2008 Washington-Baltimore Regional Air Cargo Study

June 2008

Metropolitan Washington Council of Governments
National Capital Region Transportation Planning Board

ABSTRACT

TITLE 2008 Washington-Baltimore Regional Air Cargo Study	**Date:** June 2008 **Number of Pages:** 47 + appendix

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AGENCY:
The Metropolitan Washington Council of Governments (COG) is the regional organization of the Washington area's major local governments and their governing officials. COG works toward solutions to such regional problems as growth, transportation, the environment, economic development and public safety. The National Capital Region Transportation Planning Board (TPB) conducts the continuing, comprehensive transportation planning process for the National Capital Region under the authority of the Federal-Aid Highway Act of 1962, as amended, in cooperation with the states and local governments.

ABSTRACT:
This report examines air cargo at Baltimore/Washington International Thurgood Marshall and Washington Dulles International Airports. The study provides analysis of existing and future demand for air cargo services and facilities, and compares this demand with current and planned facilities as well as current and expected highway accessibility to identify air cargo considerations needed for future planning decisions.

SUBJECT:
Air Cargo demand and facilities and highway accessibility at Washington Dulles International and Baltimore/Washington International Thurgood Marshall Airports.

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The contents do not necessarily reflect official views or polity of the U.S. Department of Transportation.

Executive Summary

The Metropolitan Washington Council of Governments (MWCOG) last completed the air cargo element of the regional air system plan in 1997. Titled, *Washington-Baltimore Regional Air System Plan: Volume III – Air Cargo*, the report provided an analysis of existing and future demand for air cargo at Baltimore Washington International Thurgood Marshall Airport (BWI) in Maryland and Washington Dulles International Airport (IAD) in Virginia, as well as an examination of the suitability of current and planned cargo facilities to accommodate future air cargo demand. This update builds on the 1997 plan by providing updated analysis on regional demographic and air cargo trends and forecasts; air cargo facilities and ground access systems at the airports; and current and expected accessibility conditions from the airports to other parts of the region across the region's highway network. This update concludes with recommendations designed to ensure continued effective delivery of air cargo services throughout the air system planning region.

This study was prepared as part of MWCOG's Continuous Airport System Planning (CASP) program, an iterative process that supports the planning, development and operation of airport and airport-serving facilities in the region. The National Capital Region Transportation Planning Board (TPB), which carries out transportation planning at the regional level, oversees the CASP program through its Aviation Technical Subcommittee of the TPB Technical Advisory Committee. The air system planning region is composed of 21 jurisdictions in Maryland, Virginia, West Virginia and the District of Columbia, and is served by three major commercial airports: BWI, IAD and Ronald Reagan Washington National Airport (DCA).

Air cargo has been characterized as the fastest-growing of the transport options, or "modes," used for moving freight shipments. Among the various freight modes, which include truck, rail, ship, air and pipeline, air cargo accounts for the smallest share of freight in terms of volume (weight), but it conversely accounts for the largest share in terms of value per unit of weight (typically measured in tons). Air cargo is used to transport high-value commodities and/or commodities requiring just-in-time delivery. These may include fresh food, flowers, or other perishable items.

Historically, the air system planning region has been among the most prosperous in the nation, boasting high educational attainment rates among residents and workers and leading other regions in developing and utilizing cutting-edge technologies. As such, the demographic and economic composition of the region make it well suited to benefit from high-value, just-in-time air cargo services. Based on forecasts of population, households and jobs, the planning area is expected to sustain the growth that is underway. Between 2010 and 2030, the number of persons, households and jobs will each increase by approximately one-fifth. This points to increased demand for air cargo services in the region provided by BWI and IAD.

Moreover, the air cargo industry is forecast to expand worldwide, fueled by long-term increases in worldwide GDP and rapid growth in other markets, such as China. BWI and

IAD are both poised to embrace this growth from a demand perspective. BWI has historically served domestic demand for air cargo. By 2030, the share of domestic air cargo as a percent of total air cargo at BWI will increase and account for 97 percent of air cargo handled by BWI. By contrast, growth in air cargo handled by IAD will be more focused in the international sector during the planning period. Most of the growth between 2010 and 2030 will be international air cargo, which will account for more than twice the amount of domestic air cargo freight handled at IAD by 2020.

Both BWI and IAD have planned and constructed facilities in a comprehensive manner to ensure efficient transport of air cargo. Both have specialized facilities including climate-controlled warehousing for sensitive items, ramps and apron areas dedicated exclusively for air cargo support, Free Trade Zones (FTZs), and federal regulators and inspectors onsite to provide necessary clearances for air cargo commodities. BWI and IAD have recently embarked on ambitious capital improvement construction programs designed to establish operational efficiencies and expand capacity for current and future air operations. These improvements are particularly necessary given the presence of competing air cargo services that are available at other airports within a six to eight hour truck trip from BWI and IAD.

Nevertheless, most of these improvements have been confined to the airports' property footprints or to areas immediately adjacent to the airport. They did not address ground access systems far beyond the airport boundary other than those facilities that directly serve the airports. Accessibility from the airports to other parts of the region will generally constrict between 2010 and 2030 due to increased traffic volumes even though regional transportation improvements will be implemented during the period. This has substantial implications for the transport of air cargo goods that are transferred from aircraft onto trucks for final delivery over the highway network. Because air cargo serves a time-sensitive market, impaired accessibility can undermine efficient delivery of air cargo shipments, and therefore the air cargo industry as a whole in the region.

Because of these accessibility issues, it will be important for airport operators and their parent agencies to ensure that ground access considerations are adequately addressed in the regional transportation planning process. As a result, the following recommendations are made:

- **As part of the airports' ongoing planning and construction programs, specific consideration should be given to the need to plan internal circulation systems and parking facilities in a manner that alleviates congestion in and around cargo facilities and improves truck access to and from cargo facilities.** This will help mitigate compromised accessibility to other parts of the region by improving travel time from on-airport cargo facilities to the airport exit. During periods of heavy air operations traffic, congestion at the airports themselves can result in long waits to reach the airport exits.

- **Airports should continue to incorporate air cargo needs into their comprehensive planning activities.** This will help ensure that air cargo facilities, passenger facilities, air operations facilities, and infrastructure improvements are planned in a systematic manner that seeks to maximize operational efficiencies and reduce unnecessary capital and operational costs. Such savings can result in fiscal benefits that can be otherwise allocated to addressing other documented needs.

- **Airports should continue to actively participate in the regional transportation planning process to ensure ground access needs are identified and analyzed as part of the regional process and that suitable ground access systems are planned and implemented.** Ongoing participation provides leverage in assuring that identified surface transportation needs of airports are addressed and incorporated into the regional CLRP and TIP. As participants in the regional process, airports can advocate the need to analyze ground access projects in the regional travel demand model, which informs decision-makers of key transportation priorities. Both airports are important components of sustained regional prosperity, and as such, critical needed ground access improvements can be given regional priority for limited resources.

- **As a corollary to the preceding recommendation, it is further recommended that area jurisdictions continue to work together to collaboratively identify opportunities that are financially beneficial to the region for improving airport ground access in the Washington-Baltimore region.**

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1. Introduction

The Metropolitan Washington Council of Governments (MWCOG) last completed the air cargo element of the regional air system plan in 1997. Titled, *Washington-Baltimore Regional Air System Plan: Volume III – Air Cargo,* the report provided an analysis of existing and future demand for air cargo at Baltimore Washington International Thurgood Marshall Airport (BWI) in Maryland and Washington Dulles International Airport (IAD) in Virginia, as well as an examination of the suitability of current and planned cargo facilities to accommodate future air cargo demand. This update builds on the 1997 analysis by providing updated information on regional demographic and air cargo trends and forecasts. In addition to the 1997 report, this report provides additional analysis on ground access issues associated with transporting air cargo shipments across the region's highway network, and makes planning recommendations to ensure continued effective delivery of air cargo services throughout the air system planning region.

1.1. Regional Air System Planning

MWCOG, in cooperation with the Federal Aviation Administration (FAA), the Distirct of Columbia Department of Transportation, (DDOT), the Maryland Aviation Administration (MAA), and the Metropolitan Washington Airports Authority (MWAA), has conducted a metropolitan airport system planning process since 1978. The goal of this Continuous Airport System Planning (CASP) program is to provide a process that supports the planning, development and operation of airport and airport-serving facilities in a systematic framework for the Washington-Baltimore region.

Transportation planning at the regional level is coordinated in the Washington area by the National Capital Region Transportation Planning Board (TPB), which is staffed by MWCOG's Department of Transportation Planning. The TPB is composed of representatives of the transportation agencies of the states of Maryland and Virginia, and the District of Columbia, local governments, the Washington Metropolitan Area Transit Authority, the Maryland and Virginia General Assemblies, and members from the MWAA and federal agencies. Established in 1965, the TPB is the official Metropolitan Planning Organization (MPO) designated by the federal government to carry out the comprehensive regional transportation planning process under the authority of the Federal-Aid Highway Act of 1962, as amended.

The TPB has a Technical Advisory Committee, which in turn, has several standing subcommittees. One of these subcommittees, the Aviation Technical Subcommittee (ATS), provides oversight and direction to the CASP program. This ***2008 Washington-Baltimore Regional Air Cargo Study*** was prepared as an element of the CASP work program with the oversight of the Aviation Technical Subcommittee.

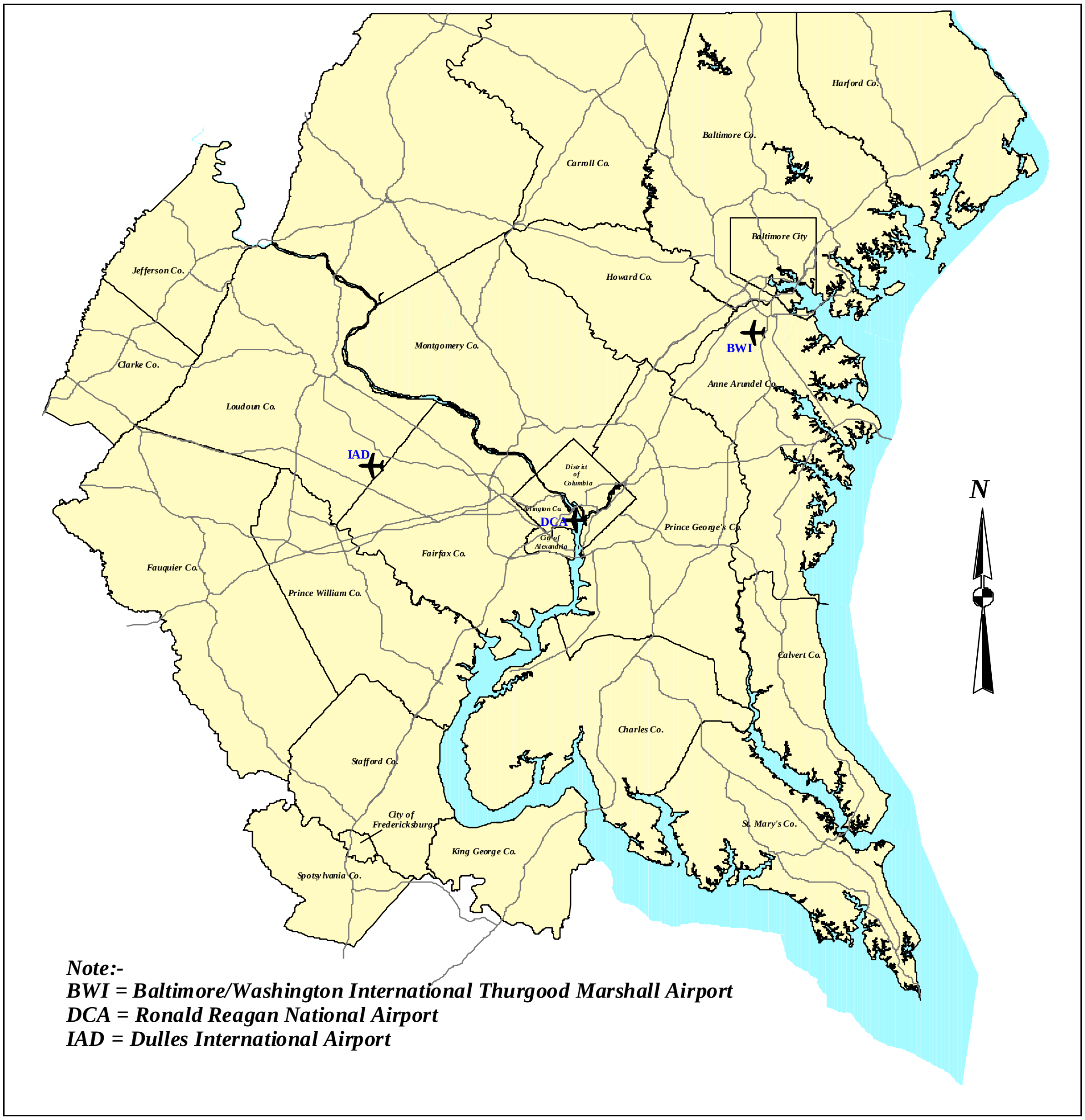
In its role as the MPO, the TPB prepares the region's Constrained Long-Range Plan (CLRP) and Transportation Improvement Program (TIP). A key step in the CLRP and TIP preparation is the preparation of forecasts. Air passenger forecasts are directly used in the development of forecasts of locally originating ground access (passenger) vehicle trips to the region's three commercial airports. These forecasts of airport trips are included in the travel demand modeling for the CLRP. Air cargo forecasts to the airport are not directly estimated as such and thus are not specifically included in the CLRP modeling; however, air cargo trips are "indirectly" included in the origin and destination forecasts of truck travel by Transportation Analysis Zones (TAZs) and are included in the forecasts of truck travel to and from the airports TAZs.

