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CONCEPT PAPER

A GLOBAL AIR CARGO-INDUSTRIAL COMPLEX FOR THE STATE OF NORTH CAROLINA

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**INSTITUTE
OF
PRIVATE ENTERPRISE**

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The Honorable James G. Martin
Governor of North Carolina
Raleigh, North Carolina

Dear Governor Martin:

In response to your request, I am submitting to you my thoughts concerning the potential for a Global Air Cargo Industrial Complex for North Carolina.

I am confident that this initiative will make North Carolina a leader in the emerging global economy of the 21st century. Certainly, the realization of such a concept could well map North Carolina's future.

Again, my thanks for your support.

Sincerely,

John D. Kasarda

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Director

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THE EMERGING FIFTH WAVE

Transportation accessibility and changes in transportation technology have always been paramount to community economic development. America's first great commercial centers developed around seaports. Next came riverine and canal-linked cities that formed the backbone of America's industrial revolution. Railroads fostered the third wave of state and local economic development, opening up America's land-locked interior to manufacturing and trade. Major centers of goods processing and distribution emerged at rail hubs, generating massive numbers of jobs and commercial activity at these terminal and "break-in-bulk" points. In fact, the contemporary South's largest commercial center, Atlanta, developed as a railway hub and was initially known as Terminus.

The fourth wave of economic development was spawned by highways and the shift to cars and trucks to move people and goods. With the introduction of freeways, beltways, expressways and interstate highways, massive deconcentration of economic activity commenced. Major suburban commercial centers developed and many rural communities along the interstates that were previously inaccessible had new economic life pumped into them, while those that remained isolated stagnated.

We are now entering the fifth and perhaps most opportune, economic era where international markets and international sourcing will play increasingly dominant roles, and "speed" will become a critical competitive factor. The fifth wave is being ushered in by the irreversible forces of immense significance: (l) the globalization of economic transactions; (2) fundamental changes in manufacturing methods from producing large, uniform batches to making customized goods on short notice and to "just-in-time" processes that substantially cut production and delivery cycles to minimize inventory costs, and (3) a growing requirement of business to ship products by air rather than by surface. The combined thrust of these interacting forces is creating an entirely new economy where aviation and airports will ultimately supplant seaports, rail and highway systems as the primary job and wealth generators for states and localities.

North Carolina's ability in the coming decades to maximize indigenous commercial growth, expand exports, and attract major investment from around the country and the world will require our understanding the fifth wave and the forces creating it. Competitive success will also require vision and pro-action regarding the pivotal role aviation will play.

After briefly describing the forces shaping the new economy, I will outline my concept for a global air cargo-industrial complex which would exploit these forces to provide North Carolina with a competitive edge in capturing a disproportionate share of the nation's future economic development.

MACRO-FORCES CREATING THE NEW ECONOMY

Globalization: Since the early 1980s there has been a marked growth and integration of world markets resulting in huge volumes of raw materials, components, and finished products flowing across international borders every day. U.S. exports and imports more than doubled during the 1980s, reaching $1.3 *trillion* annually by 1990, while total world trade surged to $4 *trillion* per year. Investment abroad by America's multinational corporations likewise mushroomed to $1.3 *trillion* in 1990.

The growing interdependence of world markets is reflected not only in terms of international trade and multinational corporate activities, but also in international information flows and financial transactions. For example, between 1977 and 1987, international telephone calls to and from the U.S. (the vast majority for business purposes) rose by well over 1000%, from 300 million minutes to nearly 5 *billion* minutes. At the same time, Japanese, German, and Dutch banks have become the chief underwriters of U.S. Treasury bonds and financiers of massive commercial projects in the U.S. and around the world. By 1988, the *daily* volume of foreign exchange trading amounted to $600 *billion.*

Perhaps nowhere is the new global economy more concretely manifested than in the dramatic rise of component sourcing. Nearly a decade ago, Ford introduced the world car, assembled in Detroit from parts produced on each of the seven continents. Today, global sourcing is commonplace with advanced telecommunications and transportation technologies allowing wide geographic dispersion of component manufacturing sites and places of final assembly, depending upon raw material availability, labor costs, and markets. In this regard, a personal computer produced at IBM's Research Triangle Park acility is likely to be assembled from integrated circuits imported from Japan, a power supply unit from Mexico, microprocessors from Korea, disk drives from Malaysia, and a glass screen from Taiwan.

