

New-Quality Productive Forces and the Construction of High-Quality Livable Areas

-- A Case Study of Nanchong Linjiang New Area

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Abstract: "New-quality productive forces" constitute a creative development and practical innovation of Marxist productive forces theory in China, embodying a high-level modernized form of productive forces and serving as a fundamental theoretical and practical guide for optimizing urban development patterns and spatial layout. Guided by the CPC Nanchong Municipal Committee and the Nanchong Municipal People's Government, Nanchong has evolved into a modern city characterized by beauty, civilization, and harmony. Despite remarkable progress in urban construction, the city still faces prominent challenges, including traffic congestion, irrational spatial layout, urban waterlogging, inadequate sewage treatment, and backward infrastructure construction (e.g., communication and gas pipeline networks). Taking these practical dilemmas as the entry point, this study proposes targeted countermeasures for urban construction under the guidance of the "new-quality productive forces" paradigm. The research aims to provide theoretical reference and practical support for addressing existing bottlenecks and advancing the high-quality construction of Nanchong Linjiang New Area.

Keywords: New-quality Productive Forces; Guiding Ideology; Problems Existing in Urban Area Construction; Solutions.

1. Introduction

In September 2023, General Secretary Xi Jinping proposed the concept of "new-quality productive forces"[2] during his inspection tour in Heilongjiang, emphasizing the need to rely on these forces to lead and promote social development. New-quality productive forces represent the Chinese innovation and practice of Marxist productive forces theory. They are a high-level form of modern productive forces and a concrete manifestation of the modernization of productive forces. Compared with traditional productive forces, new-quality productive forces are distinguished by distinct features, including novel types, optimized structures, advanced technological levels, high-quality output, efficient operation, and strong sustainability—attributes that enable them to break through the constraints of conventional development models and drive high-quality urban construction.

Nanchong Linjiang New Area, the third provincial-level new area in Sichuan Province, is geographically situated at the geometric center of the Northeast Sichuan Economic Zone. As a core construction carrier for building the "Northeast Sichuan Central City" and the "Chengdu-Chongqing Dual-City Economic Circle Second-Tier City," it has adhered to the guiding principle of "balancing construction and management, and synchronously enhancing urban appearance and connotative development" in its urbanization process. Through systematic planning and implementation, the new area has achieved notable progress in the following key areas: Urban renewal and infrastructure upgrading: A total of 1,872.47 kilometers of high-standard urban roads have been constructed, significantly improving regional transportation connectivity. Additionally, the renovation of 305,100 shantytown units and 276,700 old residential communities has been completed, effectively enhancing residential living conditions and residents' sense of well-being. Public service

and ecological space improvement: Multiple public leisure and ecological facilities have been built, including Binjiang Wetland Park, Beihu Park, Qingquansi Park, Xiheba Sports Park, and Binfen Shui'an Wetland Park. As a result, the per capita park green space area in the region has reached 14.67 square meters, providing residents with high-quality outdoor activity spaces and optimizing the urban ecological environment. Modern service industry and consumption capacity enhancement: Key functional platforms have been newly established, such as the Northeast Sichuan Financial Center, the "1227" Characteristic Commercial Block, Renhe Chuntian Commercial District, Wangfujing Commercial Back Square, and the International Logistics Park. These facilities have not only enriched the urban commercial and service formats but also driven a comprehensive upgrading of Nanchong's urban landscape and functional layout. Environmental governance and sponge city construction: Sixteen county-level and above sewage treatment plants have been built, strengthening the region's capacity for sewage collection and treatment. Furthermore, a series of sponge city projects have been completed, including the Huangjin Jiang'an Tourism Infrastructure Project, the "Impression Jialing River" Shangzhongba Wetland Protection Project, and the Binfen Shui'an Wetland Park Project. These efforts have earned Nanchong the titles of "National Demonstration City for Black and Odorous Water Body Treatment (Third Batch)" and "Provincial Demonstration City for Systematic and Comprehensive Sponge City Construction."