The Aviation Technical Subcommittee deals specifically with aviation issues related to transportation planning. Such issues include air cargo (the focus of this study), ground access travel time, as well as the travel characteristics of regional air passengers. Another Technical Subcommittee currently being formed is the Freight Subcommittee, which focuses on the role of freight, including all modes, in regional transportation. Because air cargo represents one of the modes to transport freight, it is a subject of interest to both the Aviation Technical Subcommittee and the Freight Subcommittee.

1.2. Washington-Baltimore Air System Planning Region

Cities and counties making up the Washington-Baltimore air service market area, or the air system planning area, encompass an area larger than those normally within the purview of the Metropolitan Washington Council of Governments (MWCOG) and the Baltimore Metropolitan Council (BMC). From north to south, the air system planning area stretches from Harford County, Maryland, on the Susquehanna River at the Pennsylvania border to Spotsylvania County, Virginia, halfway between Washington, DC, and Richmond, VA. From east to west, the air system planning region extends from the Chesapeake Bay to beyond the front range of the Appalachian Mountains. Figure 1 shows the 21 jurisdictions constituting the air system planning region, as well as the three commercial airports: Baltimore-Washington Thurgood Marshall Airport (BWI), Ronald Reagan Washington National Airport (DCA), and Washington Dulles International Airport (IAD).

Figure 1
Washington / Baltimore Air System Planning Region



Note:-
BWI = Baltimore/Washington International Thurgood Marshall Airport
DCA = Ronald Reagan National Airport
IAD = Dulles International Airport

1.3. Air Cargo

There are several transport options, or "modes," when considering freight movement in the region. Commodities can be transported by truck, rail, ship, pipeline, and by air. Air commodities are generally flown for one leg of the commodity's multimodal journey. These commodities usually reach their final destination by surface transportation, typically on trucks. Consumer goods are often discharged at warehouses in a metropolitan region before being transported in another truck to local vendors. Consumers have the ability to check the labels and investigate where their products originate.

Airports are among the biggest economic drivers of regional and local economies. Air cargo represents the smallest proportion by weight of all modes transported; however, air cargo represents the fastest-growing segment of the nation's freight movement (by weight) according to the Bureau of Transportation Statistics. Air freight moved less than one percent of total tonnage but carried 12 percent of total value of shipments in 1998 (FHWA 2002).

1.3.1. Air Cargo Characteristics

Air cargo entails the shipment of commercial freight transported in domestic and international freighter aircraft or even passenger aircraft. Air cargo is used for special commodities that must be transported quickly due to the high value or perishability of the commodity or the speed the commodity needs to be transported over long hauls. Examples of air cargo includes ". . . time-sensitive high-tech and high-value goods such as computer chips, automotive parts, pharmaceuticals, medical supplies, and perishable commodities like fruits, fish, vegetables and flowers. It can also include live animals, U.S. mail, and human remains. It is critical to the nation's just-in-time manufacturing sector and Main Street's 'when it positively has to get there overnight' economy" (ACI 2008). Air cargo moves specialized commodities as opposed to other top commodities transported from the Washington, DC, region such as waste/scrap, coal, and gravel, which are better transported by rail or truck.

1.3.2. Air Cargo Market

Airports are among the biggest economic drivers of regional and local economies. The Washington-Baltimore region is served by three major airports that compete for the area's air cargo market. They include: (1) Baltimore Washington International Thurgood Marshall Airport (BWI) in Maryland; (2) Washington Dulles International Airport (IAD) in Virginia; and the (3) Ronald Reagan Washington National Airport (DCA) close to downtown Washington, DC, in Virginia. While these three airports are more widely known for their role in transporting thousands of travelers on a daily basis, they also play a substantial role in the movement of goods, or cargo, to and from the region, particularly BWI and IAD. Each airport competes for their share of the air cargo market by ensuring reliable ground access via major highways to the airport, warehouse space, ramp facilities, specialized services such as refrigerated and heated areas, access to U.S. Fish and Wildlife inspectors, etc.

Baltimore Washington International Thurgood Marshall Airport (BWI)

Domestic air cargo at BWI grew an average of 4.4 percent annually between 1990 and 2002 with some annual fluctuations. Between 1982 and 1990, domestic cargo grew at 5.8 percent and international cargo grew faster, at 11.6 percent (CSI 2008). BWI's ten cargo buildings provide a total of 414,900 square feet of warehouse space. In recent years BWI captured a larger share of the mail shipping market with air freight carries such as Federal Express (FedEx), DHL, and the United Parcel Service (UPS) based at the airport. "FedEx accounts for more than two-thirds of all BWI air cargo movements, and is the single largest influence in determining how BWI serves the Maryland market" (CSI 2007).

Dulles International Airport (IAD)

As the airport with the most scheduled international flights in the region, IAD understandably handles more outbound air cargo than any other airport in the air system planning region. In fact, IAD serves as one of the top 20 international air cargo gateways in the United States. Much of the cargo is carried in the haul of wide-bellied international passenger flights as well as commercial air cargo planes (CSI 2007).

Ronald Reagan Washington National Airport (DCA)

Since 1990, DCA's share of the air cargo market has declined steadily as BWI and IAD's shares have increased. This is due largely to the substantially smaller size and capacity of the airport, particularly in comparison to BWI and IAD. "The most dramatic reduction in air cargo has been in mail shipments, declining 98 percent since 1990" and shifting largely to BWI (CSI 2007). Because of the limited role in regional air cargo activity, limited capacity for future expansion, and the predominance of air passenger service, DCA is not included in much of the analysis contained in this report.

Similar to ports, airports are an entry border gateway into the country and it is important to have nearby cargo storage facilities and to maintain efficient surface transportation for truck or rail to move cargo to and from the airport. With the growth expected in air cargo markets, airport planners need to consider the ground access that shippers need to transport the cargo.

With growing international economic trade, numerous agencies predict a growing domestic and particularly international air cargo market. The Federal Highway Administration's Freight Analysis Framework estimated international trade to increase by 2.8 percent annually between 1998 and 2020, nearly doubling in volume (FHWA 2002).

In the Federal Aviation Administration's Aerospace Forecast Fiscal Years 2008-2025, expansion in domestic and international air cargo markets by United States commercial carriers are collectively expected to be an annual growth of 5.0 percent through 2025 (FAA 2008). According to Federal Highway Administration's 2002 Freight Analysis Framework forecasts, domestic air cargo tonnage is projected to nearly triple between 1998 and 2020 although its share of total tonnage is expected to remain small (FHWA 2002).

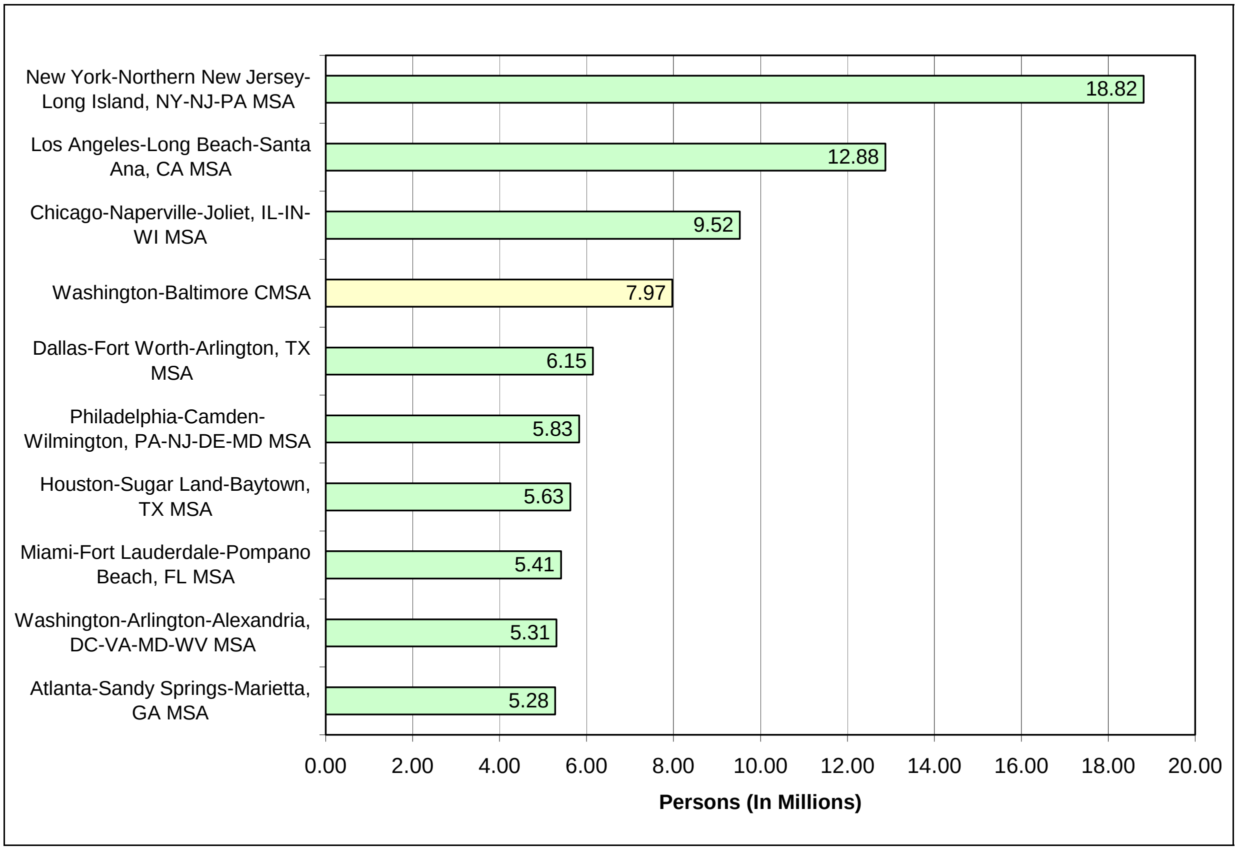
1.4. Washington-Baltimore Region Industrial and Demographic Profile

Population

The Washington-Baltimore region is a major population, employment, and consumer center for both the East Coast and the entire United States. In terms of 2007 population estimates, the Washington Region ranked 8th and the Baltimore region ranked 20th among U.S. metropolitan areas. When considered together as the Washington-Baltimore Consolidated Metropolitan Statistical Area (CMSA), the Washington and Baltimore regions collectively are ranked 4th in the nation in terms of population, according to 2007 estimates (U.S. Census Bureau 2007).[1] Figure 2 shows the 2007 population estimates for the largest metropolitan areas.

