The Chongqing Air Logistics Platform: Strategic Guidelines

Report 2

Infrastructure and Facilities Guidelines

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2.1 Chongqing's Air Logistic Engine

Providing speedy long-distance connectivity to time-critical suppliers, manufacturers and distributors, and therefore driving the Chongqing Air Logistics Platform, is Chongqing Jiangbei International Airport (CKG). In 2008, the airport, located 21 km north of downtown Chongqing, handled 11,138,000 passengers (ranking tenth in China) and processed 160,000 metric tons of cargo (twelfth in China).

The fact that the Chongqing Metropolitan Area ranks much higher in terms of the size of its economy as well as population size (____ and ____ respectively) suggests that its aviation infrastructure (including airline route structure) has lagged. Part of this lag may be explained by Chongqing's economic mix which is dominated by older, heavier manufacturing industries and therefore products that predominately move by rail and river to distant sites, as well as the lower average income levels of its huge population, affecting air travel propensities.

Despite the more recent growth in Chongqing's IT and other high-tech sectors, CKG's air exports were only 30,000 tones of its 160,000 ton air cargo total. This low air export volume may also suggest "leakage" of Chongqing-produced air exports that are being trucked to other international airports for export, which

would be a competitive time and possibly cost disadvantage to Chongqing's growing number of time-critical high-tech industries. It is therefore recommended that an air cargo leakage study be conducted to assess how much of Chongqing's air exports are being lost by CKG.

Since both passenger traffic and air cargo are forecasted to dramatically expand, plans are to increase CKG infrastructure and facilities to accommodate this expected growth. The current 3,200×60 meter runway that is 4E class and can handle aircraft up to the B747 will soon be complemented by a second runway west of the existing runway that is 3,600×60 meters and also 4E class. Plans are for a third runway that will be 3,600×60 meters which will be able to handle an A380 and eventually a fourth runway of 3,000×60 meters also capable of handling an A380.

Two passenger terminals serve domestic and international passengers. When the newer, larger terminal opened in 2004, international passengers (which make up only about 5 percent of CKG's total passengers) were shifted to the older terminal, constructed in 1990. This is a pretty shabby terminal by major international airport standards, though the newer domestic terminal is much nicer.

A state-of-the-art terminal (T2A), with a capacity of 15 million PAX is scheduled to be put into use by the end of this year that will be a significant facility upgrade over the two existing passenger terminals. Plans are to begin

construction on a large additional complementary terminal (T3) in 2011. T3 will be able to handle 30 million passengers when its first phase is completed in 2015 and eventually 55 million PAX annually when fully built out, bringing total CKG PAX capacity to 70 million annually, its target to 2040.

A total of 25 different airlines serve 58 nonstop destinations from CKG covering most of China (including Hong Kong and Macao). International flights serve Nagoya, Tokyo, Seoul, Singapore, Bangkok, Taipei, Amsterdam, Frankfurt, and Dakar. Plans are to commence routes to India and the U.S. as market conditions permit. In September 2009, Jade Cargo International commenced air freighter routes Dubai-Chongqing-Hong Kong-Vienna-Amsterdam and Dubai-Chongqing-Hong Kong-Brescia-Frankfurt. This is important because most of the aircraft serving CKG are narrow-body passenger types with limited cargo capacity. Much more emphasis needs to be placed on attaining freighter aircraft to CKG, including air express aircraft, a strategic issue I will return to later.

2.2 Cargo Facilities

The long-term plan for CKG is based on the principle of passengers in the south and cargo in the north. This is not the present active layout. Both the Air China freight facility and the CKG air freight terminal are in the C_1 freight area in the southern portion of the airport several hundred meters from the T2

passenger terminal (see Exhibit 2.1). Two additional freight terminals soon to be completed are also are also under construction in C_1. The freight terminals handle domestic in-bound, international in-bound and out-bound, and domestic out-bound including cold storage.

These C_1 freight facilities are expected to reach capacity by 2015. Since they are near the main passenger terminal and share road and landside entry with passenger and fire/security vehicles this can lead to congestion and potentially dangerous conditions with many freight trucks mixing with passenger automobiles, including at the future eastern terminal area. C_1, as a freight area, is not only inconsistent with long-term planning but the area also appears more suitable to commercial, hotel and office development that would complement the newer passenger terminals.

An option proposed is to relocate the cargo area to C_2 on Exhibit 2.1. This area, planned on the west side of the north end of the existing runway near the 319 national highway, would be used for handling domestic freight with 10 aircraft parking stands. At full capacity it would be capable of handling 1.2 million tons of cargo annually of which an estimated 70 percent would be handled by freight forwarders and 30 percent by customers themselves. Since this area would be domestic only it would not have Customs facilities and would be designed for rapid cargo flow-thru to trucks.

According to the assessment by the China IPPR International Engineering Corporation, connecting to nearby national highway 319 is not easy due to an apron height of 410 meters. It is also some distance from the airport's bonded freight port that will be an essential complement of the CKG Air Logistics Park. Placing China Customs in the C_2 zone to handle international cargo does not appear desirable nor efficient.

The C_3 area has many advantages for international cargo and as a potential primary home for the CKG Air Logistics Park. These advantages highlighted in the China IPPR International Engineering Corporation report include, among others, (1) it is at the preferred northern end of the airport between the soon to be completed second runway and the planned third runway; (2) it has sufficient and appropriate land (83.2 hectares) for facilities to process 1.93 million tons of both domestic and international cargo; (3) it is adjacent to the 38.2 hectare bonded freight port which can expand total CKG freight tonnage handled to 2.5 million tons annually (1.5 million tons domestic and 1 million tons international) meeting all forecasted cargo requirements through 2040; (4) its landside road connections to 319 national highway are reasonably good as are internal connecting passage through a flexible (movable) fence of the bonded port whose size can be shaped by future demand for international versus domestic cargo; and (5) if needed, there is also direct apron access to the C2

cargo area and potential air logistics users on that site, making for an expanded air logistics park.

After assessing the strengths and limitations of all three cargo areas the IPPR consulting report recommends that all cargo activities (domestic and international) be relocated to C_3 as as soon as feasible. This would free up C_1 for more appropriate commercial use synergies with passenger facilities at the southern portion of the airport and lead to "aggregation economics" by consolidating cargo functions in a single area in the north, consistent with long-range planning.

I absolutely agree with this recommendation and that the CKG Air Logistics Park likewise be consolidated in this area but with potential longer-term future expansion into the C_2 area. The consulting report correctly points out that there are no utilities or internal roads in the C_3 tract. This means that work needs to begin immediately on site preparation and basic infrastructure provision for this area to be ready by 2015, the date at which C_1 domestic and international cargo capacity is expected to be exceeded.

There has been some discussion and preliminary layout of the proposed facilities and corresponding functions of the CKG Air Logistics Park, originally proposed to operate in all three cargo areas discussed above (C_1, C_2, and C_3). These include primarily air freight, freight forwarding, and bonded warehousing. These need to be specified in far greater detail which I will do later

in this report and in Report 3. Suffice it to say here that success of these facilities will depend both on expanding air connectivity domestically and internationally and multimodal surface connectivity to industrial and commercial parks in the Chongqing area, to other Chongqing area logistics parks, and to the broader economic region. I turn now to a brief discussion of present and planned multimodal surface connectivity before providing guidelines for infrastructure and facility development at the CKG Air Logistics Park and surrounding multimodal logistics platform.

2.3 Air Logistics Platform Multimodal Infrastructure

Efficiently connected highway, port, and rail infrastructure is as important as aviation infrastructure for successful air logistics platform development. Exhibit 2.2 illustrates existing and planned (under construction) highways for Chongqing City while Exhibit 2.3 show these in greater detail in the immediate airport area. While there is an impressive set of expressways and national highways, the expressway between the the airport and the downtown is congested at times and other choke points are emerging in the airport area and those leading to a number of industrial parks and other Chongqing logistics parks (team needs to detail these in the report).

Chongqing's railway system is in reasonably good shape. A monorail passing through Chongqing's newly built central station goes northward to the airport and southward to the peninsula and southern area of the Yangtze River. As noted in Report 1, the city is served by five major railroads, including three electrified (the Chongqing Line, Yuquin Line, and Xiangy Line) plus a number of regional railways. In addition, as shown in Exhibit 2.4, there are additional railways under construction. The flagship project is a new high-speed rail link to Shanghai which will cut transit time from 42 hours to just 8 hours. According to local authorities, the city will have eight containerized rail lines by 2020.