Under the leadership of the CPC Nanchong Municipal Committee and Nanchong Municipal People's Government, the people of Nanchong have, through more than 10 years of efforts, built Nanchong into a beautiful, civilized and harmonious modern metropolis. However, after the relevant facilities and buildings were put into use, some problems have gradually emerged. The main problems are as follows: Urban congestion: With the renovation of shantytowns, old

residential communities and old urban areas, the traffic congestion in Nanchong's central urban area has become increasingly prominent, especially during morning and evening peak hours and holidays, with an average congestion duration of about 20 minutes. Unreasonable urban layout: With the vigorous advancement of Nanchong's urban construction, the urban architectural structure is compact and the population is concentrated. The buildings are excessively high, leading to significant potential safety hazards of falling objects from heights. Urban waterlogging: As the renovation of shantytowns, old residential communities and related urban construction in Nanchong progress, problems such as poor drainage of municipal pipe networks, deep water accumulation on roads, and increased peak flood runoff caused by urban reconstruction and construction have become increasingly prominent. Urban sewage discharge: With the vigorous promotion of Nanchong's urban construction, the urban population has been increasing, making the problem of urban sewage discharge more and more serious. It is mainly reflected in the strong regional and time-period characteristics of sewage discharge volume. Defects in urban pipe network construction: In the construction of urban pipe networks, there are flaws such as small diameters and insufficient capacity of strong and weak electrical pipelines as well as rainwater and sewage pipelines, which fail to meet the requirements of subsequent expansion. In particular, weak electrical pipelines are laid in the same channels as rainwater drainage pipelines.

2. Research Status at Home and Abroad

In the research on new-quality productive forces. 2024, Chen Yunkun[1] took new-quality productive forces as the guiding ideology, put forward relevant suggestions for the improvement of Guizhou's tourism construction and associated industrial chains, and provided new ideas for integrating technology, digitalization, platformization, and intelligence into Guizhou's tourism industry. 2024, Zhou Tao [2] focused on new-quality productive forces as the guiding principle and proposed measures for building a high-quality livable city featuring comfort and convenience, a high-quality industrial city full of vitality and efficiency, and a high-quality cultural city with profound heritage. 2024, Song Yingchang[3] conducted research on China's urbanization process under the guidance of new-quality productive forces, explored the paths for urban transformation and high-quality development in the new era, and enriched the practical samples of urbanization construction. 2024, Yao Zhi[4] analyzed the basic connotation of new-quality productive forces, empowered the construction of high-standard farmland with the profound implications of new-quality productive forces, sorted out the theoretical logic of high-standard farmland construction, and concluded that building high-standard farmland under the guidance of new-quality productive forces is an indispensable path to achieving the goal of a strong agricultural country.

In terms of urban construction. 2024, taking the current situation of flood control in Chengdu's underground space as the background, Ma Yanbin[5] analyzed the existing problems in the current flood control technical measures for underground space in Chengdu. He proposed measures to improve Chengdu's underground space's ability to respond to waterlogging disasters and enhance disaster prevention and mitigation capabilities, so as to upgrade the urban safety level,

reduce disaster losses, and assist in the construction of a beautiful, livable and park city. 2024, Zhou Dawei [6] took the traffic congestion problem in small and medium-sized cities as the research object, explored the adverse impacts of traffic congestion, and proposed that the problem could be solved through a multi-departmental collaborative traffic governance strategy. 2024, Huang Rongping [7] analyzed the challenges encountered in existing pipe network maintenance, drew on the application of environmental protection technology in the leather manufacturing industry, and proposed a comprehensive pipe network management method, which improved the efficiency of pipeline drainage and sewage discharge. 2005, Wu Jianhu[8] conducted research on hydrological problems caused by urban development, and revealed that changes in urban climatic conditions, a sharp drop in urban groundwater levels, and urban sewage discharge are the fundamental reasons for the severe urban flood control situation. 2024, based on the perception of driving data transformation characteristics in remote sensing image processing, Wang Yitian [9] established an urban structural scale layout model, obtained the optimal solution of the model using an improved genetic algorithm. After optimization with this method, the rationality index of urban structural scale layout has been significantly improved. 2023, Li Yingcheng[10] conducted research on urban building density, and discussed that exploring the distribution law of internal urban building density is of great significance for revealing the basic characteristics of urban spatial growth and formulating planning strategies to promote sustainable urban growth.