[1] Note: The "Washington region" refers to the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA, and the "Baltimore region" refers to the Baltimore-Towson, MD MSA.

Figure 2
2007 Population Estimates
By Metropolitan Area (In Millions)



Source: "Table 7. Cumulative Estimates of Population Change for Metropolitan Statistical Areas and Rankings: April 1, 2000 to July 1, 2007 (CBSA-EST2007-07)," U.S. Department of Commerce, U.S. Census Bureau, Population Division, Release Date: March 27, 2008.

Labor Force and Unemployment

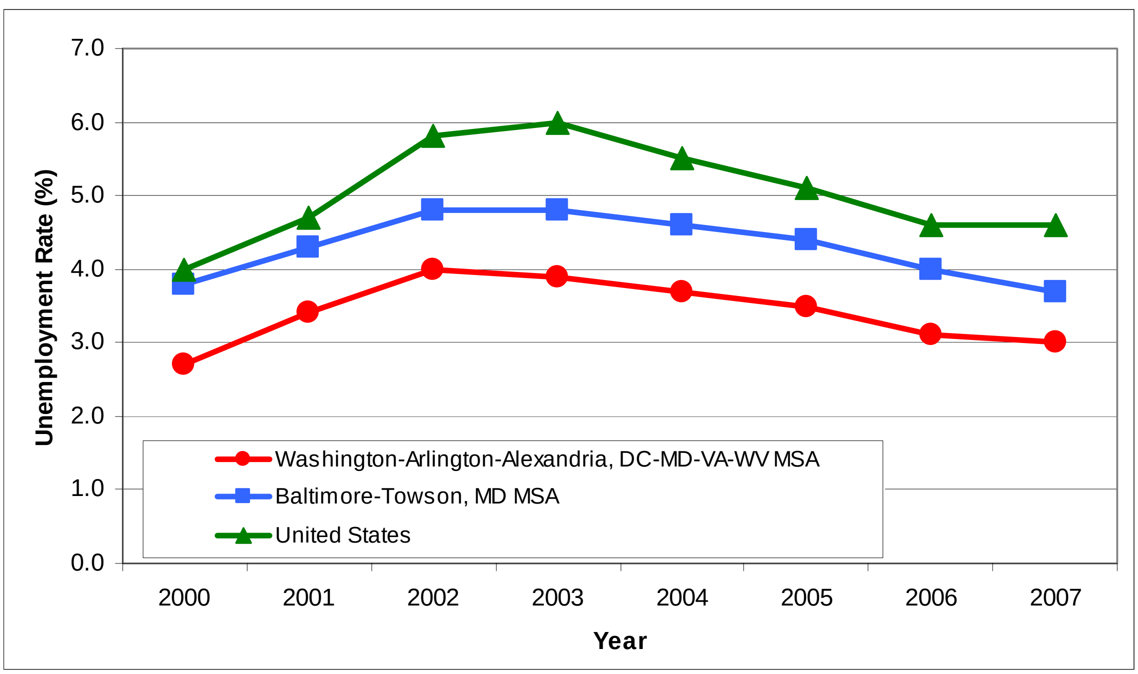
In terms of civilian employment trends, the civilian labor force in the air system planning area is comparatively strong with respect to the nation overall. During every year since 2000, both the Washington and Baltimore regions recorded lower annual unemployment rates than the nation as a whole. Table 1 and Figure 2 show unemployment trends for the planning region and the U.S. as a whole, and underscore the relative health of the labor market in the air system planning area. Moreover, these data suggest a relatively strong consumer market when compared to the nation as whole.

Table 1
Annual Unemployment Rates (Not Seasonally Adjusted)
By Region, Nation and Year

	2000	2001	2002	2003	2004	2005	2006	2007
Washington-Arlington-Alexandria, DC-MD-VA-WV MSA	2.7	3.4	4.0	3.9	3.7	3.5	3.1	3.0
Baltimore-Towson, MD MSA	3.8	4.3	4.8	4.8	4.6	4.4	4.0	3.7
United States	4.0	4.7	5.8	6.0	5.5	5.1	4.6	4.6

Source: U.S. Department of Labor, Bureau of Labor Statistics. Accessed 15 April 2008 from http://www.bls.gov/employment.htm

Figure 3
Annual Unemployment Rates (Not Seasonally Adjusted)
By Region, Nation and Year



Source: U.S. Department of Labor, Bureau of Labor Statistics. Accessed 15 April 2008 from http://www.bls.gov/employment.htm

At-Place Employment

Nearly a fifth of all jobs in the air system planning area are in the professional and business services industry. Other industries containing substantial job shares in the region include the trade, transportation, warehousing and utilities industry (15 percent), and the educational and health care and social assistance industry (13 percent). Table 2 provides 2007 at-place employment statistics for the Baltimore and Washington regions, and aggregates these data at the combined Washington-Baltimore region.

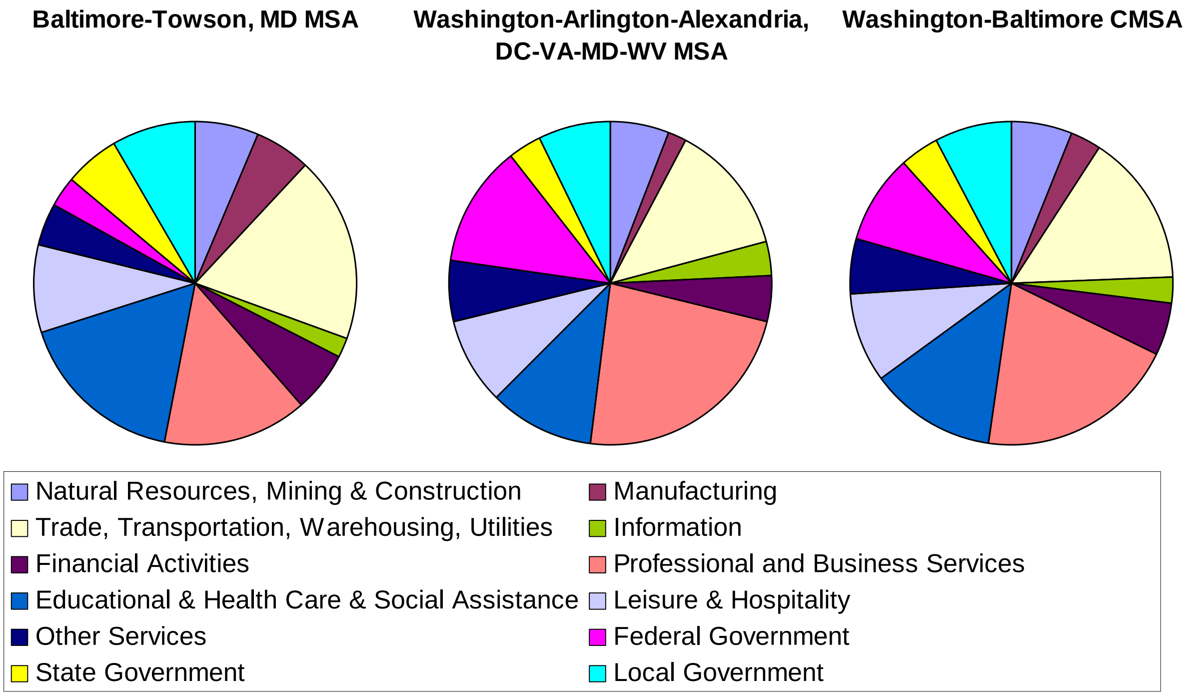
Industry shares of employment underscore the services-producing emphasis of the regional economy. Conversely, goods-producing industries such as manufacturing and natural resources, mining and construction collectively constitute only nine percent of jobs overall. 2007 industrial employment shares are provided in Figure 4.

Table 2
2007 At-place Employment by Industry (In Thousands)

Industry Title	Washington-Arlington-Alexandria, DC-VA-MD-WV MSA		Baltimore-Towson, MD MSA		Combined Region	
	Jobs	%	Jobs	%	Jobs	%
Natural Resources, Mining & Construction	142.4	5.90%	85.9	6.51%	228.3	6.12%
Manufacturing	42.1	1.74%	70.9	5.37%	113.0	3.03%
Trade, Transportation, Warehousing, Utilities	321.5	13.32%	246.8	18.71%	568.3	15.22%
Information	77.3	3.20%	23.7	1.80%	101.0	2.71%
Financial Activities	114.7	4.75%	81.1	6.15%	195.8	5.25%
Professional and Business Services	553.5	22.94%	191.4	14.51%	744.9	19.96%
Educational & Health Care & Social Assistance	256.9	10.65%	223.1	16.91%	480.0	12.86%
Leisure & Hospitality	206.2	8.54%	117.0	8.87%	323.2	8.66%
Other Services	149.3	6.19%	56.7	4.30%	206.0	5.52%
Federal Government	297.9	12.34%	40.7	3.08%	338.6	9.07%
State Government	75.6	3.13%	71.2	5.40%	146.8	3.93%
Local Government	175.9	7.29%	110.9	8.41%	286.8	7.68%
Total Nonfarm	**2,413.3**	**100%**	**1,319.4**	**100%**	**3,732.7**	**100%**

Sources: District of Columbia Department of Employment Services Office of Labor Market Research and Information. Accessed 15 April 2008 from http://does.ci.washington.dc.us/does/frames.asp?doc=/does/lib/does/DC_MD_Industry_Employment_AA_1996-2007.pdf and Maryland Department of Labor, Licensing and Regulation, Office of Workforce Information and Performance. Accessed 15 April 2008 from http://www.dllr.state.md.us/lmi/ces/cesexcel/,

Figure 4
2007 Employment Share by Industry



Sources: See Table 2 citation

Income

The Washington and Baltimore regions consistently record higher per capita income levels among most metropolitan areas nationwide and register per capita income levels higher than the national U.S. level. Table 3 shows per capita income trends in the two metropolitan areas and in the United States between 2001 and 2006. During the period, per capita income was continually higher than those recorded nationwide. In fact, the Washington-Arlington-Alexandria, DC-VA-MD-WV MSA ranked sixth in the nation among all metropolitan statistical areas (MSAs) in 2006, and the Baltimore-Towson, MD MSA ranked 26th. There are 363 MSAs included in these rankings, which further indicates the comparative income strength of the air system planning area.

Table 3
Per Capita Income

Area Name	2001	2002	2003	2004	2005	2006
United States	30,574	30,821	31,504	33,123	34,757	36,714
Washington-Arlington-Alexandria, DC-VA-MD-WV (MSA)	42,370	42,762	43,830	46,452	49,442	51,868
Baltimore-Towson, MD (MSA)	34,896	35,929	36,727	39,154	40,933	43,026

Source: Regional Economic Information System, Bureau of Economic Analysis, U.S. Department of Commerce, accessed 15 April 2008 from http://www.bea.gov/regional/reis/CA1-3fn.cfm.

2. Air Cargo Demand Analysis

This section begins with an analysis of demographic and economic drivers in the region that may affect demand for air cargo services. Indicators such as growing population, workforce and employment provide insight into how regional demand may be sustained or grow. Following that discussion, this section examines the air cargo industry outlook from a macro, global perspective, which is then followed by how this outlook, when considered with demographic and economic drivers in the region, translates into regional demand for air cargo at BWI and IAD.

2.1. Residential Demand

MWCOG and BMC prepare population estimates and projections for the jurisdictions in the Washington and Baltimore regions, respectively. According to the latest round of forecasts, the air system planning area population is forecast to increase 16 percent between 2000 and 2010. Afterward, considerable growth is still anticipated through at least 2030. Between 2010 and 2020, the air system planning area population is forecast to increase 11 percent, and another 7 percent between 2020 and 2030. Table 4 provides population forecasts for all the jurisdictions constituting the air system planning region. Similarly, the number of households is expected to growth during the same forecast period. In fact, household growth is expected to increase slightly faster than the overall population during this time. This is the result of a continuing trend toward fewer persons per households. Nevertheless, households are typically the key input factor in determining residential demand over a planning period. As a result, transportation investment decisions are usually driven by *household* and employment forecasts, rather than population and employment forecasts. Table 5 shows the household growth anticipated in the planning region through 2030.