While the efficiency of the freight railways is high, none serve the immediate airport area. Later I will describe the need to construct a freight rail spur to the airport area to offer intermodal rail/truck access to the multimodal air logistics platform, including a possible in-land port.

I also summarized Chongqing's port assets in the first report. Exhibit 2.5 locates Chongqing's major ports and capacities. Suffice it to note here that port capacity is excessive with only about half of it being utilized. As Chongqing's economy continues to grow, however, this excess port capacity will likely be absorbed.

Having all four modes of transportation is important to successful multimodal logistics platforms. What is even more important, though, is how they are tied together. Chongqing's decision-makers are aware of this and have

invested heavily in Cuntan Harbor (and its bonded zone) along with Tuangiechun Railway Logistics Center, both providing rail-highway-river access. As shown in Exhibit 2.6 Chongqing also has developed a Highway Terminal and Logistics Center.

A shortcoming, however, is that the airport is not part of those integrated complexes. This is a glaring gap in Chongqing's intermodality and unless addressed with proper planning and implementation will not enable the city to fully capitalize on fast-cycle logistics driven by air access and the air logistics park to attract more high-value, time-critical industries. Guidelines for addressing this gap will be provided in the following sections of this report and further elaborated in the third report.

Another issue of concern is the distribution of commercial parks and especially industrial parks with respect to the airport. Companies in high-tech, time-critical industries, such as HP and Foxconn, are locating in Xiyong Industrial Park. As shown in Exhibit 2.7 this IT park is located some distance (approximately 30 minutes) from the airport.

On the other hand, the Airport Industrial Park, located in close proximity to the airport (see Exhibit 2.8), has relatively few firms who use the airport. This mismatch between airport location and air-intensive industry location must be addressed in the future. A basic planning guideline that should be implemented is that firms should be encouraged to locate in proximity to the airport based on

their frequency of use so that consistent aviation users locate near the airport and those who rarely use air services are steered to areas more distant from the airport. This will not only lessen road traffic (especially trucks) but also improve access time of aviation-dependent industries to the airport.

Thus, land available for development near the airport as shown in Exhibit 2.9 should be reserved for aviation-intensive businesses that will be leveraged by the airport and in turn will generate more passengers and cargo for the airport. Some of this land may also be assessed for potential outside the airport fence multimodal logistics platforms.

In the following sections of this report I will discuss the best way to plan and design a Chongqing Air Logistics Platform (CALP) that fully leverages multimodality both inside and outside the airport fence.

2.4 Designing a Chongqing Air Logistics Platform

From the start, I have emphasized that one of the most important competitive attributes for Chongqing and its future industrial prosperity will be fast-cycle logistics built around efficient multimodal transportation systems, anchored by air cargo. In the following sections I therefor elaborate the infrastructure and facility planning guidelines that should be generally followed in implementation of a Chongqing fast-cycle logistics system with emphasis on

the future development of a new northern cargo and logistics area at CKG in area C_3. These guidelines should be followed regardless of the timing and exact location of CKG's new logistics infrastructure and facilities.

2.4.1 New Northern Cargo Area Facilities and Design

An important future feature of a Chongqing Air Logistics Platform (CALP) will be the aforementioned Northern Cargo Area (NCA) which will constitute a future zone of facilities on the northern side of the airport (as was indicated by C_2 and C_3 in Exhibit 2.1). The NCA will include a New Northern Cargo Facility (NNCF), as shown in Exhibit 2.10, which can be a shared facility attractive to a variety of all-cargo carriers, a regional air express facility, perishables center (PC) to support in-transit and regional agricultural shipments, e-commerce fulfillment, and the Customs Clearance Center (CCC) at the new Northern Cargo Facility.

The new northern cargo facility should be designed so that it is modular and can therefore expand as the market demands. It also needs to be designed for rapid flow-thru of cargo and to have sufficient cross-docks for trucks and eventual internal rail connectivity (see Exhibit 2.11).

Other primary components of the Northern Cargo Area should be a Logistics Operation Area, with value-adding logistics and distribution tenant

facilities alongside taxiways, nearby truck docks, special materials handling and freight forwarder and 3PL facilities, and eventually (after 2025) a Cargo Transport System (CTS) connecting all CALP tenants with cargo processing facilities. Since the northern cargo area (NCA) will be one of the most important future components of the CALP and overall CKG development, its infrastructure and facility planning guidelines are elaborated below.

2.4.2 Guidelines for Northern Cargo Area Design

Three key principles of agility should be followed in the design for the future Northern Cargo Area: 1) Flexibility; 2) Targeted Mechanization; and 3) Expandability/Phased Growth. Building agility into the processing capability and location of facilities is essential because of: 1) unpredictable longer-term cargo handling demands on the CALP; and 2) a dynamically changing and improving technological and logistics environment.

2.4.3 Flexibility

A critical design requirement of the future Northern Cargo Area (NCA) which will house the CKG Air Logistics Park is that its developments should be demand-driven and responsive to changing needs and requirements of CKG

tenants and users. A flexible, incremental development approach is highly recommended, given the difficulties of forecasting the exact types and levels of cargo and industrial activity at and around the CALP. Thus, for example, automation of material handling systems or full-scale development of intermodal connectors and interfaces may not be prudent early in the implementation of the CALP. In the design of most processing systems, cost, flexibility of operation, and operational efficiencies demand appropriate cost/sophistication compromises at different stages of infrastructure and technology development.

Three realities caution against initial automation of Air Logistics Park materials handling and processing systems: 1) the expanded Chongqing Air Logistics Platform (CALP) will likely have to accommodate all manner of aircraft and cargo equipment (i.e., standardization of aircraft gauge and related cargo handling equipment for serving domestic and international air cargo markets are currently not possible); 2) non-automated materials handling and accumulation (short-term storage) systems are often more cost-effective and flexible in terms of meeting peak requirements and other unanticipated immediate problems by simply providing more forklifts and manpower to meet unexpected or peak requirements; and 3) longer-term air cargo demand and other transportation mode cargo demands are difficult to forecast in turbulent national and global environments.

Only as actual demands are experienced over time for such a multimodal logistics complex would it be possible to incrementally predict materials handling equipment, logistics infrastructure, and facility needs, and to gain verification of the estimated industry mix of cargo demands placed on the Air Logistics Park (e.g., aerospace parts and components, manufactured products, fresh cut flowers, seafood and other perishables, retail distribution products, etc.). For these reasons, it is recommended that the northern cargo area commence operations with relatively inexpensive, low-tech systems. These can be upgraded over time as the demand and future tenant requirements become better known and the benefits to be acquired through automation become better understood, measured and demonstrated.

One means of attaining processing flexibility, and commonly employed in modern just-in-time (JIT) operations, is to create subsystems that have multiple processing equipment rather than one large processing system. Designing one large system often appears to offer economies of scale (i.e., less cost per unit produced as process equipment size increases). Such all the eggs in one basket type of operation, however, could easily lead to inflexibility and an inability of the Auhtority to shut down part of the total process capability for maintenance, equipment testing, equipment enhancing and even off-line employee training.

To save initial expenses and promote flexibility, mobile equipment is generally preferred to fixed position equipment (e.g., a mobile nose

loader/unloader as compared to a fixed-bridge nose loader/unloader). Ideally, all equipment should be readily reconfigurable and rearrangeable as operations layout requirements change over time. I have found that fixed position equipment (e.g., automated conveyors attached to the floor or hung from the structural system) hinders the "fluid" design concept recommended for the Air Logistics Park.

2.4.4 Targeted Mechanization

Experiences of air cargo operations at other mid-size airports do permit initial determination of the degree of mechanization in CALP operations for efficient cargo handling. Mechanization of standard processing operations such as container consolidation, container breakdown, and conveyors to accommodate x-ray equipment should be included in initial all additional Air Logistics Park operations. Yet, such targeted mechanization should be provided only when and where it is clearly demand driven and economically justified.

