban system.

TOD: Creating Mobility and Urban Development Synergies

As Shenzhen grew in density, the city turned increasingly to Transit-Oriented Development (TOD) to better integrate rail transit with land use. Careful management of development intensity around rail stations using the Shenzhen Urban Planning Standards and Guidelines ensured homes, jobs, commercial activities and public



Rail express lines connect the city nodes with peripheral clusters.
Image: Shenzhen Urban Planning & Land Development Research Center

services were concentrated in areas with high public transport accessibility. Today, average development intensity within 500 metres of rail stations is about 1.8 times the city-wide average, while 81% of commuters can complete a one-way journey within 45 minutes.

Transport is not merely infrastructure that responds to urban growth; it also plays an active role in shaping how urban space and functions are organised.

Alongside rail planning and construction, Shenzhen also adopted a coordinated approach to underground space development to integrate different facilities and functions around rail stations. Projects such as Chegongmiao Fengshengding Commercial Street, Link City Mall and the Keyuan Avenue underground complex demonstrate the benefits of developing above- and below-ground spaces together. This integrated approach allows rail transit to support surrounding development, while the concentration of activities and passenger flows, in turn, helps sustain rail operations.

From arterial roads supporting early urban expansion to rail networks reshaping connections across the city, and TOD integrating transport with land development, Shenzhen's transport system has evolved together with the city itself. Transport is therefore not merely infrastructure that responds to urban growth; it also plays an active role in shaping how urban space and functions are organised.

Creating Compound Spaces: From Single Mobility Facility to Integrated Urban Development

As Shenzhen has shifted from rapid outward expansion towards high-density development under increasingly tight land constraints, its transport challenges have also changed. The question is no longer simply whether transport services are available, but how limited urban space can be used more efficiently.

Going Vertical: Space-Sharing Enhances Transport Facilities and Urban Functions

Traditionally, bus depots occupied standalone sites and served a single function. In a high-density city such as Shenzhen, however, this low-density model is increasingly difficult to sustain. Since 2014, Shenzhen has restructured its bus depot system with comprehensive multi-storey depots that accommodate operational functions such as parking, charging and maintenance, while ancillary terminals support passenger services, including dispatching, boarding and alighting.

The Shenzhen Urban Planning Standards and Guidelines further require residential, commercial and transport-hub developments above specified thresholds to incorporate ancillary bus terminals. More than 150 such terminals have now been completed across the city.

Beyond addressing the land requirements of bus facilities, this approach reflects a broader shift in how transport infrastructure is planned in a high-density city: rather than occupying additional standalone land, transport facilities are increasingly integrated with other urban functions. By moving from single-level to vertical development and from single-purpose to mixed-use space, Shenzhen has created a more efficient and integrated relationship between its transport infrastructure and the surrounding city areas.



Bus terminal integrated with urban functions—Shangjun Garden, Shenzhen.
Image: Shenzhen Urban Planning & Land Development Research Center

Mobility Hubs: From Transfer Facilities to Urban Living Rooms

Traditional transport hubs have been designed primarily to move passengers efficiently. Gangxia North Hub represents a different approach: beyond enabling transfers, can a transport hub also become a place where people choose to stay?

Located in Futian CBD, Gangxia North Hub integrates four metro lines, bus services, commercial uses and public space within approximately 206,000 m² of underground space. With sunken plazas and skylights bringing in natural light, the hub is transformed from a purely functional transfer space into a vibrant urban public space with activities that encourage people to stay, meet and spend time.

This reflects a broader shift in the role of transport infrastructure—from simply enabling movement to supporting public life. In line with Shenzhen's approach to green mobility-led urban development, transport hubs are no longer merely nodes that connect different parts of the city; they are also becoming important components of urban space and everyday life.

From integrating bus depots with urban functions to combining multimodal hubs with public spaces, Shenzhen has gradually moved away from the traditional model of standalone, single-purpose transport facilities. Within a highly constrained urban environment, transport infrastructure increasingly shares space with retail and public activities, creating more integrated and efficient urban places.

Shaping Greener Urban Life Through Mobility: From Green Travel to Urban Liveability

As Shenzhen enters a more mature stage of urban development, its transport planning priorities are also changing. In the past, the primary focus was on operational efficiency. Today, there is greater focus on people's travel experience, urban liveability, environmental protection and healthier lifestyles.