Most of the aforementioned studies are limited to the development of tourism, the construction of high-standard farmland, etc., under the guidance of new-quality productive forces, or focus on individual problems in urban construction. Few studies have addressed the problems in urban construction with "new-quality productive forces" as the guiding ideology. Taking "new-quality productive forces" as the core guiding principle, this research will identify the relevant causes, analyze relevant data, and propose corresponding decisions to solve the problems such as urban congestion, unreasonable urban layout, urban waterlogging, and urban sewage discharge encountered after Nanchong's urban construction. It is expected to provide reference for the construction of Nanchong Linjiang New Area.

3. Problems Existing in Nanchong's Urban Construction

(1) Issues in the Design and Planning of Nanchong's Urban Areas

Urban planning serves as a core guarantee for the long-term sustainable development of cities, yet it often encounters multi-dimensional constraints in practical implementation. Combining the specific context of Nanchong and the universal challenges faced by urban areas across China, the current urban design and planning in Nanchong exhibit prominent deficiencies in ecological orientation, spatial coordination, resource allocation, infrastructure layout, and governance mechanisms. These issues are detailed as follows: Insufficient integration of ecological priorities in planning: From the perspective of Nanchong's urban construction design plans and existing spatial layout, the number of park green spaces in built-up areas is relatively limited, while the building density remains high. This mismatch directly results

in a low per capita green space area, failing to meet the standards of ecological livability and weakening the city's ecological regulation capacity (e.g., heat island effect mitigation, air purification). Mismatch between functional zoning and transportation efficiency: The irrational spatial distribution of residential areas, employment hubs, and commercial districts leads to excessively long travel distances for residents' "residence-work" and "residence-consumption" trips. In some core areas, the over-concentration of land use (e.g., mixed high-density residential and commercial functions without supporting employment) further triggers "pendulum-style traffic" during peak hours, significantly exacerbating commuting pressure and transportation energy consumption. Inadequate planning and allocation of educational resources: The spatial layout of kindergartens, primary schools, and secondary schools lacks balance—with overcrowding phenomena (e.g., 50 students sharing a single classroom) occurring in schools within densely populated residential areas. This issue reflects two core planning defects: first, the insufficient prediction of educational demand corresponding to population growth and residential expansion; second, the asynchrony between the construction of public service facilities (including schools) and the pace of urban spatial expansion. Deficiencies in urban transportation system planning: Despite the relatively wide road width in some areas, inadequate systematic planning of the transportation network has led to structural problems such as excessive intersections, scattered dead-end roads, and irregular corner roads. These defects disrupt the continuity of traffic flow, easily causing traffic bottlenecks and reducing the overall operational efficiency of the urban transportation system. Inadequate and uncoordinated planning of urban pipelines: The planning of functional pipelines (including telecommunications, water supply, gas, and electricity) lacks overall coordination, resulting in frequent occurrences of "co-piping" (i.e., mixed laying of different types of pipelines). This not only increases the difficulty of daily maintenance but also requires frequent excavation and replacement of pipelines in case of failures, leading to repeated road damage and disruption of urban normal operations. Insufficiency of public welfare infrastructure: The construction of public welfare infrastructure (e.g., community health service centers, elderly care facilities, public cultural venues) is characterized by insufficient quantity and lagging progress. This deficiency not only fails to meet the growing public service demands of residents but also further exacerbates the imbalance between urban construction scale and functional support capacity. Weaknesses in planning decision-making mechanisms and public participation: The Urban-Rural Planning Committee has not fully fulfilled its regulatory and decision-making functions, with insufficient professional capacity in technical review and policy formulation—leading to strong arbitrariness in planning adjustments (e.g., frequent revisions of land use plans). Meanwhile, the grassroots management mechanism for planning supervision is unsound, and effective channels for public participation are lacking, making it difficult to form a multi-subject collaborative supervision pattern involving the government, experts, and residents.