As stressed above, because of the difficulty of predicting material handling demands and a desire to provide flexibility of arrangement which is consistent with 21st century business practices, the CALP facility design should assume that initial material handling operations would be performed with relatively low-tech material handling equipment (e.g., forklifts, motorized tugs,

pallet jacks, etc). This technology is not only far less costly but also "tried and true" time-tested and reliable. At likely relatively low initial levels of manufacturing and supply-chain management demand at the Air Logistics Park, fully automated materials handling systems, though flashy, simply may not make economic sense.

When demands over time become better known and experienced, one-at-a-time evaluation of potential productivity benefits of automated equipment and facilities can be assessed and enhancements implemented to take advantage of operational improvements. For example, as available New Northern Cargo Facility (NNCF) space fills up with increased activity, pallet racks should be provided to gain better use of the facility cube. Later, when sufficient put-away and picking requirements develop, fork-lift use would be discontinued for automated put-away and picking of cargo from racks and replaced by computerized rail-guided picking and put-away equipment.

2.4.5 Expandability/Phased Growth

I have been emphasizing that future demands placed on CALP facilities and their resulting space needs are difficult to predict with any confidence. This is why it was proposed that facility development at the CALP encompass flexible, evolutionary and phased growth. Facility requirements should be

estimated as accurately as initially possible based on regularly updated CKG air cargo forecasts and market demands, but the CALP must also be allowed to become what it needs to be as requirements reveal themselves over time. Thus, the design guidelines proposed herein are not so much a fixed plan as they are a flexible framework to accommodate a wide variety of tenant industries, regional users, and physical layouts.

The above framework allows for CALP development to be modified as cargo and market demands, resources, new technologies, and infrastructure advances occur. For example, the new northern cargo area including its logistics and potential JIT industrial facilities should employ a modular layout for maximum flexibility and phased development. Ground transportation designs should incorporate redundant routings and flexible road systems to minimize the impact of congestion or accidents, both within the CALP and in connecting highway systems. Rights-of-way should be sized to allow future expansion without negatively affecting ongoing highway operations. And CKG's aviation infrastructure must periodically be upgraded with state-of-the-art navigational aids to allow for growing air capacity demands and eliminate weather delays. Zoning controls in areas near the airport should be implemented to minimize potentially conflicting land uses and noise problems that could preclude the extensive 7-day, 24-hour airport operation as aviation operations grow.

CKG management and Chongqing area economic development agencies also must be prepared to respond rapidly and creatively to evolving tenant and user needs and an ever-changing business environment; hence, CKG's management itself must be agile as it creates or coordinates "one-stop shop" support for tenants and regional users from each logistical or industrial sector. Down the road, both the airport managers and local economic development agencies may not only wish to market the CALP, but also operate as strategic partners with tenants and area industrial recruits in dealing with other government agencies and in seeking access to a full range of technical, financial, and political resources.

Consistent with Chongqing's new "green" principles and ISO 14000 standards (international standards that enable companies to systematize and improve their environmental management efforts), maintaining environmental quality and safety are a fundamental objective of CALP planning and development. The CALP system must provide facilities and procedures for the handling, storage, transportation, and disposal of environmentally sensitive materials as a continuous process. Likewise, modern CALP utility systems must offer high-quality and reliable power, water, natural gas, wastewater treatment, and solid-waste disposal to meet growing tenant needs in the expanded areas of the CKG Air Logisticst Park.

Each potential commercial tenant at CKG should be evaluated for its compatibility with environmental regulations and standards. A CKG management/tenant partnership should address the requirements for operating within acceptable environmental parameters jointly. Innovative site planning and design should ensure visually attractive development with ample landscaping and aesthetic touches.

Aesthetics will be as important to CKG's cargo and logistics areas as passenger access. Ideally, logistics, cargo and light industrial clusters at and around CKG should appear more like a university campus than a traditional industrial/logistics park.

Although cost savings remain important in today's industrial location decisions, CKG management should operate under the assumption that tenants will pay more for its integrated, high-quality, reliable services and sound environmental planning. Because a delicate trade-off exists between costs and on-site services, however, CKG's cost effectiveness will be optimized by the phasing of development to minimize initial investment and location costs for tenants. Development of the overall site infrastructure and facilities should be incremental, demand-driven, modularized, and reconfigurable.

Further flexibility in the new northern cargo area would be achieved by oversizing and reserving spacious rights-of-way for future infrastructure and facility expansion. The internal transportation corridors linking the

transportation modes and production/logistics facilities also should be oversized to meet increasing traffic levels over time and to accommodate future developments in vehicles and transport systems. The same corridors should have all the underground utility channels needed for powering and servicing airport goods processing firms and shared support facilities. This includes designing corridors with rapid and flexible plug-in telecommunications capability for tenants, as needed.

I've recommended that CKG's Air Logistics Park be designed with flexible or expandable facilities with modular and reconfigurable attributes. Such design would allow facilities to grow over time to accommodate ultimate space needs. One way to reserve space initially is to provide excess separation between contiguous facilities, allowing them to grow closer together as increasing space requirements are met over time. Another way is to site selected easy-to-relocate facilities between other facilities with the intention of moving them at a later date to permit the surrounding facilities to grow together in the space vacated by the relocated facility.

2.4.6 Intermodal Interfaces

A major process element of the CALP is the interconnection and integration of multiple modes of transport (air, truck, and rail). Ideally, each

mode must be able to seamlessly and efficiently connect to any other mode without significant loss of time or high cost. The primary long-term operational CALP connector (the "glue" that connects the various transportation modes) is a cargo transfer system (CTS). The transfer system will emanate from the New Northern Cargo Facility (NNCF). The cargo transfer system may be composed of a combination of trucking modes operating on C_3's internal roads, or in later phases of development (likely after 2025) by dedicated automated cargo movement systems (for example, rail or tram) depending on the relative configuration of the elements of the CALP and the level of activity.

2.4.7 Guidelines for On-Site Transportation Connectivity

The new northern cargo facility (NNCF) would need to interface with the following modes of transportation: 1) air, via CKG taxiways; 2) truck, with adequate cross-docking at the NNCF and other Northern Cargo Area (C_3 and C_2) facilities as required to meet cargo trucking demand forecasts; and 3) tram, by providing CTS access throughout the Air Logistics Park and later perhaps providing an interface between the CTS and a potential rail spur in proximity to CKG to the planned intermodal facility along 319 national highway. The CTS would also be the primary connector between the NNCF and off-ramp CALP

production and distribution facilities. These intermodal interfaces are illustrated in Exhibit 2.12.

Because the predominant mode of transportation of products moving to and from CKG locally and regionally would be via highways, truck terminal facilities and facility cross-docks at and near the CALP along with airport future ring road links would be helpful design elements for successful operation of the CALP.

2.4.8 Guidelines for CALP Connectivity

A Chongqing multimodal air logistics system must be able to accommodate a broad variety of transportation origins and destinations to and from it in the mid- and long-term phases. Flow paths of domestic and international air, water, truck and rail modes are represented in Exhibit 2.13 as they might occur between the CALP and domestic or international origins and destinations at ultimate development. Flow paths of intra-CALP cargo are shown within the boundaries of the CALP in the exhibit. Truck, potential rail and air cargo terminal links are included as nodes of the cargo transfer system. Truck cross-docks and the CTS may locate near manufacturing or distribution tenants as the extended CALP develops in later phases.

Regional truck transportation should be available between all Chongqing industrial nodes and the CALP. Truck shipments consigned to CALP tenants will most likely be delivered directly to those tenants. Deliveries to consignees located further from the CALP will be delivered to the NNCF, or to appropriate truck terminals for processing and subsequent delivery to the consignee.

Good truck transportation to Chongqing's river ports will be required if the CALP is to achieve full quadramodality. Though there tends to be limited air-vessel product movement, bringing all capabilities together at the CALP and nearly areas will create the critical mass of logistics activities that will make it a powerful magnet for industry. I will return to this point in the next report.