Overall, residential growth is expected to continue in the planning region for at least the next 20 years, with the outlying areas in the planning area expected to grow the fastest. Even between 2020 and 2030, the following jurisdictions are expected to sustain household growth rates of 15 percent or more: Frederick and Charles counties in Maryland; Fauquier, King George, Spotsylvania and Stafford counties in Virginia; and Jefferson County in West Virginia. This is notable because it underscores that since the fastest residential demand is expected to occur in the outlying areas, it is important to ensure that efficient air cargo delivery to the region's growing residential market is maintained.

Although outlying jurisdictions will grow the fastest during the period, it also must be noted that it is the inner suburbs, along with some of the outer suburbs, that will experience the most absolute growth terms of population and households. Between 2000 and 2030, Fairfax County, VA, and Montgomery County, MD, will add 137,000 and 117,000 new households, respectively. This will be followed by Loudoun and Prince William counties in Virginia, which will add 106,000 and 103,000 new households, respectively. As a result, while much of the focus will be on faster-growing areas, it is also important to not lose sight of the fact that growth in closer-in areas will be significant.

In short, growing regional demand for air cargo from a residential standpoint will not be confined to a specific area. Demand is expected to grow throughout the region during the period and sustaining efficient air cargo delivery to accommodate this growing demand will continue to be an important transportation planning consideration.

Table 4
Population by Jurisdiction
Washington / Baltimore Air System Planning Region

Jurisdiction	Population (1000s)				Percent Change (%)			
	2000	2010	2020	2030	2000-10	2010-20	2020-30	2010-30
District of Columbia	572.1	601.1	665.2	714.1	5.1	10.7	7.3	18.8
Anne Arundel County, MD	489.7	532.5	555.0	571.7	8.8	4.2	3.0	7.4
Baltimore City, MD	651.2	659.2	675.8	685.9	1.2	2.5	1.5	4.0
Baltimore County, MD	754.3	821.7	842.3	849.7	8.9	2.5	0.9	3.4
Calvert County, MD	74.6	91.0	96.0	101.4	22.0	5.5	5.6	11.4
Carroll County, MD	150.9	183.5	206.1	226.7	21.6	12.3	10.0	23.5
Charles County, MD	120.5	147.4	177.2	204.2	22.3	20.2	15.3	38.5
Frederick County, MD	195.3	243.2	287.9	339.7	24.6	18.4	18.0	39.7
Harford County, MD	218.6	257.0	277.0	282.1	17.6	7.8	1.8	9.8
Howard County, MD	250.8	288.7	316.6	325.0	15.1	9.7	2.6	12.6
Montgomery County, MD	866.3	982.6	1,067.7	1,137.6	13.4	8.7	6.5	15.8
Prince George's County, MD	815.1	908.2	968.9	1,000.3	11.4	6.7	3.2	10.1
St. Mary's County, MD	86.2	100.8	114.8	127.6	16.9	13.9	11.2	26.6
City of Alexandria, VA	128.3	142.6	156.2	171.1	11.2	9.5	9.5	20.0
Arlington County, VA	190.3	217.2	235.8	242.5	14.1	8.6	2.8	11.6
Clarke County, VA	12.7	15.4	16.9	18.8	21.9	9.7	11.2	21.9
Fairfax County, VA	1,000.7	1,171.3	1,319.1	1,375.9	17.0	12.6	4.3	17.5
Fauquier County, VA	56.1	74.5	98.8	131.2	32.6	32.7	32.8	76.2
City of Fredericksburg, VA	19.3	22.1	24.8	26.0	14.9	12.2	4.7	17.4
King George County, VA	16.8	23.5	28.1	32.8	40.1	19.3	16.7	39.2
Loudoun County, VA	169.6	301.1	409.9	468.5	77.6	36.1	14.3	55.6
Prince William County, VA	326.7	469.3	548.8	613.7	43.7	16.9	11.8	30.8
Spotsylvania County, VA	71.6	105.8	137.5	166.4	47.8	29.9	21.0	57.2
Stafford County, VA	92.4	135.3	175.0	210.9	46.4	29.3	20.5	55.8
Jefferson County, WV	42.2	51.4	62.7	76.4	21.9	21.9	21.9	48.6
Total	**7,372.2**	**8,546.8**	**9,464.1**	**10,100.0**	**15.9**	**10.7**	**6.7**	**18.2**

Source: MWCOG Round 7.1 Cooperative Forecasts (approved January 2008) and BMC Round 7 Cooperative Forecasts (approved February 2007)

Table 5
Households by Jurisdiction
Washington / Baltimore Air System Planning Region

Jurisdiction	Households (1000s)				Percent Change (%)			
	2000	2010	2020	2030	2000-10	2010-20	2020-30	2010-30
District of Columbia	248.3	265.8	302.0	325.7	7.0	13.6	7.9	22.6
Anne Arundel County, MD	178.7	202.4	217.5	229.1	13.3	7.5	5.3	13.2
Baltimore City, MD	258.0	266.1	278.7	284.7	3.1	4.7	2.1	7.0
Baltimore County, MD	299.9	330.8	339.6	343.1	10.3	2.7	1.0	3.7
Calvert County, MD	25.4	31.0	34.3	36.2	22.0	10.6	5.5	16.6
Carroll County, MD	52.5	64.9	74.8	84.6	23.7	15.2	13.2	30.4
Charles County, MD	41.7	52.2	63.7	76.9	25.3	21.9	20.8	47.2
Frederick County, MD	70.1	87.7	104.1	123.1	25.2	18.7	18.2	40.4
Harford County, MD	79.7	97.0	107.9	112.7	21.8	11.3	4.4	16.2
Howard County, MD	91.0	110.0	126.6	133.0	20.9	15.1	5.0	20.9
Montgomery County, MD	323.4	368.8	406.7	440.1	14.0	10.3	8.2	19.3
Prince George's County, MD	289.8	329.8	360.6	379.1	13.8	9.3	5.1	14.9
St. Mary's County, MD	30.6	36.4	42.6	48.4	18.9	16.9	13.6	32.8
City of Alexandria, VA	61.9	70.3	78.3	87.0	13.6	11.4	11.0	23.7
Arlington County, VA	86.9	103.0	114.3	117.8	18.6	10.9	3.1	14.3
Clarke County, VA	4.9	6.1	6.9	7.8	24.3	11.7	13.3	26.5
Fairfax County, VA	363.1	426.0	479.2	500.1	17.3	12.5	4.4	17.4
Fauquier County, VA	20.2	26.9	35.7	47.5	33.0	33.0	33.0	76.8
City of Fredericksburg, VA	8.1	9.4	10.8	11.4	15.6	15.7	4.8	21.2
King George County, VA	6.1	8.8	10.7	12.5	44.7	21.6	16.5	41.7
Loudoun County, VA	59.9	106.3	146.0	165.9	77.5	37.4	13.6	56.0
Prince William County, VA	109.7	159.3	188.6	212.9	45.3	18.4	12.8	33.6
Spotsylvania County, VA	24.8	36.8	48.7	58.7	48.6	32.3	20.6	59.6
Stafford County, VA	30.2	43.5	57.5	69.2	44.1	32.1	20.4	59.0
Jefferson County, WV	16.2	20.4	26.0	33.1	26.4	27.1	27.4	61.9
Total	**2,781.0**	**3,260.1**	**3,662.0**	**3,940.4**	**17.2**	**12.3**	**7.6**	**20.9**

Source: MWCOG Round 7.1 Cooperative Forecasts (approved January 2008) and BMC Round 7 Cooperative Forecasts (approved February 2007)

2.2. Commercial Demand

2.2.1. Job Growth

Similar to residential forecasts, at-place employment forecasts prepared by both MWCOG and BMC for the air system planning area jurisdictions call for continued growth in employment through at least 2030. Nearly 658,000 new jobs are expected to be added to the planning area between 2010 and 2020, while approximately 527,000 new jobs will be added during the following 10-year period. This equates to nearly 1.2 million new jobs being added to the region between 2010 and 2030. By 2010, the region is expected to have 5.2 million jobs. So, the number of *new* jobs that will be added to the region in the 20-year period following 2010 will equal approximately 22 percent of the number of *total* jobs already in place in 2010. Table 6 shows employment forecasts for the jurisdictions in the air system planning region.

Like residential demand, new jobs will generally grow the fastest in jurisdictions farther away from the combined region's center cities. All of the jurisdictions expected to experience a 15-percent or greater increase in new jobs between 2020 and 2030 are considered to be outlying jurisdictions, with the exception of Prince George's County, Maryland. These include Prince George's County in Maryland; Fauquier, King George, Loudoun, Prince William, Spotsylvania and Stafford counties and the City of Fredericksburg in Virginia; and Jefferson County in West Virginia. These same jurisdictions are also expected to sustain 15 percent or higher growth in new jobs between 2010 and 2020, as well as three of their neighbors, including Anne Arundel and Howard counties in Maryland and the City of Alexandria in Virginia.

As with the case for residential growth, jurisdictions that will experience the fastest job growth are not necessarily the same as those that will experience the most growth. Fairfax County, Virginia, which is not anticipated to grow among the fastest jurisdictions through 2030, will add the most jobs among all jurisdictions with 292,000 new jobs. It will be followed by Loudoun County, VA (200,000 new jobs), Montgomery County, MD (196,000 new jobs), and Prince George's County, MD (180,000 new jobs).

Therefore, similar to population and household growth, new jobs added to the region during the period will not be confined to a specific area. This will contribute to regional demand for air cargo services and any improvements necessary to accommodate this added demand will be important considerations for transportation planning.

Table 6
At-Place Employment by Jurisdiction
Washington / Baltimore Air System Planning Region

Jurisdiction	Employment (1000s)				Percent Change (%)			
	2000	2010	2020	2030	2000-10	2010-20	2020-30	2010-30
District of Columbia	743.6	783.7	844.3	881.4	5.4	7.7	4.4	12.5
Anne Arundel County, MD	297.0	341.3	398.8	439.0	14.9	16.9	10.1	28.7
Baltimore City, MD	460.6	451.4	471.2	481.6	-2.0	4.4	2.2	6.7
Baltimore County, MD	452.0	509.7	523.7	527.7	12.7	2.8	0.8	3.5
Calvert County, MD	22.8	32.9	34.5	35.6	44.1	4.9	3.2	8.2
Carroll County, MD	68.3	84.3	88.3	90.3	23.4	4.8	2.3	7.2
Charles County, MD	41.9	62.9	66.8	69.1	50.2	6.2	3.4	9.9
Frederick County, MD	96.3	142.4	158.3	167.3	47.9	11.1	5.7	17.4
Harford County, MD	96.0	129.7	147.3	163.5	35.1	13.6	11.0	26.1
Howard County, MD	160.0	196.4	231.2	260.2	22.7	17.7	12.6	32.5
Montgomery County, MD	472.1	542.6	613.3	668.1	14.9	13.0	8.9	23.1
Prince George's County, MD	340.4	367.8	422.1	520.3	8.0	14.8	23.3	41.5
St. Mary's County, MD	49.6	61.9	65.1	67.2	24.8	5.2	3.2	8.6
City of Alexandria, VA	89.3	107.8	124.5	141.5	20.8	15.5	13.6	31.3
Arlington County, VA	182.6	215.4	241.9	258.4	18.0	12.3	6.9	20.0
Clarke County, VA	4.4	5.1	5.7	6.4	15.1	13.1	11.3	25.9
Fairfax County, VA	615.3	726.7	835.3	907.2	18.1	14.9	8.6	24.8
Fauquier County, VA	17.2	22.3	29.2	35.4	29.5	30.9	21.3	58.7
City of Fredericksburg, VA	21.9	28.1	34.0	39.9	28.3	21.2	17.3	42.2
King George County, VA	11.1	13.0	15.4	17.7	17.5	17.9	15.1	35.7
Loudoun County, VA	90.5	166.9	241.3	290.7	84.4	44.6	20.5	74.2
Prince William County, VA	119.9	157.7	190.2	217.8	31.6	20.6	14.5	38.1
Spotsylvania County, VA	27.9	39.1	47.4	55.7	40.3	21.1	17.4	42.2
Stafford County, VA	30.2	44.1	57.1	67.9	46.1	29.5	18.9	54.0
Jefferson County, WV	12.8	16.8	20.8	24.5	31.6	24.0	17.5	45.7
Total	**4,523.7**	**5,249.9**	**5,907.7**	**6,434.5**	**16.1**	**12.5**	**8.9**	**22.6**

Source: MWCOG Round 7.1 Cooperative Forecasts (approved January 2008) and BMC Round 7 Cooperative Forecasts (approved February 2007)

2.3. Commodities

Freight transported through air cargo modes consists predominantly of high-dollar and/or time-sensitive commodities. This is illustrated in Table 7, which shows the top commodities traded to and from the Washington region by air or a combination of truck and air. Because of this aspect, air cargo is distinguished by the fact that although it accounts for small share of total freight tonnage shipped by mode, it conversely accounts for a high share of freight value.