Because of North Carolina's strategic location at the center of the east coast and attractive business climate, foreign companies are showing increasing interest in siting their export-oriented production facilities in the state, making North Carolina a leader in attracting manufacturing direct foreign investment. Concurrently, the state's home-grown businesses are becoming increasingly involved in exporting everything from blueberries to textile machinery to air fresheners. Concord Farms (Concord, NC) even sells ducks to the Chinese! With new international agreements substantially reducing trade barriers likely to be negotiated during the early 1990s, export opportunities for manufactured goods and agricultural products should skyrocket. ***To sum up, we are at the dawn of a new economic era in which global sourcing, marketing, and exporting will be critical to the future competitiveness and prosperity of North Carolina's businesses. Our state leadership must act quickly and decisively to position North Carolina as a hub in this rapidly expanding global network.***

Just-in-time Production and Delivery: The shift to a global economy, while generating a phenomenal expansion of market opportunities, has also brought in a multitude of new international competitors, placing growing pressure on firms to reduce costs and increase productive efficiency. In the manufacturing arena, global sourcing has been one mechanism frequently employed to reduce costs. Another is a major innovation in production, distribution, and inventory control methods known as "just-in-time." Under this system, all elements in the value chain, from raw material acquisition to delivered finished products, are synchronized to substantially cut production and delivery times and virtually eliminate inventories.

The economic logic underlaying just-in-time operations is that inventory carrying costs are becoming a greater percentage of the total cost of production and distribution of many products. According to Business International Corporation, the proportion of total distribution costs that goes to maintaining inventory has doubled during the past decade, with timing of delivery a crucial factor. Early delivery, raises warehousing and inventory expenses, while late delivery results in costly interruptions in production schedules and missed sales opportunities. The new economy will place a premium on manufacturers acquiring materials and producing and delivering finished products in a highly synchronized fashion, precisely as needed.

The necessary transition to just-in-time systems is also being validated by marketing research which shows that consumer tastes and product demands are changing much more swiftly today than was the case in prior decades. Indications are that such shifts will accelerate faster in the decades ahead resulting in situations where products that are "hot" one month may become obsolete the next. Thus, the current era when manufacturers can produce large batches of standardized goods for relatively stable markets will inexorably give way to an accelerated era of customized production on short notice for response to changing demand. Just-in-time systems are ideally suited to this new economic environment where flexibility and speed will be imperative to competitive success.

The Coming Aviation Era: With international transactions, production flexibility, and speed characterizing the new economy, it is certain that air cargo will play an increasingly important role. No other means of transit is better equipped to meet the economic realities of the coming era where global sourcing and selling and just-in-time logistics will require that producers receive and ship smaller quantities more frequently and quickly over long distances. Already air freight accounts for more than one-third of the value of U.S. products exported, a percentage that will surely rise in the years ahead. International air cargo shipments are projected to grow at least 7% annually during the 1990s with the booming Pacific Rim routes generating double digit annual growth rates throughout the decade.

Much of the cargo will continue to go in the bellies of passenger planes, with some Boeing 747s carrying as much as 35 tons of cargo along with their passenger loads. So important has international aviation become that the Boeing Corporation alone has some 2000 aircraft on back order, including over 300 747s and 200 767s. Yet, because air cargo is

growing so much faster than passenger transit, hundreds of passenger planes are being converted to all-cargo carriers, including numerous 747s. New orders for all-cargo aircraft (known as freighters) are likewise rapidly rising with Boeing expected to sell at least 125 747-400 freighters (the largest U.S.-produced airplane with well over 100-ton cargo capacity) during the 1990s.

In prior economic eras, when speed of delivery and production flexibility were less crucial to competitive success, air freight was considered a luxury. It was confined primarily to small, light-weight, compact products with high value-to-weight or to items needed on an emergency basis at a distant site. Today, essentially anything that can be loaded onto a large aircraft is routinely shipped internationally by air — automobiles, heavy machinery, high tech equipment, textiles, furniture, pharmaceuticals, live cattle, bulk seafood, poultry and agricultural products. When Japan reduced tariff on American cigarettes by 26% in May 1987, 10 million pounds of U.S.-made cigarettes were air freighted to Japan in the following four months. Moreover, air freight is creating entirely new industries such as shipping fresh cut flowers and other highly perishable goods for delivery to distant markets within hours.

The next generation of freighters will be similar to the world's largest aircraft, the Soviet Antonov 225 which was the darling of last year's Paris Air Show. This ocean vessel-size cargo plane has a wingspan of 100 yards, a landing gear consisting of 32 wheels, and it can carry a payload of 250 tons thousands of miles. Hypersonic planes are likewise on the drawing boards which will be able to carry products from North Carolina to Europe in less than two hours and to the Pacific Rim in less than three hours.