2.4.9 Guidelines for EDI Design

To support 21st century business practices of electronic commerce, just-in-time delivery, and supply chain management, electronic data interchange (EDI) must be provided as a tool for CALP facility operators, tenants, logistics service providers, and China Customs. The CALP EDI system will be a network of computers and databases that provide an interface between all parties involved in arranging a shipment. This EDI system must be capable of interfacing with multimodal carrier systems to provide on-line tracking and tracing capability for both the shipper and consignee. A key function of this system should be to

interface with China Customs. The CALP EDI network should also have access to global telecommunications networks via satellite transmission. Similarly, the EDI system should be tied to a bar-coding or preferably more advanced RFID (radio frequency identification) systems for shipment identification within the system and in-transit. The general objectives of the CALP EDI system, consistent with the communication vision of 21st century business practices are to:

- Build a cost-effective, resilient, and manageable EDI network throughout Chongqing Province and beyond that is web-based and open architecture.
- Allow all Chongqing's businesses to connect to the CALP via a network backbone at lowest charges possible.
- Ensure connectivity by providing enough fiber optics bandwidth and connection channels.
- Ensure capacity so that the Chongqing business community and CALP tenants can connect and not be denied access due to insufficient electronic ports.
- Provide support for all protocols required by the users of the system.
- Allow tenants, users, and logistics service providers with a range of hosts (e.g., workstations with high-speed network access, mobile computing and data exchange via secure Wi-Fi, Wi-WAN and fiber networking) to connect to the CALP's network.
- Allow CKG tenants and the greater Chongqing user community to access applications (e.g., database inquiries/updates) on a range of different information management systems operated by third-party entities.

Conceptually, the CALP Communications System can be viewed in Exhibit 2.14 This exhibit presents a vision of a possible future global communications system for the Chongqing's Air Logistics park.

2.4.10 CALP Planning Integration Strategy

As described in the previous sections, the CALP represents a new kind of logistical center in which information technology, transportation and supply chain activities are operationally integrated to create a seamless business environment. Traditional airport master planning activities do not capture the intersections and linkages that are necessary to create this new environment.

The proposed integrated planning process at and around CKG must differ from traditional planning processes in three respects:

1. Shift from Element Focus to Process Focus. Traditional master planning typically targets individual elements of multimodal infrastructure in separate plans. For example, independently produced master plans for rail, ports, highways, and the airport. Each of these master plans is based on traditional roles and functions of these infrastructures. In a process-oriented plan, the exercise begins with an understanding of the integrated business processes and seamless multimodal transportation needs of the tenants and

customers. In this new approach, the design concept for a regional intermodal rail facility or truck cross-docking facility at the airport should be guided by the desire to create value for the industrial user of the facility rather than to maximize the utilization of designed capacity. This will involve a close coordination and integration of all elements of infrastructure planning for the Air Logistics Park and greater multimodal logistics platform.

2. Identify New Elements of the CALP. To achieve success, the Chongqing Air Logistics Park will require new elements of infrastructure. In the 21st century, businesses compete based on how efficiently and creatively they manage information to create competitive advantage. Even Fred Smith, Chairman of FedEx, has described his company as an IT firm that happens to fly airplanes. The provision of information technology therefore is not an afterthought, addressed once the size and function of a building or infrastructure have been designed, but rather an organizing principle around which the identity and function of a building or infrastructure have been designed. In this process planning environment, information technology capabilities must complement and reinforce the development of multimodal transportation and

industrial capabilities at the CKG Air Logistics Park and throughout the greater airport region.

3. Establish New Linkages Between Infrastructure Elements. The creation of a 21st century business environment at the CALP and surrounding area requires new linkages among key infrastructure elements. Uninterrupted flow of people, products, and materials through the CALP and the surrounding area require the integration of various modes of transportation. It is therefore necessary to plan the material handling and management systems that will integrate the movement of goods and materials from across these modes regionally and to and from the CKG.

2.4.11 Designing for Future Tenant Business Needs

The ultimate success of the future CKG Air Logistics Park will depend on how well it meets the business needs of future tenants. The real customer for the planning process is not the CKG management or Chongqing government, but firms that the airport and local governments wish to recruit. Therefore, concepts and capabilities targeted to 21st century business practices described below

should guide and inform the planning process and the required functionality of CKG Air Logistics Park. These businesses require the following:

- Paperless Environment. Companies are rapidly moving to a paperless environment in which orders for materials as well as finished goods are transmitted electronically from customers worldwide to their suppliers. Global manufacturers are insiting that their suppliers communicate electronically, and the availability of access to global communications and information networks will qualify future CALP tenants, large and small, for new commercial demands.

- End-to-End Supply Chain Visibility. The ever growing imperative for speed and lower costs has caused companies to more closely manage their supply chains. The basis of competition has changed from head-to-head competition between companies to a competition that pits supply chain against supply chain. A weak link anywhere along the supply chain can have a devastating impact on a company's ability to perform. Increasingly, companies are requiring end-to-end asset visibility along the entire chain requiring state-of-the-art tracing and tracking information technology.

- Just-in-Time Delivery. As companies manufacture in increasingly smaller lots and provide more customization of their products, the need for just-in-time delivery has grown. Not only must small batches of materials be shipped as economically as large batches, but they often must be delivered within 36 to 48 hours anywhere across the globe. Traditionally, manufacturers seek suppliers that are located near the manufacturing site. The availability of an integrated information and transportation infrastructure provides the capability for suppliers, manufacturers, and customers to work across great distances as if they were located nearby.

- Real-Time Asset Control. To assure flexible and fast response to changing customer needs, companies must not only be able to trace and track their assets quickly, but also to change their destination, routing or carrier mode as customer requirements change. Only the complete integration of information, transportation and manufacturing can provide this capability. A growing portion of multinational companies are able to do this now which will likely become a standard of doing business in the future.

In sum, successful development of the CKG Air Logistics Park intermodal and information technology systems will require a broad understanding of the

basic business processes of tenants, users, and logistics service providers, their current information system capabilities, and future technology/business needs. These include better understanding of Chongqing's emerging needs of information-rich industries such as 1) microelectronics, medical instruments, and telecommunications, 2) logistics, trading and transshipment, 3) aerospace, pharmaceuticals, perishables, and 4) even hospitality industries, including hotels, tourism, and recreation that will form the service backbone of much airport-area commercial development.

Attracting more high-tech manufacturers, assemblers, and distribution industries will also require a thorough understanding of modern supply chain management principles and the order-to-delivery process. To offer a truly marketable competitive advantage, CKG management with the assistance of Chongqing and Yubai municipal governments should bring together experts in logistics and supply chain management, multimodal infrastructure development, and information technology to collaborate to create the design specifications that properly integrate all system elements. Few locations in the world are doing this, so Chongqing can have a first-mover advantage in attracting high value-adding industries if it takes the lead in seizing this opportunity. This logistics expertise is but one component of the broader business resource planning required for the Chongqing Airport Air Logistics Park and surrounding multimodal platform success which I now turn my attention to in Report 3.