By contrast, according to the 2020 FHWA Freight Analysis Framework, the top commodities transported to and from the region in terms of tonnage, regardless of mode, were gravel, coal and other non-metal mineral products.

Table 7
Top Commodities Transported by a Combination of Air and Truck
To and From the Washington, DC Metro Region
By Value, 2002

Commodity	Millions of Dollars	Inbound	Outbound
Electronics	3,033	90%	10%
Precision Instruments	684	100%	0%
Transportation Equipment	424	54%	46%
Pharmaceuticals	267	90%	10%
Motorized Vehicles	183	100%	0%
Machinery	153	99%	1%
Miscellaneous Manufacturing Products	134	99%	1%
Printed Products	133	90%	10%
Textiles/Leather	33	92%	8%
Nonmetal Mineral Products	28	98%	2%

Source: Freight Analysis Framework, FHWA, 2002, as reported in "Enhancing Consideration of Freight in Regional Transportation Planning, Final Report," prepared by Cambridge Systematics, inc. for the National Capital Region Transportation Planning Board of the Metropolitan Washington Council of Governments, May 2007.

Air cargo also satisfies time-sensitive requirements. These may include, among others, live animals, fresh foods, flowers and other agricultural/horticultural products, or perishables. For example, one of the top exports of BWI is finfish and shellfish, which are harvested from the Chesapeake Bay and other nearby waterways that are in close proximity to BWI. Timely delivery of such products is critical to the success of businesses that export perishable items. As a result, dependable and expedient air cargo service is an essential component of the supply chain for delivering time-sensitive items to consumers. This critical need creates demand not only for air cargo service alone, but for adjunct services such as forwarding, climate-controlled storage, and the like—all of which contribute to the success of the just-in-time business model.

So, with respect to demand, by commodity or commodity type, air cargo fulfills a niche demand for high-dollar, time-sensitive items. As the air system planning area continues to grow in population and affluence, as past trends and forecasts indicate, demand for this specialized niche service can be expected to increase as well. As noted earlier, the fastest growing sector in freight is air cargo, which points to growth in demand for commodities shipped via air cargo. As this demand increases, due, in part, to long-term growth in the regional economy, BWI and IAD can be expected to handle larger volumes of air cargo.

2.4. Air Cargo Industry Growth

According to the FAA's aerospace forecasts for 2008 – 2025, growth in air cargo is expected to occur commensurate with growth in gross domestic product (GDP) (FAA 2008). This assumption is based on observations of past trends, which note the correlation. Nevertheless, FAA emphasizes that certain recent changes in the air cargo industry could affect the degree to which this correlation holds true during the forecast period. These include, among others, new air cargo security regulations and procedures imposed by FAA and TSA; shifts in cargo transport modes from air cargo to other modes such as truck and rail; international trade agreements, including "open sky" agreements; technological innovations such as e-mail and electronic data transfer capabilities that could decrease demand for mail air cargo; and increases in fuel surcharges and rapidly-escalating fuel costs (FAA 2008).

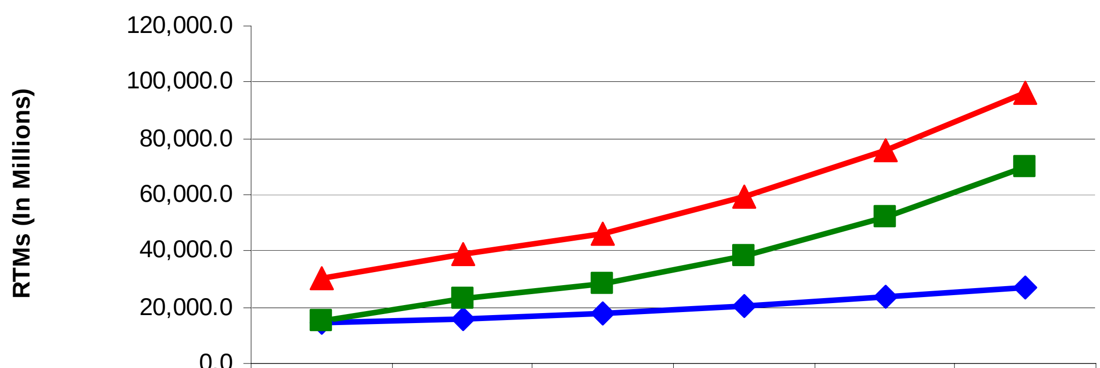
FAA portrays air cargo demand in terms of revenue ton miles, or RTMs. An RTM "is equal to one ton carried one mile and measures utilization of air-freight services" (FAA 2008). Total RTMs (domestic and international) are forecast to experience a 2.8 percent increase in 2008, followed by a 6.1 percent increase during the following year. Thereafter, FAA forecasts call for total RTMs to increase 5.1 percent annually through 2025, when total RTMs are forecast to be approximately 96.5 billion. This represents an average annual increase of 5.0 percent throughout the entire forecast period. While these forecasts are the latest available, the recent surging cost of fuel and the effect it may have on modal transport choices for commodities cannot be overlooked and may affect future air cargo forecasts.

Domestic cargo RTM forecasts call for a similar 2.8 percent increase in 2008, but a 4.4 percent increase in 2009, which is slightly lower than the 6.1 percent increase for total RTMs in 2009. This means that the domestic and international RTMs will have the same growth rate in 2008, but international RTMs will increase faster in 2009, compared to their domestic counterparts, underscoring anticipated increasing growth in the international air cargo market. This expanding growth in international air cargo expected over the forecast period is of particular concern for IAD, which provides extensive international air cargo service in addition to its domestic service capabilities.

Growth in international air cargo is also forecasted by Boeing, which prepares global and regional air cargo forecasts. According to the most recent Boeing air cargo forecasts, the United States and China are the world's "growth leaders" due in large part to strong consumer demand and lower interest rates in the U.S. and the significant economic expansion occurring in China (Boeing 2006/2007). Notwithstanding the current economic downturn, which by all accounts constitutes a short-term economic adjustment, growth in air cargo worldwide is expected to continue, but could be affected by sustained increases in the cost of fuel.

Both FAA and Boeing air cargo forecast reports referenced in this section maintain that growth in air cargo will correlate strongly with capital spending and the overall economy. As a result, short-term fluctuations may be expected in the air cargo industry over the forecast period, just as normal, short-term business cycle fluctuations occur in the economy. As a long-term forecast, however, substantial growth in air cargo continues to be anticipated through 2025, as GDP growth continues to occur over the long-term. Figure 5 shows past and forecasted air cargo trends reported by FAA for U.S. commercial air carriers.

Figure 5
U.S. Commercial Carriers
Air Cargo Revenue Ton Miles (RTMs) [In Millions]



	2000	2005	2010	2015	2020	2025
Domestic	14,698.7	16,089.6	17,638.0	20,597.4	23,616.1	26,725.8
International	15,357.8	23,128.9	28,571.6	38,494.8	52,060.8	69,732.8
Total	30,056.5	39,218.5	46,209.6	59,092.2	75,676.9	96,458.6

Year

Source: U.S. Department of Transportation, Federal Aviation Administration. FAA Aerospace Forecast: Fiscal Years 2008-2025

In an early 2006 Henry Fund Research report, it is stated that the air cargo industry growth rates will more than double worldwide GDP growth rates during the next two decades (University of Iowa 2006). This more optimistic forecast was based on the robust 2006 economy at the time the report was prepared, coupled with rapid globalization. Although current economic conditions may suggest pre-downturn exuberance driving this conclusion, it nevertheless underscores the universal acknowledgment that sustained long-term growth in global markets will drive faster growth in international air cargo demand over the forecast period.

2.5. Air Cargo Growth in the Region

Table 8 shows the Airports Council International (ACI) preliminary 2007 rankings of the top 50 North American airports for total air cargo. The table shows IAD was ranked 19th overall and BWI was ranked 39th. Both airports were among the top 50 out of 160 airports considered. In fact, both airports increased their relative position in the rankings, with IAD increasing a notch from 20th in 2006 to 19th in 2007, and BWI increasing four slots from 43rd to 39th during the same period. Although BWI's total cargo decreased between 2006 and 2007, its ranking increased because several other airports in the rankings experienced greater declines than BWI. This enabled BWI to be ranked higher even though its total cargo volume decreased.

Changes in air cargo activity at both BWI and IAD are tied heavily to changes in air passenger service provided to different markets from BWI and IAD. As service changes are made resulting in markets no longer being served by air passenger flights, the obvious implication is that the air cargo shipments made in the bellies of those aircraft would cease as well. As a result, it is important to underscore that there is a strong correlation between air cargo operations at both IAD and BWI and air passenger operations.

Table 8
Top 50 North American Airports
2007 Cargo Traffic

RANK	CITY, STATE (AIRPORT CODE)	TOTAL CARGO (Metric Tons)	PERCENT CHANGE (%) FROM 2006
1	MEMPHIS (MEM)	3,840,491	4.0
2	ANCHORAGE (ANC)**	2,825,511	0.6
3	LOUISVILLE (SDF)	2,078,947	4.8
4	MIAMI (MIA)	1,922,985	5.0
5	LOS ANGELES (LAX)	1,884,317	-1.2
6	NEW YORK (JFK)	1,607,050	-1.9
7	CHICAGO O'HARE (ORD)	1,533,606	-1.6
8	INDIANAPOLIS (IND)	998,675	1.1
9	NEWARK (EWR)	963,794	-0.6
10	DALLAS/FT WORTH (DFW)	724,140	-4.1
11	ATLANTA (ATL)	720,209	-3.5
12	OAKLAND (OAK)	647,594	-3.1
13	SAN FRANCISCO (SFO)	562,933	-5.4
14	PHILADELPHIA (PHL)	543,357	2.1
15	TORONTO (YYZ)	504,608	-1.1
16	ONTARIO (ONT)	483,309	-2.3
17	HOUSTON (IAH)	409,193	0.0
18	TOLEDO (TOL)	361,867	2.4
19	**WASHINGTON DULLES (IAD)**	**358,527**	**2.2**
20	SEATTLE (SEA)	319,013	-6.7
21	BOSTON (BOS)	298,536	-8.1
22	DENVER (DEN)	267,294	-5.2
23	MINNEAPOLIS (MSP)	257,394	-6.4
24	PORTLAND (PDX)	254,754	-1.8
25	PHOENIX (PHX)	251,925	-12.2
26	FORTH WORTH (AFW)	236,875	-5.4
27	DETROIT (DTW)	233,034	8.7
28	VANCOUVER (YVR)	225,412	1.2
29	ORLANDO (MCO)	183,070	5.9
30	SALT LAKE CITY (SLC)	177,710	-2.0
31	HARTFORD/SPRINGFIELD (BDL)	162,929	-3.3
32	WINNIPEG (YWG)	155,988	3.7
33	SAN DIEGO (SAN)	140,304	-25.6
34	FORT LAUDERDALE (FLL)	137,219	-7.4
35	CALGARY (YYC)	134,250	5.5
36	KANSAS CITY (MCI)	127,767	-5.3
37	SAN ANTONIO (SAT)	124,390	-0.7
38	CHARLOTTE (CLT)	122,149	-17.7
39	**BALTIMORE/WASHINGTON (BWI)**	**115,402**	**-6.9**
40	RALEIGH-DURHAM (RDU)	107,485	1.5
41	COLUMBIA (CAE)	105,629	8.8
42	COLUMBUS (LCK)	100,009	-12.1
43	LINCOLN (LNK)	99,123	5.6
44	TAMPA (TPA)	98,018	-10.2
45	AUSTIN (AUS)	95,587	-8.3
46	DES MOINES (DSM)	91,391	-1.8
47	LAS VEGAS (LAS)	91,205	-10.0
48	MILWAUKEE (MKE)	88,237	-13.4
49	MANCHESTER (MHT)	87,747	9.7
50	CLEVELAND (CLE)	86,690	-6.1

Source: Air Cargo International-North America, Accessed 13 June 2008 from http://www.aci-na.org/stats/stats_traffic

For purposes of this analysis, regional air cargo demand consists of air freight and air mail that originate or terminate in the *market region* of Dulles and BWI airports. The overall market region is defined as an eight-state region consisting of North Carolina, Virginia, West Virginia, the District of Columbia, Maryland, Delaware, Pennsylvania, and New Jersey. The region is within 250 miles of one of these airports, or within 500 miles of the airports and not closer to a major cargo airport (such as New York-Kennedy [JFK], Atlanta Hartsfield-Jackson International [ATL], or Chicago-O'Hare [ORD]). This definition is based on analysis of cargo flow patterns, trucking services, and the marketing systems for the air carriers at those airports.