(2) Problems in the Construction of Nanchong's Urban Areas

Through on-site investigations of key construction projects, including the "Nanchong High-Tech Zone Construction Site," "Nanchong Linjiang New Area Construction Site," and other relevant urban construction sites in Nanchong, this study

identified prominent problems in the construction process of under-construction urban areas, which mainly manifest in the following aspects: Poor connectivity of the road network: Road planning lags behind the pace of urban construction—with many under-construction areas facing issues such as incomplete road networks, a large number of dead-end roads, and excessive T-junctions. This not only restricts the transportation accessibility of the construction areas but also hidden dangers for traffic congestion after the completion of the projects. Lagging construction of underground pipelines: Similar to the planning stage, the construction of underground pipelines (telecommunications, water supply, gas, electricity, etc.) lacks coordination, with frequent co-piping phenomena. Moreover, the technical standards and capacity of constructed pipelines become outdated quickly, failing to keep up with the pace of urban development and population growth. This leads to the need for frequent excavation, replacement, and repair of pipelines shortly after completion, resulting in a waste of construction resources and disruption of urban operations. Continuity of public welfare infrastructure deficiencies: Consistent with the planning stage problem, the construction of public welfare infrastructure in under-construction areas remains insufficient and lagging. For example, new residential communities are often put into use before the completion of supporting kindergartens or community service centers, further widening the gap between residential supply and public service support. Insufficient scientificity in construction-phase planning implementation: The urban construction process lacks sufficient consideration of dynamic factors such as population carrying capacity and landscape pattern protection. For instance, some areas pursue high-intensity construction without evaluating the bearing capacity of resources (e.g., water resources, land) and the environment, leading to excessive urban load and hindering the realization of long-term sustainable development goals. Inadequate integration of ecological concepts in construction: In the pursuit of economic growth and construction progress, the protection of the urban ecological environment has been neglected. For example, some construction projects have destroyed original green spaces or wetland ecosystems without effective ecological restoration measures, resulting in obvious contradictions between urban development and ecological protection (e.g., reduced biodiversity, weakened water conservation capacity). Weak control over pollution discharge at construction sites: The supervision and control of pollution (including construction dust, noise, and construction waste) during the construction process are inadequate. Uncontrolled dust and noise pollution have directly affected the living environment quality of nearby residents, while the random disposal of construction waste has increased the pressure on urban environmental governance.

(3) Problems in the Operation of Nanchong's Existing Urban Areas

Under the leadership of the CPC Nanchong Municipal Committee and the Nanchong Municipal People's Government, the people of Nanchong have developed Nanchong into a modern metropolis characterized by beauty, civilization, and harmony through over a decade of efforts. However, as the constructed facilities and buildings have entered the long-term operation phase, a series of functional and operational problems have gradually emerged, which are mainly reflected in the following aspects: Intensified urban traffic congestion: With the advancement of shantytown