Exhibit 2.1. Map of the Location of Chongqing Airport Air Logistics Park

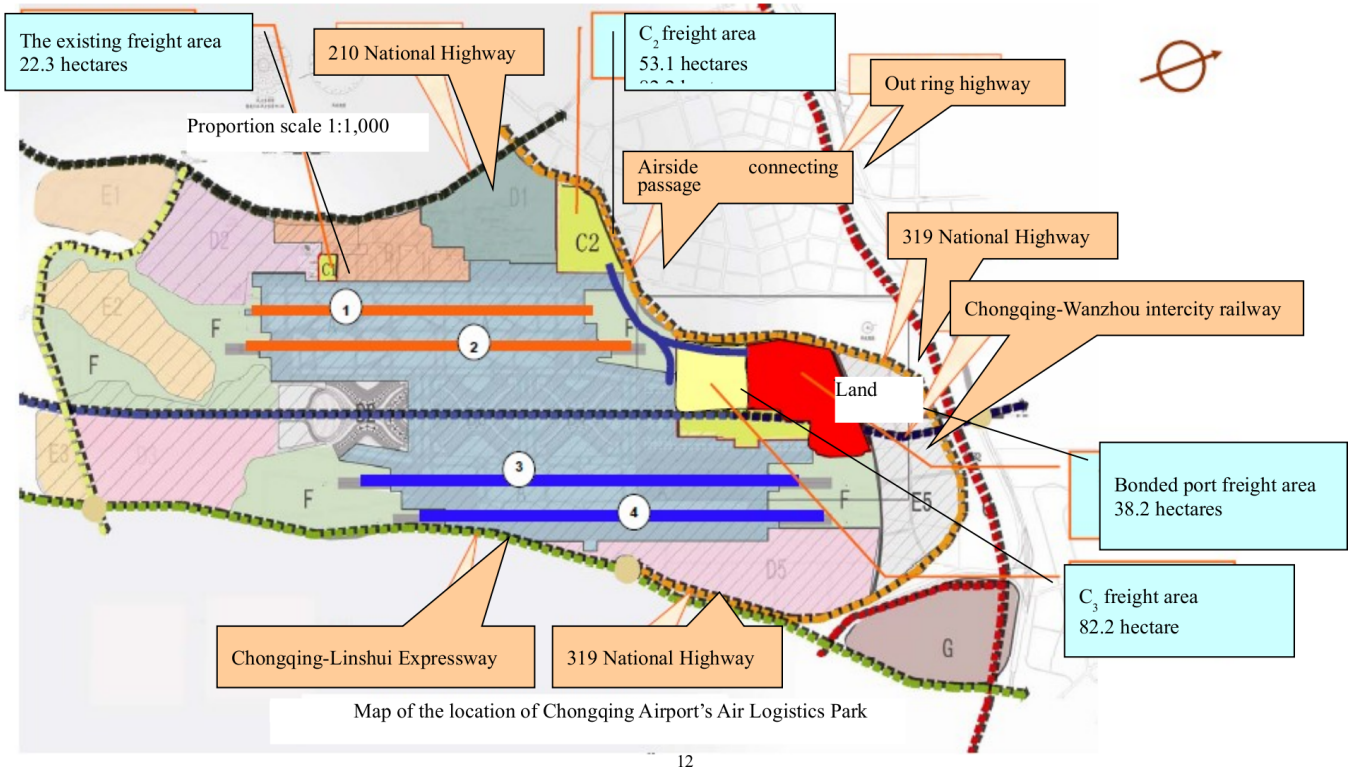

Table 2.1. Composition table of Chongqing Airport's Air Logistics Park

Block No.	Sub-item	Area		Building area	Schemed function
		(Hectare)	(Mu)	(m^2)	
C_1	C_1 existing freight area	22.3	335	33,090	Original freight area
C_2	C_2 freight area	53.1	796	212,263	Domestic freight area
C_3	C_3 freight area	82.2	1,233	387,084	Domestic/international freight
C_3	Bonded port air freight area	38.2	573	155,587	Bonded port freight area
	Total	195.8	2,937	788,024	

Notes:
1. The building area includes the existing area, under-construction area and planned total area;
2. The self-support existing and under-construction freight facilities of the airlines are excluded.

Exhibit 2.2. Existing and Planned (under construction) Highways for Chongqing City