Airport forecasts used in the following subsections are provided by the respective airports and are based on assumed annual growth rates. Airport statistical analysts caution that air cargo forecasts are based on assumptions of industry factors that typically have a high degree of variability. These variables can affect air cargo trends considerably from one year to the next. As a result, air cargo forecasts are prepared to show the general trend anticipated over a planning period and do not necessarily capture year-to-year fluctuations that may actually occur.

2.5.1. BWI

Air cargo trends and forecasts for BWI are presented in Table 9. Between 2004 and 2007, air cargo declined from 119,000 metric tons to 109,000 metric tons. The sharpest decline in terms of rate occurred in international air cargo, which decreased 62 percent. Domestic air cargo decreased 4.5 percent, and this resulted in an overall decrease of eight percent for total freight air cargo.[2] Mail experienced a considerable decline as well, dipping 39 percent in the four-year period.

Despite these declines, air cargo is expected to increase annually between 2010 and 2030, although at modest levels. Between 2010 and 2020, total freight is forecast to increase nearly 15 percent to 132,000 metric tons, and another 14 percent to a total of 150,000 metric tons in the following decade.

In 2010, domestic air cargo is forecast to be 112,000 metric tons at BWI. Between 2010 and 2020, this is expected to increase 15 percent to more than 128,000 metric tons; and between 2020 and 2030, domestic air cargo is forecast to increase another 14 percent to 146,000 metric tons.

International air cargo is expected to grow as well during the period, although at slightly lower rates. In 2010, international air cargo is expected to amount to 3,000 metric tons. In the following 10 years, this amount is expected to increase 12 percent to 3,500 metric tons, and that is forecast to increase by nearly 12 percent again to a level of 3,800 metric tons by 2030.

[2] Total freight includes domestic and international air cargo, but not mail.

By far, domestic air cargo accounts for the greatest share of total freight handled at BWI. In 2004, 93 percent of total freight was domestic, and by the end of the forecast period, this share is expected to hover around 97 percent, underscoring the dominance of domestic air cargo as a percentage of total freight at BWI.

Forecasts for mail are not available due to the extreme variability of mail freight at individual airports. For example, in any given year, a carrier located at a specific airport may pick up (or conversely lose) a contract to provide mail freight services. This could result in more than doubling of existing mail volumes (or significant reductions). As a result, mail freight demand is indicated by past trends only.

Between 2004 and 2006, mail freight hovered consistently around 10,000 metric tons, but decreased sharply to 6,000 metric tons in 2007. This represents an overall decrease of 39 percent in mail freight during the 2004 to 2007 period; although mail freight in general has increased at BWI since 1990.

2.5.2. IAD

Between 2004 and 2007, domestic air cargo at IAD dipped during the period, but rebounded to complete the four years with an overall two percent increase. By contrast, international air cargo registered growth during most of the period, increasing 34 percent. Overall, total freight posted an increase of more than 17 percent, increasing from 296,000 to 348,000 metric tons. Table 10 shows air cargo trends and forecasts for IAD.

Forecasts call for more robust air cargo growth between 2010 and 2030 at IAD. Between 2010 and 2020, total freight is anticipated to increase more than 42 percent, increasing from 389,000 to 554,000 metric tons. Individually, domestic air cargo is expected to increase nearly 25 percent, from 161,000 to 201,000 metric tons, while international air cargo is expected to increase 55 percent, from 228,000 to 353,000 metric tons.

During the following ten years, between 2020 and 2030, growth rates for domestic and international air cargo are forecasts to match those of the preceding 10 years. Domestic air cargo will increase 25 percent, from 201,000 to 251,000 metric tons, and international air cargo will increase 55 percent, from 353,000 to 547,000 metric tons. This illustrates the increasing dominance of the international air cargo sector at IAD and stresses the need to ensure air cargo services provided at IAD are sufficient to capture the ballooning demand for international air cargo.

During the same period, mail freight declined each year, decreasing from 14,000 metric tons in 2004 to 10,000 metric tons in 2007. This represents an overall decrease of 27 percent during the period.

Growth between 2010 and 2030 will be markedly greater at IAD both in absolute and percentage terms compared to BWI, and this growth will build off an already larger baseline amount at IAD. As result, according to the air cargo forecasts, IAD’s air cargo market share dominance in the air system planning region will continue to expand during the forecast period. This expansion will be fueled more by increases in international air cargo demand for which IAD is well poised.

According to Airbus' Global Market Forecast, the top freight market in 2025, in terms of market flows, will be the Peoples Republic of China (PRC) – North America. By 2025, this market flow will account for nearly 15 percent of worldwide freight-ton kilometers (FTK) (Airbus 2005). In January 2007, United Airlines was awarded a direct flight route between IAD and Beijing, which was a highly sought after award among large commercial airlines in the U.S. There are just more than 10 direct flights between the U.S. and China, so the addition of this route provides a significant direct link between the air system planning area and one of fastest-growing worldwide markets. Indeed, such a route tethers the air system planning region to one of the fastest growing economies in the world; and that represents a significant opportunity to capitalize on the prospect for robust trading between two regions expecting long-term economic growth.

In addition to the new direct connection between the Chinese and U.S. capitals, IAD has extensive international service other international markets, including Asia and Europe, which fuel the bulk of the international air cargo demand. In the same Airbus report, the next two largest international freight markets in which the U.S. was identified included Asia – North America and Europe – North America, which are expected to account for 4.9 and 4.0 percent of worldwide FTK, respectively (Airbus 2005).

Table 9
Historic and Forecast Enplaned and Deplaned Air Cargo (Metric Tons)
BWI

Air Cargo Type	Historic				Forecast			Percent Change (%)		
	2004	2005	2006	2007	2010	2020	2030	2004-10	2010-20	2020-30
Domestic	110,961	112,905	109,000	105,998	111,826	128,503	146,220	0.8	14.9	13.8
International	7,735	6,113	4,545	2,954	3,089	3,456	3,856	-60.1	11.9	11.6
Freight Only	**118,696**	**119,018**	**113,545**	**108,952**	**114,915**	**131,959**	**150,076**	**-3.2**	**14.8**	**13.7**
Mail	10,546	10,114	10,430	6,470	Mail Forecasts Not Available					
Freight+Mail	**129,242**	**129,132**	**123,975**	**115,422**						

Source: Maryland Aviation Administration, BWI Airport, Statistics, 2008 (Historical Data); personal communication (e-mail) from Tony Storck, Manager Aviation Statistics and Analysis, BWI Airport, March 13, 2008 (Forecast Data through 2025).

Note: The following forecast growth assumptions were made using 2007 as the base year:

1. Domestic Growth 2008-2012: Annual increase of 1.8%
2. Domestic Growth 2013-2025: Annual increase of 1.3%
3. International Growth 2008-2012: Annual increase of 1.5%
4. International Growth 2013-2017: Annual increase of 1.0%
5. International Growth 2018-2025: Annual increase of 1.1%
6. Assumptions 1 through 5 provided as cited above. For purposes of this analysis, growth rates for 2026-2030 were assumed to be the same as the respective growth rates for 2025.

Table 10
Historic and Forecast Enplaned and Deplaned Air Cargo (Metric Tons)
IAD

Air Cargo Type	Historic				Forecast			Percent Change (%)		
	2004	2005	2006	2007	2010	2020	2030	2004-10	2010-20	2020-30
Domestic	154,061	144,825	147,304	157,338	161,043	201,176	251,310	4.5	24.9	24.9
International	142,238	144,054	191,086	190,705	227,739	352,995	547,143	60.1	55.0	55.0
Freight Only	**296,299**	**288,879**	**338,390**	**348,043**	**388,782**	**554,171**	**798,453**	**31.2**	**42.5**	**44.1**
Mail	14,378	14,133	12,435	10,484	Mail Forecasts Not Available					
Freight+Mail	**310,677**	**303,012**	**350,825**	**358,527**						

Source: Metropolitan Washington Airports Authority, Washington Dulles International Airport, 2008.

2.6. Demand Conclusions

Historically, the region has been among the most prosperous in the nation, boasting high educational attainment rates among residents and workers and leading other regions in developing and utilizing cutting-edge technologies. As such, the demographic and economic composition of the region make it well suited to benefit from high-value, just-in-time air cargo services. Based on forecasts of population, households and jobs, the planning area is expected to sustain the growth that is underway. Between 2010 and 2030, the number of persons, households and jobs will each increase by approximately one-fifth. This points to increased demand for air cargo services in the region provided by BWI and IAD.

Moreover, the air cargo industry is forecast to expand worldwide, fueled by long-term increases in worldwide GDP and rapid growth in other markets, such as China. BWI and IAD are both poised to embrace this growth from a demand perspective. BWI has historically served domestic demand for air cargo. By 2030, the share of domestic air cargo as a percent of total air cargo at BWI will increase and account for 97 percent of air cargo handled by BWI. By contrast, growth in air cargo handled by IAD will be more focused in the international sector during the planning period. Most of the growth between 2010 and 2030 will be international air cargo, which will account for more than twice the amount of domestic air cargo freight handled at IAD.

The economic health of the planning region depends on robust domestic inter-regional commerce as well as increasing participation in global commerce. Therefore, it is important that air cargo services in the region can respond to increasing domestic and international air cargo demand.

3. Regional Airports Cargo Facilities

Cargo facilities were originally designed based on the predominant type of air cargo service occurring at the major airports—belly freight on passenger aircraft. As a result, air cargo facilities were placed within or close proximity to passenger terminals without considering that substantial growth in air cargo facility expansion may be necessary in the future. Most facilities were not planned in a comprehensive manner to support air cargo as a primary activity; rather, they were planned and constructed within the pretext that air cargo operations occurred adjunct to air passenger service.

Rapid expansion of the Washington and Baltimore regions, coupled with the emerging importance of all-cargo carriers, such as FedEx and UPS, prompted the need to rethink air cargo facilities planning and make specific accommodations for consolidated air cargo facilities in airport layout plans (ALPs). The emergence of the importance of air cargo as a substantial revenue generating activity of carriers spawned the need to strategically plan air cargo facilities at major airports. In short, the strategic planning and development of air cargo infrastructure became an economic development necessity for major airports seeking to maintain their competitiveness, if not expand their prominence and desirability. To do otherwise could result in missed opportunities to retain market share among major commercial airports. BWI and IAD are the two commercial airports in the air system planning region containing substantial air cargo operations and infrastructure to support them.

Section 2 states that air cargo demand is forecast to increase during the planning period. Increased demand is anticipated for both domestic and international air cargo service. As noted, even expanded international service to previously underserved markets such as China and other Asian countries further contributes to this increased demand and the need to provide air cargo facilities needed to support long-haul air cargo shipments.

This section provides and overview of the facilities and infrastructure in place at BWI and IAD necessary to support air cargo. It also identifies considerations that may be necessary in future facility planning activities to continue to effectively accommodate air cargo operations.