renovation, old residential community upgrading, and old urban area renewal, the population density and vehicle ownership in Nanchong's central urban area have increased significantly—leading to increasingly prominent traffic congestion. This problem is particularly severe during morning and evening rush hours and holidays, with an average daily congestion duration of approximately 20 minutes, seriously affecting the efficiency of urban transportation and residents' travel experience. Irrationality of the operated urban spatial layout: Driven by the rapid progress of urban construction, the architectural structure of Nanchong's existing urban areas is relatively compact, and the population is highly concentrated in core areas. Additionally, the excessive height of some high-rise buildings not only disrupts the rational spatial hierarchy of the city but also brings significant potential safety risks (e.g., accidents caused by falling objects from high altitudes) and affects the living environment quality (e.g., reduced lighting and ventilation for low-rise buildings). Frequent occurrence of urban waterlogging: As shantytown renovation, old residential community upgrading, and other urban construction projects have been completed and put into operation, problems related to urban waterlogging have become increasingly prominent. Specifically, these problems include the insufficient drainage capacity of existing municipal pipe networks, deep water accumulation on road surfaces during heavy rainfall, and a substantial increase in peak flood runoff caused by the expansion of impermeable surfaces (e.g., roads, buildings) in the process of urban reconstruction. These issues pose direct threats to urban public safety and the normal operation of social and economic activities. Pressing challenges of urban sewage discharge: With the continuous growth of the urban permanent population driven by urban construction, the pressure of urban sewage discharge has been further aggravated. This problem is mainly manifested in the obvious regional differences and temporal fluctuations in sewage discharge volume: for example, densely populated residential areas have significantly higher sewage discharge than other regions, and the discharge volume during morning and evening living peaks (e.g., morning water use, evening cooking) is much higher than that during off-peak hours. These fluctuations pose severe challenges to the stable operation of urban sewage treatment systems. Functional defects of existing urban pipe networks: The operation of urban pipe networks has exposed obvious functional defects. On the one hand, the diameter and capacity of strong and weak electrical pipelines, as well as rainwater and sewage pipelines, are insufficient to meet the needs of subsequent urban expansion and population growth—leading to frequent pipeline blockages or overloads. On the other hand, the irrational layout of pipelines (e.g., the co-laying of weak electrical pipelines and rainwater drainage pipelines) increases the risk of pipeline damage and functional failure during operation (e.g., water seepage from rainwater pipelines affecting the normal operation of weak electrical systems).

4. Summary of Existing Problems

Under the overall leadership of the CPC Nanchong Municipal Committee and Nanchong Municipal People's Government, through more than ten years of continuous investment and systematic construction, Nanchong has gradually developed into a livable, business-friendly, civilized and harmonious modern regional central city.

Combining the characteristics of the urban development stage, a systematic combing from the entire chain of planning and design, construction and implementation to operation and management shows that Nanchong is currently facing six prominent problems in the process of urban development:

Urban traffic congestion: With the orderly advancement of shantytown renovation, old residential community renewal, and organic renewal projects in old urban areas, the population and motor vehicle ownership in the central urban area have increased simultaneously, and the traffic flow has shown a rigid upward trend. The problem of traffic congestion has become increasingly prominent. Especially during morning and evening peak hours, the traffic efficiency of core road sections has dropped significantly, and the traffic pressure is particularly acute.

Irrational urban spatial layout: With the continuous expansion of urban construction scale and the acceleration of urbanization, the structural problem of unreasonable urban spatial layout has gradually emerged. It is mainly manifested in the unbalanced overall functional layout of the urban area, excessively high building density in some regions, blurred functional zoning, and mismatch between public service facilities and population distribution, resulting in low spatial utilization efficiency.

Inadequate urban ecological construction: In the process of rapid urban development, due to the relatively high attention paid to economic growth, the overall coordination of ecological environment protection and construction needs to be strengthened. This has led to the lag in the construction of the urban green space system, insufficient total supply of green space resources, and the per capita green space area, the number of park green spaces, and their service radius have failed to fully meet the people's growing demand for ecological leisure.

Urban waterlogging control: Affected by urban construction activities such as shantytown renovation and old residential community renewal, coupled with the low construction standard of the original drainage system, problems such as urban road water accumulation and insufficient flood discharge capacity of drainage pipe networks have become increasingly prominent. During periods of concentrated rainfall, the risk of waterlogging in some low-lying areas has increased significantly, exerting a certain impact on the normal operation of the city and residents' lives.