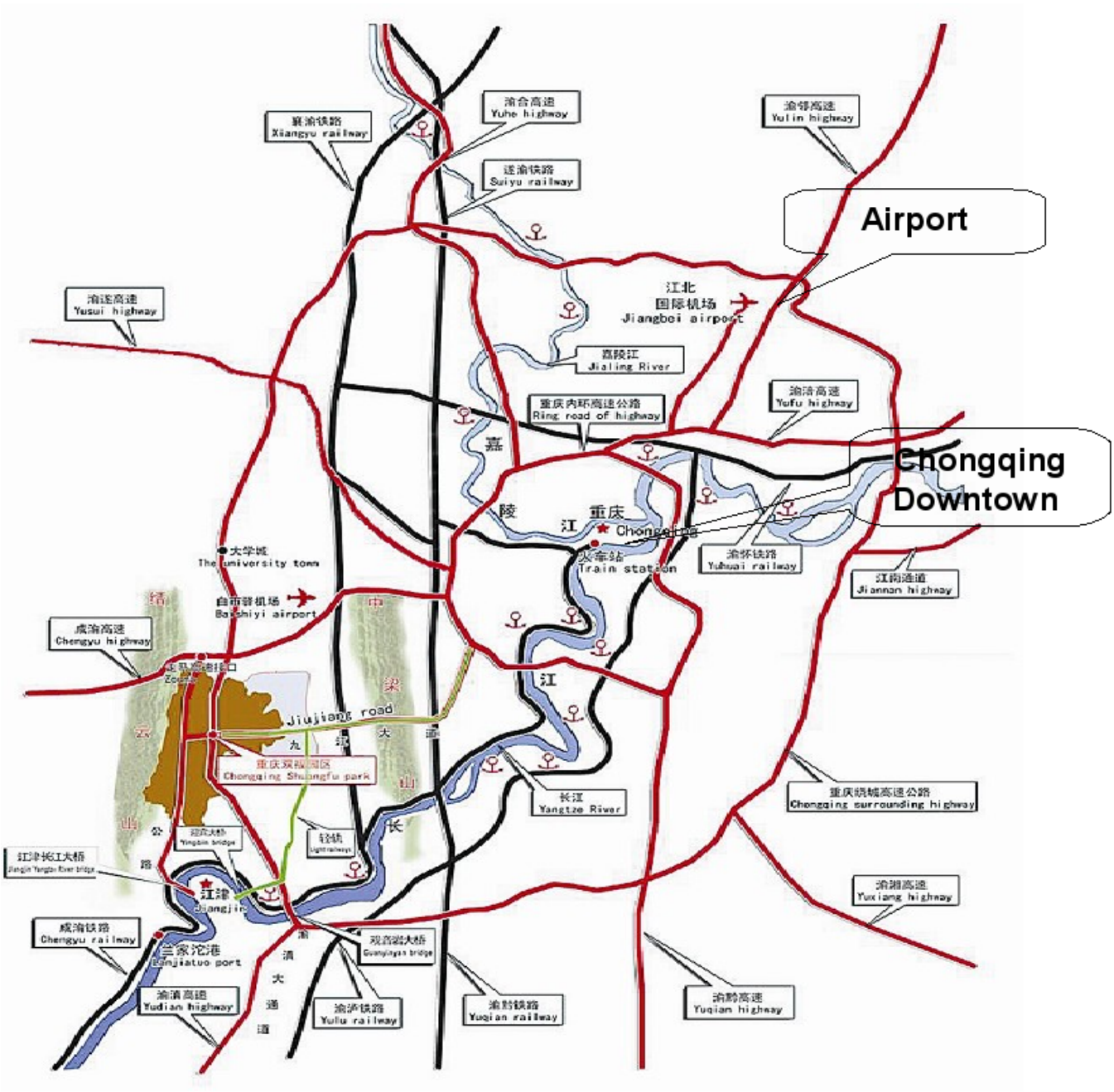

Exhibit 2.3. Existing and Planned (under construction) Highways Near CKG

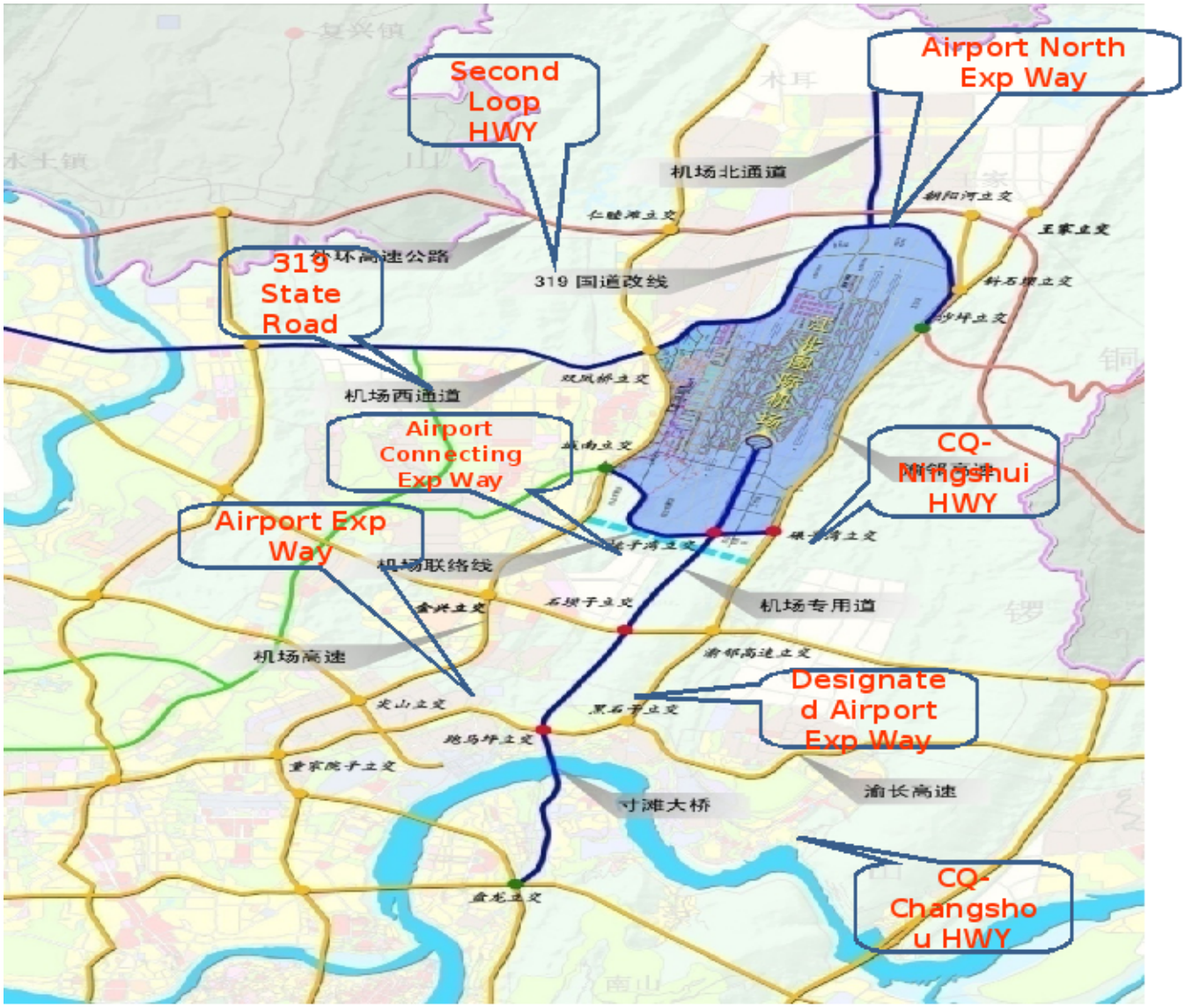

Exhibit 2.4. Chongqing's Existing and Planed railway System

Exhibit 2.5. Chongqing's Major Ports

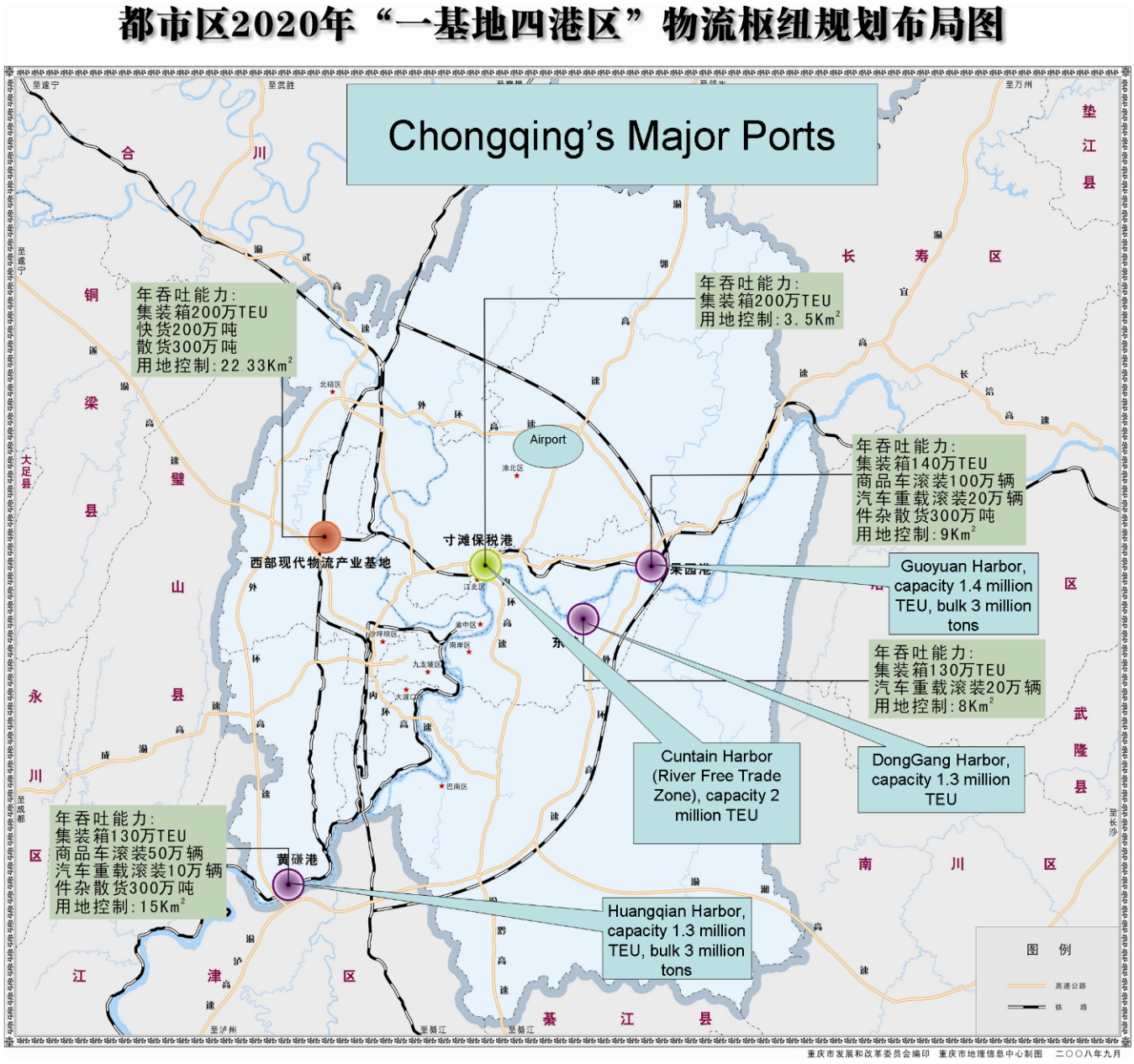

Exhibit 2.6. Planned and Existing Logistics Centers

Exhibit 2.7. Industrial Parks and Commercial Centers.