3.1. BWI

There is an average of 14 daily cargo flights occurring at BWI. To support these operations, as well as passenger operations that also carry in-belly cargo shipments, BWI has numerous air cargo and operations facilities. There are four runways operating around the clock. Runway 10 approach of Runway 10/28 has the highest-classified Instrument Landing System (ILS), Category III (CAT III), which is necessary to support aircraft landings in the least favorable weather conditions. This will ensure all types of aircraft can be accommodated in unfavorable conditions. Runway 10/28 is 3,200 meters in length. BWI encompasses a total of 3,500 acres, or 5.5 square miles.

Ten (10) cargo buildings accounting for 414,900 square feet of warehouse space are present to support air cargo operations. This space includes a cold storage facility with direct ramp access to support time-sensitive air cargo shipments such as flowers or other perishables. Such facilities are important components to the supply chain for delivering time-sensitive commodities and are necessary to demonstrate to air cargo users that the quality of their products will not be undermined because of inadequate conditions that may occur in the air cargo shipping process.

BWI has direct nose-in access for 15 freighter positions and air cargo ramps that can accommodate up to 24 aircraft. These facilities enable multiple air cargo operations to be supported simultaneously, which in turn, bolsters the through-put—ultimately resulting in increased capacity for air cargo operations at BWI. This is particularly beneficial to BWI because of its primary focus on domestic air cargo services. Domestic operations are typically supported by more frequent flights but with smaller aircraft. Sufficient through-put is needed to support such operations.

The only U.S. Fish and Wildlife Service (USFWS) inspection gateway in the mid-Atlantic is located at BWI. USFWS inspectors provide on-site inspection of live animals, fish and game to expedite clearance and ultimate delivery of live air cargo to their final destination. Similarly, the U.S. Department of Agriculture (USDA) has on-premises inspectors to expedite clearance of plants and other vegetative resources included in air cargo shipments.

BWI is a designated international airport and as such, it is both an origin and destination for international air cargo shipments. As a result, permanently-assigned staff from the Department of Homeland Security's (DHS) U.S. Customs and Border Protection (CBP) are located at BWI around the clock for all international air passenger and air cargo operations occurring at the airport. This 24/7 presence helps expedite the flow of air cargo through this key transfer point in the supply chain.

Another key facility at BWI that supports expedient air cargo movements is the Foreign Trade Zone (FTZ). An FTZ is a facility or group of facilities exclusively set aside for " . . . conducting international trade activities whereby the usual customs duties and taxes are not required on foreign merchandise unless and until it enters the Customs territory for domestic consumption, in which case the importer ordinarily has a choice of paying duties either on the original foreign material or the finished product" (MAA 2008).

Interstate highways are readily accessible to BWI, including major national north-south and east-west highways. (See Section 4 for additional information on highway accessibility).

3.2. IAD

Three runways support operations at IAD. Two runways measure 3,200 meters, and the third is 3,500 meters in length. All three runways are CAT III certified. Construction of a fourth runway, 1L/19R, is underway with completion expected later in 2008. A fifth runway has been planned, but construction of this facility has not been scheduled. Like BWI, Washington Dulles International Airport conducts 24-hour operations.

IAD houses seven cargo buildings accounting for 540,000 square feet of warehouse space, and it contains 23 acres of air cargo ramp area. These facilities accommodate specialized services, including refrigerated and heated areas to protect sensitive, perishable shipments; special handling for live animals to provide protection from noise and temperature extremes; and security areas for short-term storage of high value cargo.

In addition to the facilities that accommodate air cargo operational capacity, IAD also includes facilities that support expedient transfer of air cargo shipments. These include an FTZ for conducting international trade.

IAD is also a designated international airport and accommodates international air cargo shipment as a result. To help facilitate this, IAD has permanently-assigned staff from DHS CPB to provide continuous customs support for all air passenger and air cargo operations.

Located on the border of Loudoun and Fairfax counties in Virginia, IAD is served by three limited access highways as well as a major primary route that is being upgraded to limited access near the airport. (See Section 4 for additional information on highway accessibility).

The airport property itself is composed of nearly 11,000 acres, or 17 square miles, and much of the property is still undeveloped. As a result, there is capacity for substantial facility expansion to occur to support the increased carrying capacity that will occur with the completion of new and reconstructed runways. Dulles Development, or D2, is an intensive capital construction campaign underway to accommodate future growth and all air operations (MWAA 2008). This program includes the aforementioned new runway projects, the reconstruction of an existing runway, and myriad capital improvements, including state-of-the art people mover systems, a new international arrivals building, and terminal expansion and improvements, and ground access improvements, among others. This capital construction program seeks to ensure that future needs will be addressed in a systematic, comprehensive airport expansion occurring within the 11,000 acre footprint.

3.3. Facilities Conclusions

Sustained growth in the air cargo market is anticipated through 2030. While both BWI and IAD have implemented capital improvement projects to accommodate air cargo growth and activities, careful consideration will be needed when planning future facilities and related improvements. For example, new aircraft such as the Airbus A380 are coming online in the near future and it will be necessary to ensure that existing facilities, including cargo ramps, aprons, runways, etc. will be suitable to accommodate these next generation aircraft from an air cargo perspective.

Increasing security requirements have been attributed to delays in timely airport operations. Security needs will require augmented consideration in the development of facility requirements for future airport facilities, and air cargo facilities will be no exception. This would be consistent with previous responses to increased regulatory requirements that have been imposed on air operations. When new regulations such as USFWS or USDA inspections were implemented for air cargo, airports responded by developing dedicated space where regulatory agencies could conduct their work efficiently and expeditiously. Air security will simply be another such regulatory activity that will need to be incorporated into facility planning at commercial airports.

Efficient ground access systems will continue to be a paramount consideration. Ground access conclusions are included in the following section, Accessibility Analysis.

4. Accessibility Analysis

As part of this study, an accessibility analysis was conducted to estimate the travel time on the region's highway network from the region's commercial airports. The accessibility analysis included BWI and IAD, plus it included Ronald Reagan Washington National Airport (DCA). The purpose of the analysis is to determine if accessibility to various parts of the region can be expected to change over time, identify the implications that such changes may have on air cargo shipments, and make any needed recommendations to help offset any potential adverse impacts that may result due to changes in travel time. With air cargo as the fastest-growing freight segment, the need to maintain suitable airports and airport ground access infrastructure will be critical. This point was underscored in the COG/TPB freight analysis conducted by Cambridge Systematics, Inc. (CSI 2006).

Data from MWCOG's and BMC's regional travel demand models were used to conduct this analysis. These models collectively cover the entire air system planning area. Each model contains a zone system composed of thousands of transportation analysis zones (TAZs) that cover the modeled area. In these models, travel time from each of the TAZs to one another is estimated based on the current highway network conditions as well as future conditions that will be expected as a result of the future completion of planned transportation improvement projects contained in the CLRP. As a result, estimated travel times are available in the current year, as well as future years through 2030 in these models. For this analysis, travel times for 2010, 2020 and 2030 were used to create a set of accessibility maps that show travel time ranges on the region's road network originating from each of the three airports. Both off-peak and AM peak travel times were used in this analysis.

These maps are contained in Figures 6 through 17. Note that the 2020 maps are not included in this section because there was little variation in the maps between the 2010 and 2020 maps and the 2020 and 2030 maps. As a result, the 2020 maps were omitted from this section to better illustrate the anticipated changes in regional accessibility between 2010 (base year) and 2030 (the final year of the planning horizon). Nevertheless, maps for all years (2010, 2020 and 2030) are included in larger size format in Appendix A of this report.

From an air cargo perspective, favorable highway accessibility originating from an airport is necessary to ensure air cargo shipments are delivered in a timely manner to their ultimate destination in the region. (Similarly, efficient ground access *to* an airport is necessary to transfer freight shipments enroute to their destinations via air cargo). This accessibility analysis portrays travel time or vehicle trips *originating* at the airports and terminating at various points in the region or traveling through the region. It should be understood, however, that characteristics of the trips taken to transfer air cargo shipments to their ultimate destination via the highway system differ from those captured in the travel demand model. For instance, air cargo shipments, once transferred to vehicles along the highway network, may undergo several intermediate steps before reaching their destination.

For example, mail or parcel shipments are frequently transferred from the aircraft to an offsite sorting facility off the airport property. This transfer would constitute one portion of the highway travel encountered for any given parcel. From the sorting facility, the parcel could then be transferred again to an intermediate facility, such as a local post office, or to its final destination of a business or residence. As a result, transfer of air cargo from the aircraft to its final destination often requires multiple vehicle trips. Therefore, the travel times portrayed in this accessibility analysis may understate the actual time it could take to deliver an air cargo shipment to its destination along the highway network.

The key to this analysis is in understanding the *change* in travel time, or accessibility, over the planning period. The maps in this section show that the land area accessible within specific ranges of time generally will become constricted between 2010 and 2030. As a result, for any given destination in the region, the travel time along the highway system may become longer from the airport to that destination; and this could potentially adversely affect timely delivery of air cargo shipments to regional customers.

Maps included in this section show three levels of accessibility defined for this analysis: (1) *good accessibility*—areas accessible within 30 minutes [dark green]; (2) *favorable accessibility*—areas accessible between 30 and 60 minutes [light green]; and (3) *impaired accessibility*—areas accessible in 1 hour or more [pale yellow].

Understandably, the accessibility maps show that good and favorable accessibility are more widespread during the Off-Peak than the AM Peak. This underscores why most freight movements along highway networks are conducted during Off-Peak hours in areas containing higher levels of residential and commercial activity. In these areas, freight movements may occur at odd hours of the night when other activities are at their lowest levels. This helps ensure timely delivery of freight. Moreover, Off-Peak freight travel enables greater efficient use of regional highway infrastructure through increased utilization of roadways during low-use periods.

4.1. BWI

Areas accessible within 30 minutes from BWI during the AM Peak will remain nearly the same in 2030 as in 2010; however, areas accessible between 30 and 60 minutes will reduce slightly. Figures 6 and 7 show regional accessibility from BWI during AM Peak for 2010 and 2030. During the AM Peak, the 30 to 60 minute accessibility contour extends primarily north and northeast from the airport, but not as much to the south and southwest for both 2010 and 2030. This results from heavy commute flows of traffic during the AM Peak of residents to jobs in the Washington region.

Accessibility from BWI during the Off-Peak is shown on Figures 8 and 9 for 2010 and 2030. These maps show that areas where accessibility is good (30 minutes or less) are roughly the same during the Off-Peak as the AM Peak. Nevertheless, the areas with favorable accessibility (30 to 60 minutes), cover a larger geographic extent during the Off-Peak compared to the AM Peak. In general, the primary difference in accessibility from BWI between the AM Peak and Off-Peak is that areas in Prince George’s and

Montgomery counties in Maryland as well as portions of the District of Columbia have favorable accessibility during the Off-Peak. Nevertheless, the favorable accessibility contour for the Off-Peak constricts between 2010 and 2030, resulting from increases in travel times anticipated during the planning period.

Good accessibility to interstates 95, 97 and 70 will continue to occur from BWI in 2010 and 2030 during the AM Peak and the Off-Peak. This will be an important travel condition for BWI because it will help ensure timely transport of air cargo goods onto major national north-south and east-west highway corridors. I-95 serves states along the eastern seaboard and provides highway access to major markets, including Philadelphia, New York and Boston, among others, to the north, and Richmond, Raleigh-Durham, Jacksonville and Miami, among others, to the south. I-70 originates at Baltimore and extends west to major metropolitan areas, including Pittsburgh, Columbus, St. Louis, and Denver, among others, before terminating in Utah at I-15, which extends from Canada to Los Angeles, CA, and serves regions including Salt Lake City and Las Vegas.