Urban sewage disposal: The continuous advancement of urban construction has driven the rapid agglomeration of urban population, the discharge of industrial and domestic sewage has increased year by year, and the pressure of sewage disposal has continued to grow. Its prominent characteristics are obvious regional differences in sewage discharge (uneven discharge intensity in different functional areas) and periodic fluctuations (concentrated discharge during morning and evening living peaks and industrial production periods), which bring challenges to the stable operation of the sewage treatment system.

Defects in Urban Pipe Network Construction. The existing urban pipe network system (including strong and weak electrical pipelines and rainwater-sewage diversion pipelines) has obvious shortcomings. It is mainly reflected in the small diameter and insufficient bearing capacity of the pipelines, which are difficult to adapt to the needs of subsequent urban construction expansion, population growth, and functional upgrading. At the same time, there are irregularities in pipe

network construction—weak electrical pipelines are connected to rainwater drainage pipelines in some areas, which affects the normal operation efficiency of the pipe network system.

5. Solutions

(1) Specific Countermeasures for Urban Traffic Congestion

Through on-site investigations, traffic congestion in Nanchong's three urban districts mainly stems from road construction and renovation in old residential communities, excessively high building density, and irrational planning of traffic signals. At the critical stage of Nanchong Linjiang New Area's construction, to avoid the aforementioned problems, guided by the ideology of new-quality productive forces, a strategy of "One Construction, Two Reductions, and One Integration" is proposed to fundamentally solve urban traffic congestion and support the construction of Linjiang New Area into a high-quality livable area.

Construct a Large-Scale Underground Express Traffic Layer to Alleviate Traffic Congestion Pressure

Plan and construct a large-scale underground express traffic layer consisting of two levels: the lower level for subway lines and the upper level for non-motorized vehicles. When economic conditions are relatively limited, non-motorized vehicles such as bicycles, electric scooters, and motorcycles can first be diverted to this underground layer, reducing ground traffic flow and directly alleviating pressure on surface roads. Non-motorized vehicles in the underground layer will operate continuously and in a fully enclosed manner without traffic lights, further reducing ground traffic burden. With fewer non-motorized vehicles on the surface, congestion at traffic lights and intersections will be reduced, thereby improving road network operation efficiency. When economic conditions permit, the lower level can be upgraded to rapid transit or subway lines. At this stage, the simultaneous operation of non-motorized vehicle routes, subway lines, and rapid transit lines will further ease surface traffic pressure.

Reduce Building Density to Mitigate Traffic Congestion

Guided by new-quality productive forces, construct low-density residential communities. Generally, higher building density leads to more concentrated population activities and subsequent traffic congestion. The following measures can be adopted to reduce congestion: Optimize residential construction in Linjiang New Area, avoid over-concentrated development, disperse population and building distribution, and reduce local traffic pressure. Formulate mandatory regulations specifying building density and maximum residential capacity, and impose relevant fees on high-density communities. Rationalize the location of building entrances and exits to align with road traffic directions as much as possible, thereby reducing traffic congestion caused by turns.

Reduce Irrational Road Planning to Alleviate Traffic Congestion

Under the guidance of new-quality productive forces, rationally plan urban traffic routes in Linjiang New Area to realize the integration of traffic planning and urban planning. Specific measures include: Plan and develop multiple urban centers to reduce unnecessary cross-regional commuting demands and ease traffic congestion. Establish land use intensity standards to avoid traffic congestion caused by over-development. Apply big data and artificial intelligence technologies to formulate scientific urban scale and structure plans, reasonably control urban development scale, and prevent traffic congestion resulting from excessive expansion.