Exhibit 2.8. Airport Industrial Park

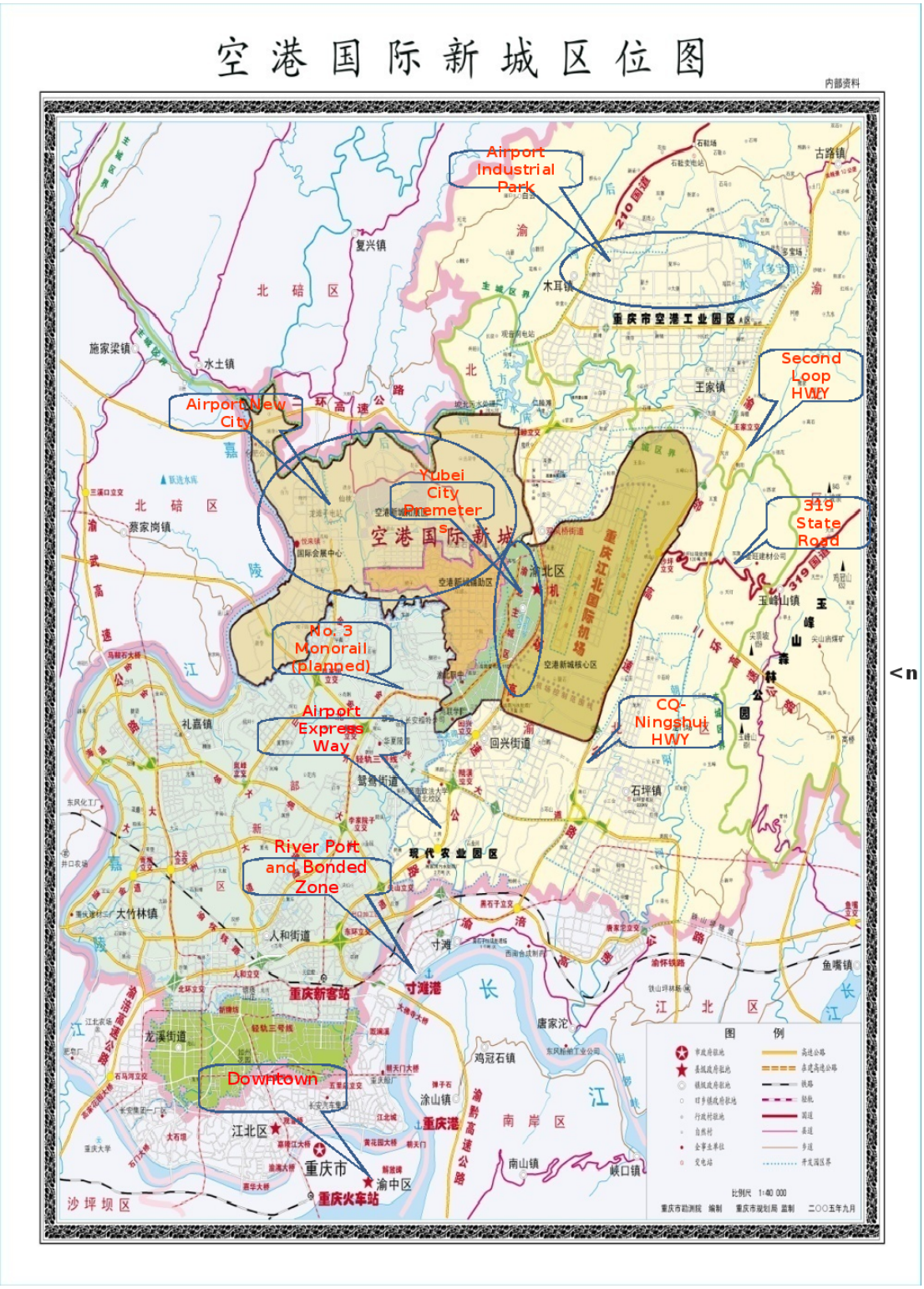

Exhibit 2.9. Land Available for Development near CKG

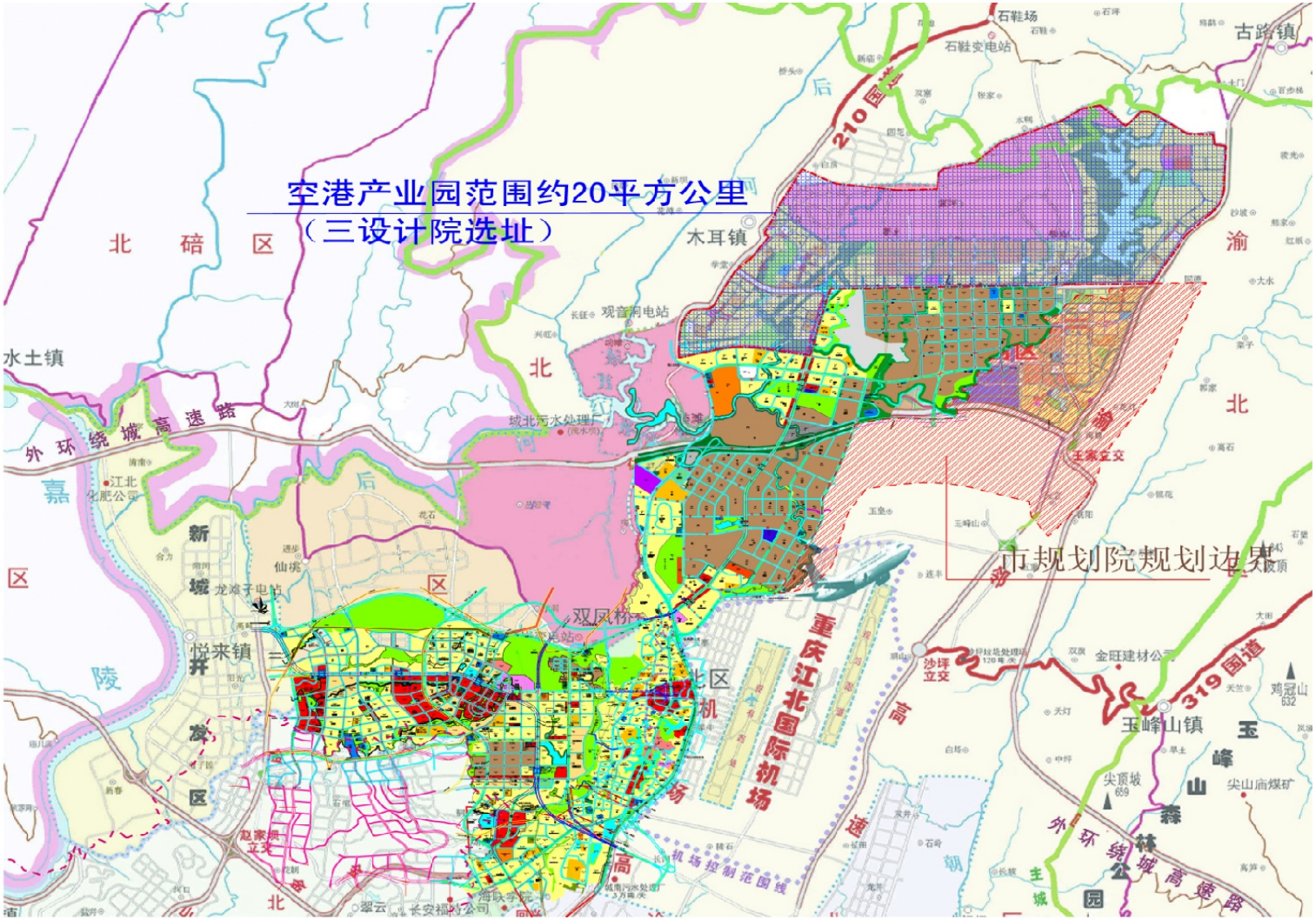

Exhibit 2.10. Proposed CKG New Northern Cargo Facility

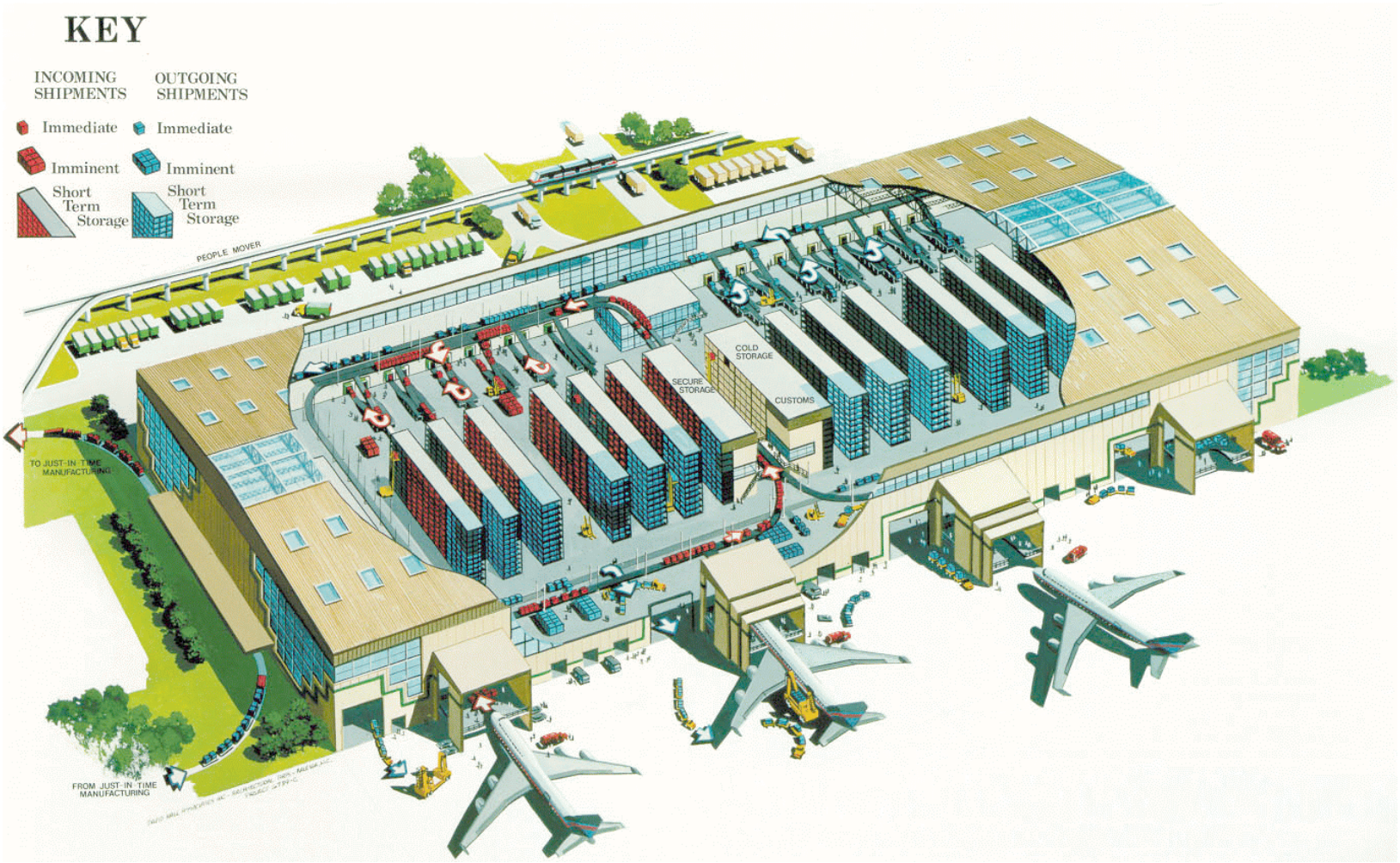

Exhibit 2.11. Air Cargo Intermodal Access