It is not unrealistic to suggest that within 25 years advances in aviation will place North Carolina's businesses within three hours delivery time to virtually any other part of the world, providing same day global access to over 8 billion potential customers. North Carolina must plan now for these and other inevitable technological advances that will usher in the "fast century" where speed, speed, and more speed will separate global business winners from losers.

Looking at the more immediate future (the 1990s), global market growth potential is also immense. ***Most of that growth will be in the Pacific Rim, a $4 trillion market expanding at $5 billion dollars a week.*** Nearly two-thirds of the world's population lives in Asia which contains the fastest growing economies, most of which are growing at real rates two to six times that of Europe and the U.S. So rapid are the increases in income levels and numbers of Asian consumers with substantial purchasing power that Fortune magazine produced a special fall 1990 issue solely on Asia, dubbing it "Mega-Market of the 1990's." All forecasts project U.S. trade with Asia growing much faster than with any other region of the world.

Unfortunately, North Carolina is on the wrong side of the country to take maximum advantage of trade with the booming Pacific Rim economies. The

West Coast states have substantially better geographic accessibility and significant temporary advantage since most exports and imports of East Coast businesses to and from Asia are currently shipped by truck or train across the country, delaying delivery from four to seven days. Air cargo essentially levels the playing field by cutting the shipping-time disadvantage to only three hours, which is the time difference in landing a 747-400 freighter from Seoul or Tokyo at a North Carolina airport versus a California airport. In the fast century, many East Coast companies wishing to do business in the Pacific Rim will have no other option but air freight to be competitive.

How valuable is an air route to the Pacific Rim? Houston officials, in their bid this fall to obtain non-stop service to Japan, had a study commissioned that showed that the route would bring in half a billion dollars a year in increased trade and tourism to the Houston area. Similar testimony is provided by other reports from around the country and scholarly research that clearly document the growing importance of international airline accessibility for state and local economic development.

With air freight becoming an integral part of a new economy based on international sourcing and sales, just-in-time production and inventory systems, and speed of delivery, let me describe how these forces can be brought together in the form of a global cargo-industrial complex that would provide North Carolina's economy with a propitious jumpstart into the fast century.

THE COMPLEX

I must make clear from the start that I am not talking about an air cargo airport, but a computer-age industrial complex in which aviation will play a pivotal role. The complex will integrate just-in-time (JIT) manufacturing systems with air freight systems (both spatially and operationally) such that the two systems function as a synergistic unit. Instead of having runways and air cargo facilities with land adjacent to them developed as manufacturing sites, JIT plants will actually be located along the taxiway, allowing freighters to interface with them, just as railway side-spurs allow freight trains to move alongside factories for raw material delivery and loading of finished products. Likewise, similar to passenger terminals where passengers move from ticket counters to gates via concourses and from the concourses into the planes via connecting jetways, the JIT factories would contain computerized conveyor systems along a central movement corridor and feeder lines connecting the central movement corridor to the freighter. Freight transfer logistics would be developed so that while one feeder line is unloading components and materials from one end of the plane another line could be loading finished products at the opposite end. All factories would have rear road access for transferring products to and from trucks for local and regional distribution to customers and to existing commercial airports for domestic air freight.

There will likely be certain economies of scale for centralizing U.S. customs, security, sophisticated loading equipment, and smaller load pick-up and

delivery by having central distribution terminals rather that having freighters taxi directly to each factory. The factories would be connected to the central distribution facilities via high-speed electronic transfer vehicles (ETVs). These central facilities would have areas for unit-load devices (ULDs) and storage areas (slots) for several hundred units up to and including 20-foot containers. They would interface with nose and side loading aircraft via nose docks and feeder lines. The docks would be served via ETVs operating throughout the entire industrial complex picking up and delivering cargo pallets and containers to computer-designated storage slots in a manner similar to modem computerized baggage handling as is done at our largest airports. Freight will be automatically weighed as it enters the facility and the weight and balance information prepared and destination checked for loading on each specific flight. Thus, when Cargolux Flight 276 pulls up to the nose dock for loading, the full load is automatically plucked from the stacks and slots in the proper loading sequence and loaded on the aircraft. The same procedure will work in reverse when ETVs arrive to pick up containers and pallets from the aircraft to be delivered to the JIT factories. Each centralized distribution facility would be designed so that numerous freighters could be loaded and unloaded simultaneously. Intermodal operations could bypass the terminal with intermodal (20-foot) containers moved directly from the aircraft to prestaged truck chassis.