Mountains-Sea-City Linkage Plan: Connecting Ecology, Recreation and Everyday Life

Walking and cycling are among the lowest-carbon forms of mobility and offer some of the most direct ways for people to experience the city. In a subtropical, high-density city like Shenzhen, however, the quality of active mobility depends not only on network continuity, but also on how well streets respond to heat, strong sunlight and frequent rainfall. Seemingly small improvements—such as providing shade, rain protection and continuous pedestrian crossings—can have a direct impact on whether people are willing to walk or use public transport.

Shenzhen has continued to improve its active mobility network, with particular attention given to continuous pedestrian routes and weather-protected walkways around rail stations. In doing so, transport planning has gradually shifted from simply providing routes to prioritising people's actual travel experience. Green mobility, in other words, depends not only on whether infrastructure exists, but also on whether people are willing to use it.

Active mobility networks do more than support daily travel; they also help connect the city with its natural environment. Nearly half of Shenzhen's territory consists of mountains, forests, rivers, lakes and coastal areas. While transport systems have traditionally focused on connecting people with urban functions, Shenzhen is increasingly leveraging walking and cycling networks to strengthen connections between people, the city and nature.



Mountains-Sea-City Linkage Plan: Western Coastal Bike Path beneath expressway (Xiwan–Qianhai Bay Section).
Image: vcg.com

The Mountains-Sea-City Linkage Plan—structured around the ecological framework of "One Ridge, One Belt and Twenty Corridors"—integrates ecological restoration, river management, waterfront parks and active-mobility networks into a connected public-space system. By linking mountains, sea, city and parks, green mobility becomes not only a means of travel, but also a way of bringing nature, recreation and everyday life closer together.

The Western Coastal Bike Path is one such example. Stretching about 50 km, it connects natural and urban landscapes—including Xiwan Mangrove Park, Qianhai, Shekou and Shenzhen Bay Park. A 6 km section between Xiwan and Qianhai Bay repurposes under-viaduct space as a multifunctional public area for cycling, jogging and recreation. As active-mobility infrastructure extends beyond its transport function to become part of the city's public-space network, it connects people more closely with nature and everyday urban life. What green mobility creates is therefore not only more convenient travel, but also an urban lifestyle that is healthier, more comfortable and more connected to nature.

Green Transformation: From Electric Vehicle to Urban-System Integration

Vehicle electrification is a key pathway in Shenzhen's transition towards greener mobility. In 2017, the city achieved full electrification of its bus fleet, followed by its taxis and ride-hailing vehicles. Shenzhen now has approximately 1.628 million new energy vehicles. Such a large-scale shift requires more than vehicle replacement alone. It also depends on coordinated support from urban planning and infrastructure provision. Shenzhen has incorporated charging-facility requirements into its urban planning standards and promoted their integration into bus depots, public parking facilities, transport hubs and existing petrol-station sites. Around 1,098 ultra-fast charging stations are now operational across the city, forming an increasingly comprehensive charging network.

Behind this large-scale transition is a broader change in the relationship between mobility and urban space. Rather than simply adding new facilities in response to emerging technologies, Shenzhen has adapted its transport-related spaces and infrastructure systems to address changing mobility needs. This reflects the city's ability to continuously evolve in response to technological change, while also strengthening the integration of transport, infrastructure and urban development.

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Conclusion: The End Goal of Transport Planning Is Not Transport Itself

Looking back at Shenzhen's transport development, what emerges is a process of continuous adaptation alongside the city's growth. The UIS provides one way of interpreting this evolution, looking at three dimensions: Transformation, Symbiosis and Aspiration.

Transformation is reflected in the city's ability to respond to emerging challenges at different developmental stages by continuously adjusting its transport strategies. Symbiosis lies in the evolving relationship between transport, urban functions, the natural environment and public space, allowing transport to generate broader urban value. Aspiration, in turn, speaks to the ultimate question behind these efforts: what kind of urban life do we want to create?

Looking ahead, Shenzhen will continue to improve transport efficiency and infrastructure while placing greater emphasis on the quality of urban life. Future efforts will focus on using land space more efficiently, responding better to climate change, strengthening connections with the city's mountain-and-sea landscapes, and improving everyday travel experience.

Ultimately, transport planning is about shaping space, building the city and improving daily life through mobility. This logic underpins Shenzhen's green mobility-led urban development and provides an important pathway towards becoming a City of Symbiosis.