Exhibit 2.12. Proposed CALP Intermodal Interfaces at Full Build-out

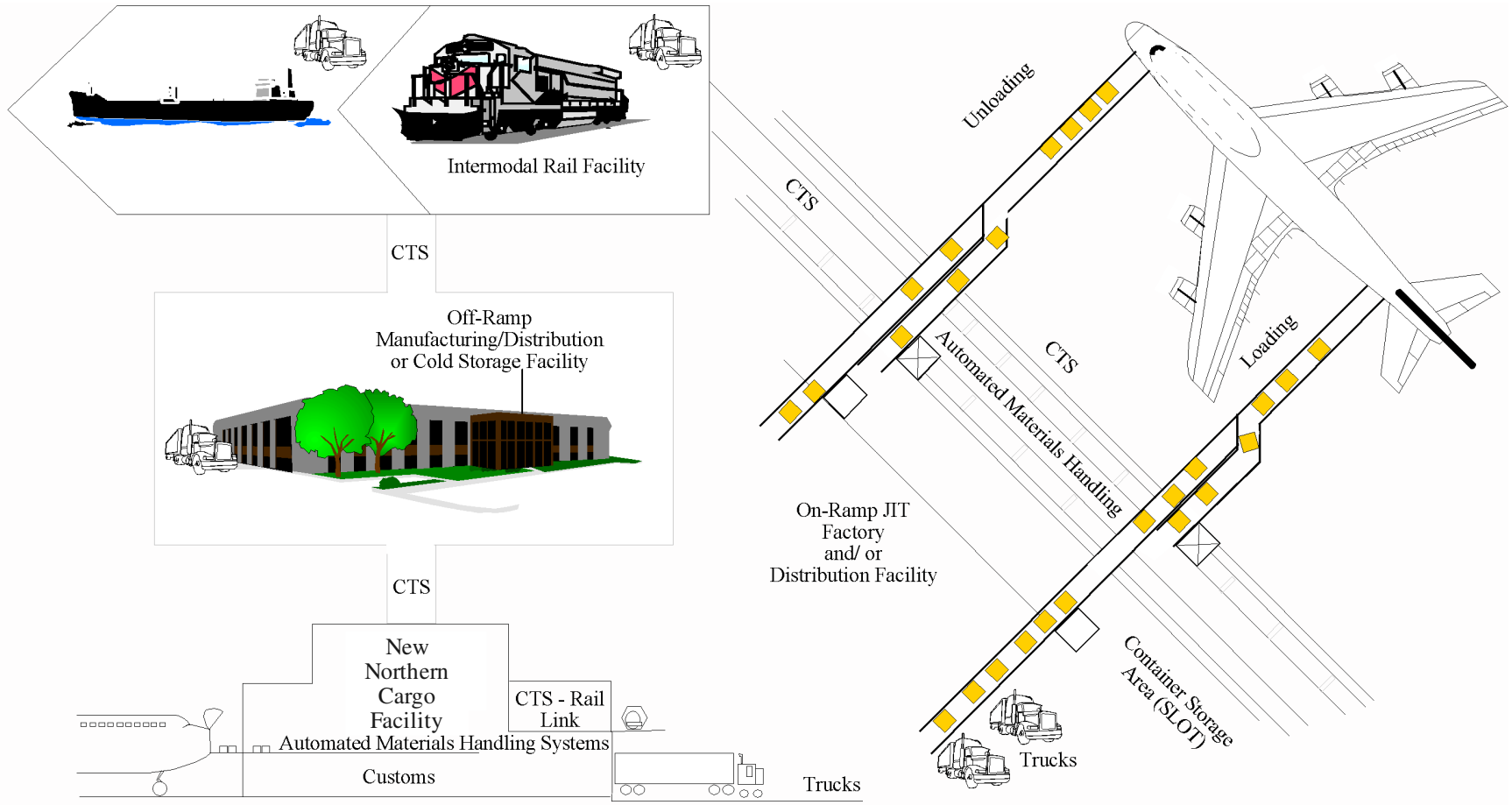

Exhibit 2.13. Transportation Linkages between a CKG Air Logistics Platform and Domestic and International Cargo Network

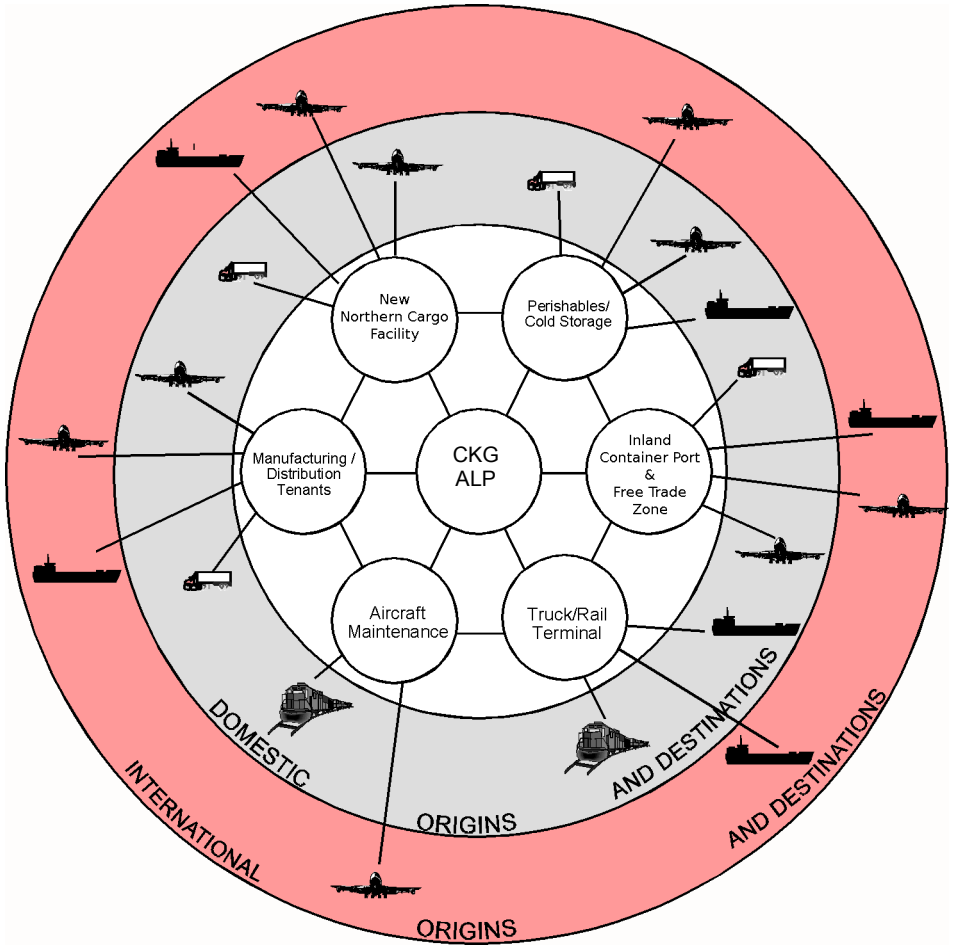

Exhibit 2.14. Overview of the CKG Air Logistics Platform Communications System