In addition to the JIT manufacturing and central distribution facilities, the complex would contain egend

1. Just-in-Time Manufacturing Plants (JIT)
2. Air Freight Systems
3. Central Distribution Terminals (CDT)
4. Central Facilities with Unit Load Devices (ULD)
5. Container Storage Areas (SLOTS)
6. Electronic Transport Vehicle Corridors (ETV)
7. Critical Inventory Replacement Warehouse
8. Global Air Cargo Anchor Companies
9. High Speed Monorail/ People Mover
10. Aircraft Maintenance Hangars
11. Office/Support Complex
12. Commercial Aviation Service
13. Regional Transit Hub

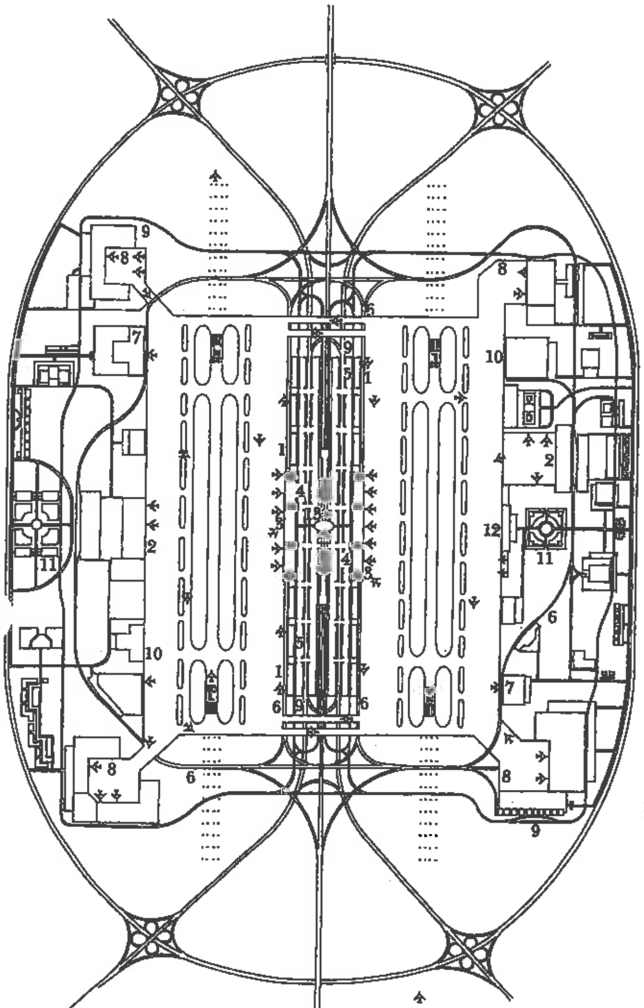

Illustration prepared by Envirotek, Inc.

A global air cargo/industrial complex.

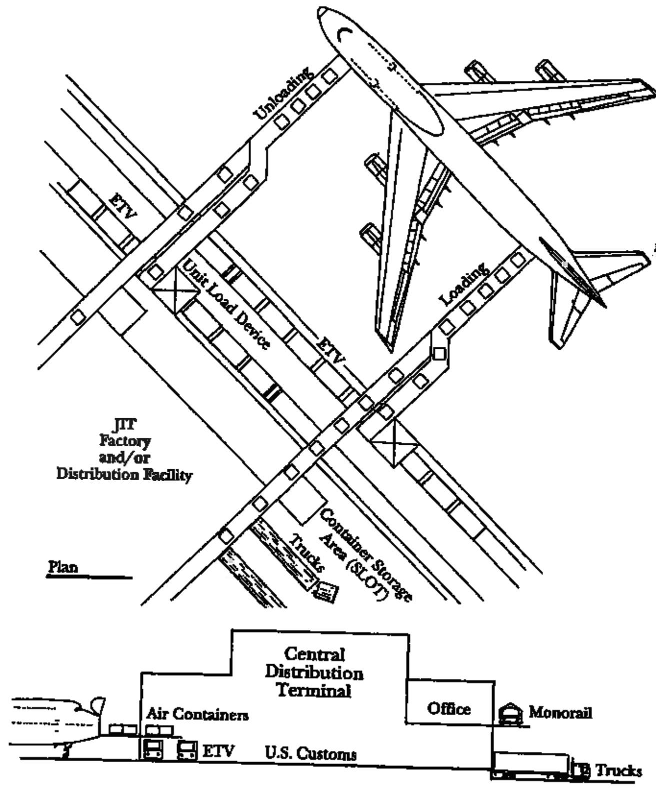

Illustration prepared by Envirotek, Inc.