Optimize the public transportation network layout by setting dedicated lanes for urban rail transit, buses, and shared bicycles to reduce traffic congestion. Construct a multi-level road system of "expressways - arterial roads - branch roads," connect dead-end roads, and build tidal lanes and grade-separated transportation hubs to alleviate traffic congestion.

Integrate AI for Real-Time Traffic Signal Adjustment to Reduce Congestion

Guided by new-quality productive forces, rationalize traffic signal planning to reduce congestion through the following measures: Utilize intelligent transportation systems to monitor traffic conditions in real time, optimize signal control, and improve road utilization efficiency. Adopt intelligent algorithms for real-time signal adjustment to enhance road traffic efficiency. Use AI to dynamically adjust traffic signals in real time, optimize traffic flow at intersections, and shorten waiting times for vehicles and pedestrians. Monitor road conditions in real time and guide traffic diversion by pushing alternative routes through navigation apps.

(2) Specific Solutions to Urban Pipe Network Problems

A "One Large, Two Multi-Functional" pipe network system is proposed to address existing urban pipe network issues, realizing the integrated functions of telecommunications, gas transmission, cable layout, rainwater storage and regulation, sewage collection and treatment, and underground transportation. The so-called "One Large, Two Multi-Functional" refers to the construction of a "large-diameter two-layer corridor pipe network system," with the two layers being the "underground rainwater and sewage corridor layer" and the "underground pipeline corridor layer."

Plan and Construct a Large-Scale Rainwater and Sewage Corridor Layer to Solve Urban Waterlogging and Sewage Discharge Problems

Urban waterlogging is a prominent issue in Nanchong's three main urban districts (Shunqing, Gaoping, and Jialing), especially during the rainy season. At the critical stage of Nanchong Linjiang New Area's planning and construction, guided by the ideology of new-quality productive forces, the following measures are proposed to address the aforementioned problems.

Lay Rainwater Collection Pipes and Shafts in the Water Collection Corridor Layer to Resolve Urban Waterlogging

Guided by the concept of new-quality productive forces, a large-scale water collection corridor layer will be planned during the construction of Linjiang New Area, with rainwater collection pipes and shafts laid to solve urban waterlogging. Specific measures include: Plan and construct multiple "urban shallow water collection wells" during urban road construction to collect rainwater during rainfall periods. Equip the water collection wells with relevant monitoring and water pumping equipment, and utilize technologies such as the Internet of Things (IoT), big data, and artificial intelligence to realize intelligent water storage and drainage. Implement the concept of sponge city construction by adding facilities such as permeable pavements and rain gardens to enhance the city's water infiltration capacity. Through a six-in-one governance system of "infiltration, retention, storage, purification, utilization, and drainage," natural accumulation, infiltration, and purification of rainwater will be achieved.

Lay Sewage Pipes in the Water Collection Corridor Layer to Address Urban Sewage Discharge Problems

Urban sewage discharge is a pressing issue in Nanchong's three main urban districts (Shunqing, Gaoping, and Jialing).

Taking the opportunity of Linjiang New Area's planning and construction, guided by new-quality productive forces, a large-scale water collection corridor layer will be planned with sewage pipes laid to solve the problem of urban sewage discharge.

Construct a large-scale water collection corridor layer and lay sewage pipes within it to resolve the mixing and backflow of rainwater and sewage during peak periods. Strictly Control the Direction and Elevation of Rainwater and Sewage Pipe Networks to Improve Sewage Discharge Efficiency Guided by the ideology of new-quality productive forces, the following measures will be taken to ensure the rational elevation of urban sewage pipes during the construction of Linjiang New Area: Select an appropriate location for sewage treatment plants with a relatively low elevation. Strictly control the elevation of sewage pipes during construction to ensure the smooth operation of the sewage pipe network system. Increase the diameter of sewage pipes to enhance sewage discharge capacity. Technological Innovation to Accurately Locate Sewage Pipe Network Problems Guided by new-quality productive forces, promote the construction of a smart city and rely on technological innovation to accurately identify problems in sewage pipe networks: Utilize IoT, big data, and artificial intelligence technologies to establish an intelligent monitoring and early warning system for sewage pipe networks, enabling real-time monitoring of congestion. Employ remote sensing technology and big data analysis to accurately locate sewage discharge issues and optimize the maintenance and management of sewage pipes. The government should formulate relevant policies to encourage and support technological innovation and upgrading of the sewage disposal system. Through measures such as financial subsidies and tax incentives, enterprises will be motivated to invest more resources in technological innovation and equipment upgrading.