:al inventory replacement warehouses with round-the-world and round-the-clock communications networks. Critical parts would be kept here for emergency shipment to international customers or dealers. Thus, a message to this center for an emergency replacement part for an advanced technology machine in Bangkok or Brasilia would be expeditiously acted upon with that part immediately placed on the next available flight to that destination.

The complex would contain two 13,000-foot runways (the length necessary for giant cargo aircraft of the future and possible hypersonic freighters) and two parallel taxiways on either side of each runway. Each of the four taxiways would be anchored at each end by two major global air cargo companies (e.g., Federal Express, Cargolux, United Parcel, Burlington Air Express) with their own aprons and maintenance facilities that they would control. As indicated, the industrial plants would be lined on either side of each taxiway. This would provide approximately 10 miles of taxiway siding upon which to locate. The entire complex would be tied together by a highspeed monorail passenger mover which connects the buildings, parking, public transportation and lodging facilities.

Preliminary analysis done by the Kenan Institute's Center for Manufacturing Excellence shows that these manufacturing facilities alone would generate a minimum of 30,000 jobs directly, with substantially greater indirect job generation through employment multipliers. At full capacity, it was estimated that the complex would contribute as much as $5

billion annually to North Carolina's economy. This does not include the economic impact that the complex would have on manufacturing and distribution facilities located within three hours driving distance of the complex which could conduct a full days production, truck it to the air cargo complex, and have it delivered via overnight cargo to virtually anywhere in the world.

Costs of building the basic complex (excluding construction of manufacturing facilities which would be assumed by the companies located at the complex) are initially estimated to be at least $250 million and more likely in the $400 million range, predicated on land costs and other locational factors. Note this is a very small portion of the projected annual economic returns that the complex would generate and less than 5 percent of the budgeted costs for North Carolina's future highway development plan.

Apropos location, a minimum of 15,000 acres would be required. The complex should be located on or very near a major interstate highway within three hours driving time of all three major metropolitan areas in the state and within one hour's driving time of at least one major metropolitan area (Charlotte, Raleigh, Greensboro). Flat topography would hold down construction costs, and the complex needs to be served by the full complement of utilities.

Most flights will be at night by many very large freighters. Aircraft noise restrictions and inevitable future restrictions on the number of night flights in metropolitan areas, as well as the massive amount of land needed for the entire aviation-industrial complex, point to a rural location of minimal population density but maximum highway accessibility. No tall objects should be within 10 miles of the complex and all land up to five miles from the complex should be appropriately zoned to minimize conflicting functional use. Free Trade Zone status must also be obtained for the complex.

Since the vast majority of the anticipated flights to the global air cargo-industrial complex will be international, this complex should substantially benefit North Carolina's existing airports that handle cargo. Many of the large loads that arrive at the complex from abroad on the freighters will, in turn, be broken down into smaller parcels and trucked to existing commercial airports where they will be placed in the bellies of passenger planes for speedy delivery to national markets.

Studies by the Federal Aviation Administration and Transportation Research Board repeatedly document that virtually all major U.S. airports (including Charlotte and Raleigh-Durham) will reach maximum capacity by the early 21st century. ***As planning for he complex moves forward, consideration should be given for developing a wayport (passenger transfer airport) as a second phase at the site (year 2005-2010) and a third phase development (year 2010-2015) of short-time use business centers, hotels, and recreation facilities to serve in-transit passengers flowing into and out of the wayport. The wayport would complement the global air cargo-industrial complex by offering cargo space for smaller loads in the bellies of passenger planes frequently flying***

between the wayport hub and commercial airports around the country.

CONCLUDING COMMENT

The above description only outlines my concept for a global air cargo-industrial complex for North Carolina. I was not able to go into the full range of engineering, environmental, regulatory, and logistical issues that would have to be addressed to make the concept a functioning reality. This I leave to experts in these fields. Rather, the concept is put forth with the broader, pro-active objective of harnessing and leveraging the fundamental forces shaping our economic future to place North Carolina in a developmental leadership position in the 1990s and beyond.

My guiding principle is that as all states (and even nations) seek to create comparative advantages that will nurture local industries and attract new commercial development, that state with the vision to see the handwriting on the wall, before the other states or nations even see the wall, will catapult ahead. In this concept paper I have tried to describe a portion of the writing on the wall. North Carolina, the birthplace of aviation and the state with the highest percentage of its workers in manufacturing, is a natural to combine the two in a visionary manner, thereby substantially enhancing the economic competitiveness of the state and the nation.