Construct an Underground Pipeline Corridor Layer to Resolve the Layout of Urban Cables, Telecommunications, and Gas Lines

Urban pipe networks are characterized by a wide variety, long length, and high maintenance difficulty. To fundamentally solve urban pipe network problems, guided by new-quality productive forces, the following construction suggestions are proposed to provide solutions for the pipe network construction of Linjiang New Area: Adopt a three-layer layout for urban pipe network construction. The so-called three-layer layout divides the pipelines into upper, middle, and lower layers: the upper layer is the road surface; the middle layer is a large integrated corridor integrating pipelines for power cables, optical cables, water supply, gas, and urban intelligent express delivery channels (allowing adults to conduct maintenance and construction inside); the lower layer consists of urban rainwater and sewage pipes and water collection wells. Integrate the aforementioned pipelines with technologies such as 5G, IoT, artificial intelligence, big data, and cloud computing to enhance the digitalization and intelligence level of urban underground municipal infrastructure. This will realize the co-construction and sharing of facility information, meeting the needs of facility planning and construction, operation services, rapid response, and emergency disaster prevention.

A schematic diagram of the urban corridor system is shown in Figure 1 below:

(3) Specific Solutions to Urban Layout Problems

The three main urban districts of Nanchong (Shunqing,

Gaoping, and Jialing) mainly face problems such as the irrational location selection of residential areas, commercial districts, educational zones, and workplaces. At the critical stage of Nanchong Linjiang New Area's planning and construction, guided by the ideology of new-quality productive forces, a "multi-plan integration" approach is proposed, adopting the layout model of Xinjiang's Bagua City to address the urban layout issues of Linjiang New Area through the following measures:

Guided by new-quality productive forces, rationalize the layout of residential, commercial, and educational zones to solve urban layout problems, mainly reflected in the following aspects: The layout of residential, commercial, and educational zones should take the residential circle as the center, with commercial circles, educational circles, and workplace circles expanding outward in turn in a Bagua diagram model. This will provide citizens with more choices. Construct a 15-minute walkable living circle, improve community-level commercial and educational facilities, and reduce the demand for short-distance motor vehicle travel. Vigorously develop higher education, taking universities as core hubs to build residential areas, commercial facilities, educational institutions, and high-tech enterprises, facilitating the daily life and internships of college students. Establish a multi-center development model, decentralize commercial and office functions to urban sub-centers, reduce tidal traffic pressure in the single central area, and achieve job-housing balance.

6. Conclusion

Nanchong Linjiang New Area is the third provincial-level new area in Sichuan Province. Located at the geometric center of the Northeast Sichuan Economic Zone, the planned area of the new area serves as the core construction site for both the "central city of Northeast Sichuan" and the "second city of the Chengdu-Chongqing Twin-City Economic Circle". Guided by the concept of "new-quality productive forces", this paper proposes an integrated corridor pipeline network system. The implementation of this system can effectively address urban issues such as traffic congestion, waterlogging, sewage disposal, and pipeline network construction. However, the preliminary design of the integrated corridor pipeline network system currently incurs relatively high construction costs, which requires further design and optimization.

Guided by the concept of "new-quality productive forces", this study intends to put forward relevant measures to solve the problems exposed in Nanchong's urban development. The proposed approach is practically feasible and can provide corresponding suggestions for the construction of a high-quality livable area in Linjiang New Area.

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