Figure 6
Regional Highway Accessibility
From BWI Airport – 2010 AM Peak

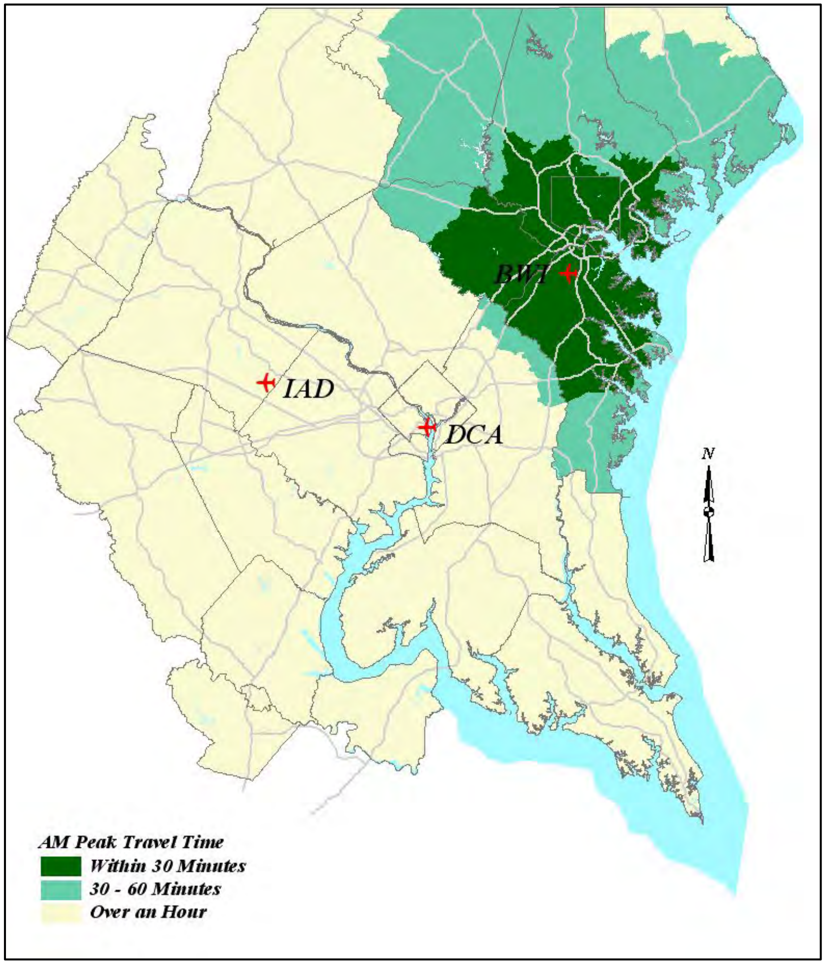


Figure 7
Regional Highway Accessibility
From BWI Airport – 2030 AM Peak

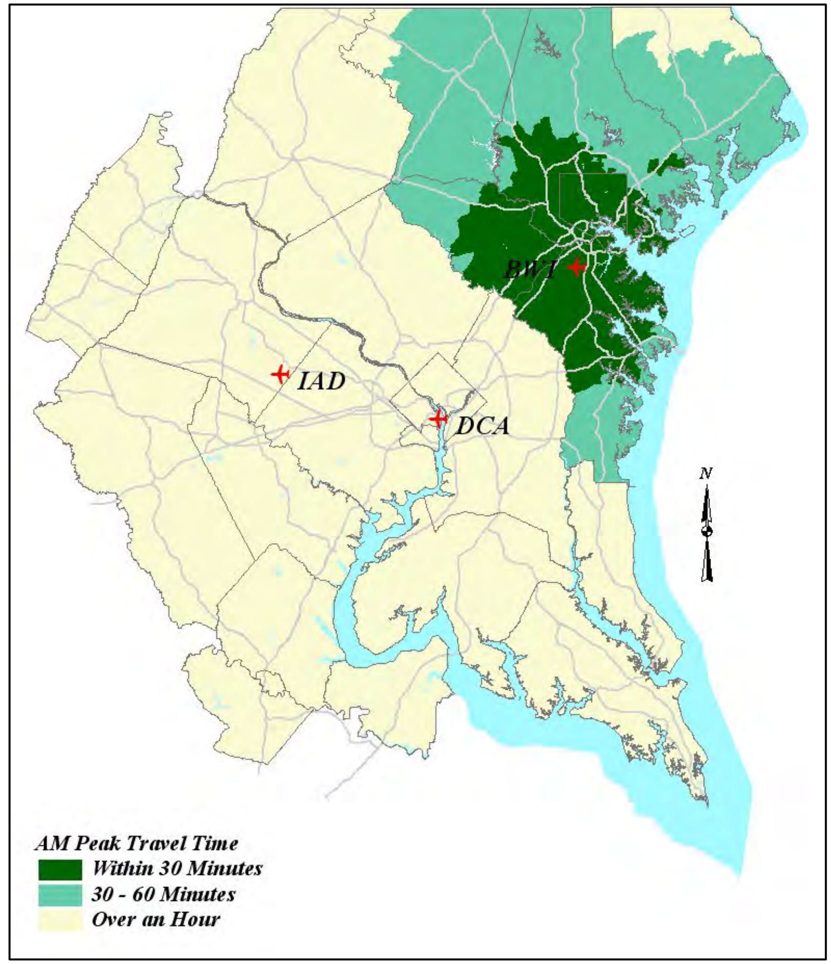


Figure 8
Regional Highway Accessibility
From BWI Airport – 2010 Off-Peak

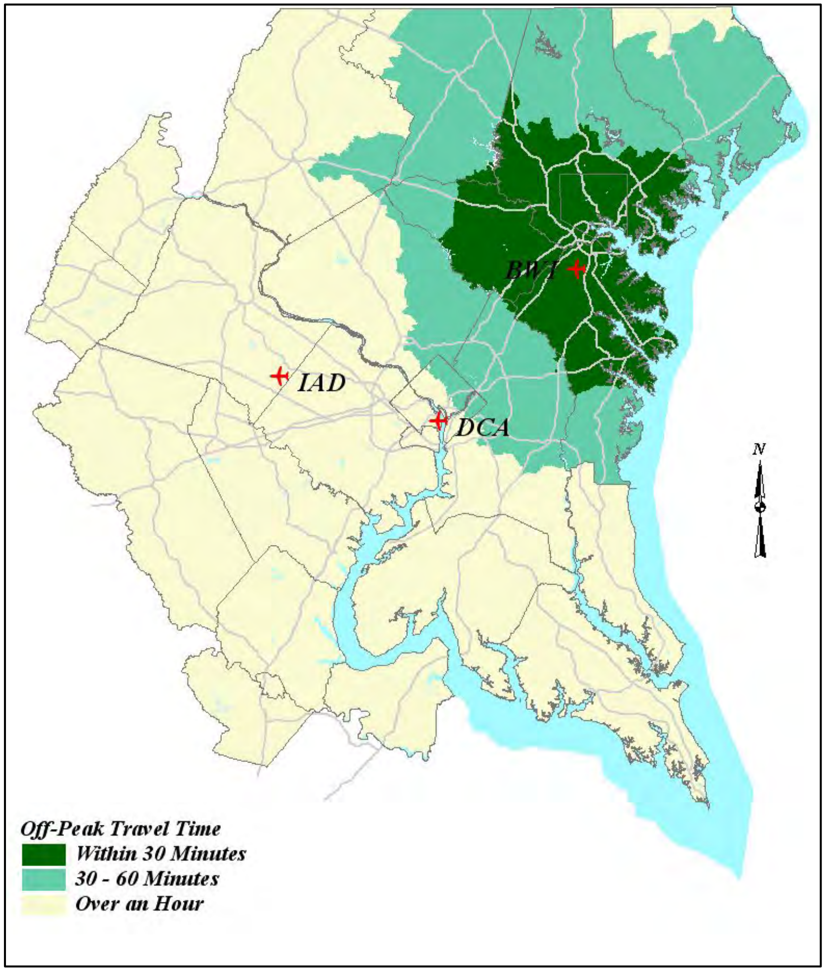
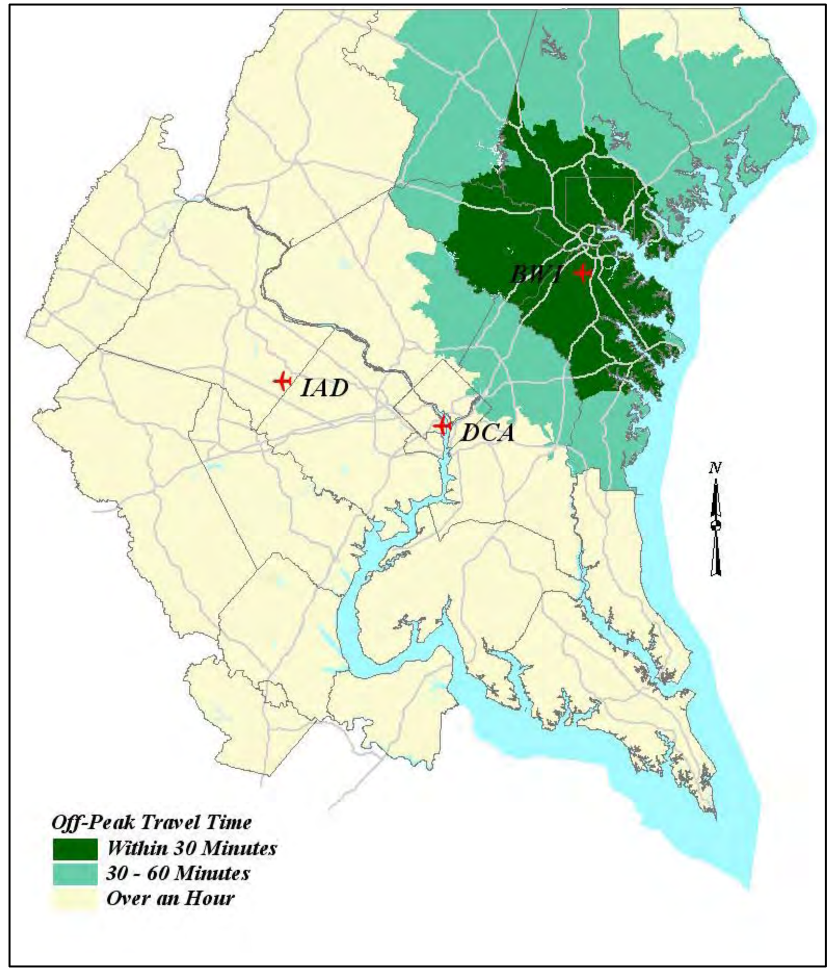


Figure 9
Regional Highway Accessibility
From BWI Airport – 2030 Off-Peak



4.2. DCA

Although DCA is not included in other parts of this report since it does not play a major role in air cargo in the region, an accessibility analysis was performed for DCA to show those areas accessible from DCA during the AM Peak and Off-Peak for 2010 and 2030. These maps are shown in Figures 10 through 13. DCA is located in the central portion of the Washington region. As such, the amount of land area with good accessibility from DCA (30 minutes or less) is smaller than that with good accessibility from BWI or even IAD. This is the case for both the AM Peak and Off-Peak. In fact, despite it close proximity to the District of Columbia, only a portion of the District's downtown will have good accessibility from DCA during the AM Peak in 2010, and this area is expected to decrease by 2030. This is primarily due to the fact that the key routes from DCA to Downtown Washington also serve as major commuter routes for vehicles traveling to the District during the AM Peak.

Compared to the AM Peak, those areas with good or favorable accessibility from DCA during the Off-Peak are not markedly different in either 2010 or 2030. This illustrates DCA's location in the central part of the Washington region, and the relative difficulty it would have moving air cargo shipments across the highway system, compared to both BWI and IAD.

Also, because of its close-in location, DCA is popular with air passengers. As a result, much of the facilities and other infrastructure at DCA have been developed to support air passenger operations at DCA, not air cargo operations. Compared to BWI and IAD, the amount of available land is substantially limited at DCA, making it difficult to develop large-scale air cargo facilities (either on-site or off-site) that would be necessary to make it competitive with BWI and IAD. Moreover, due to its limited size, it does not have the capacity for long-haul operations to Asia, Europe or other distant international destinations. As a result, air cargo service at DCA is comparatively insignificant, and not likely to change. Expansion of air cargo capacity at DCA would occur at the expense of air passenger service, which is not likely at DCA given the popularity (and subsequent profitability) of DCA as a passenger airport.

Figure 10
Regional Highway Accessibility
From DCA Airport – 2010 AM Peak

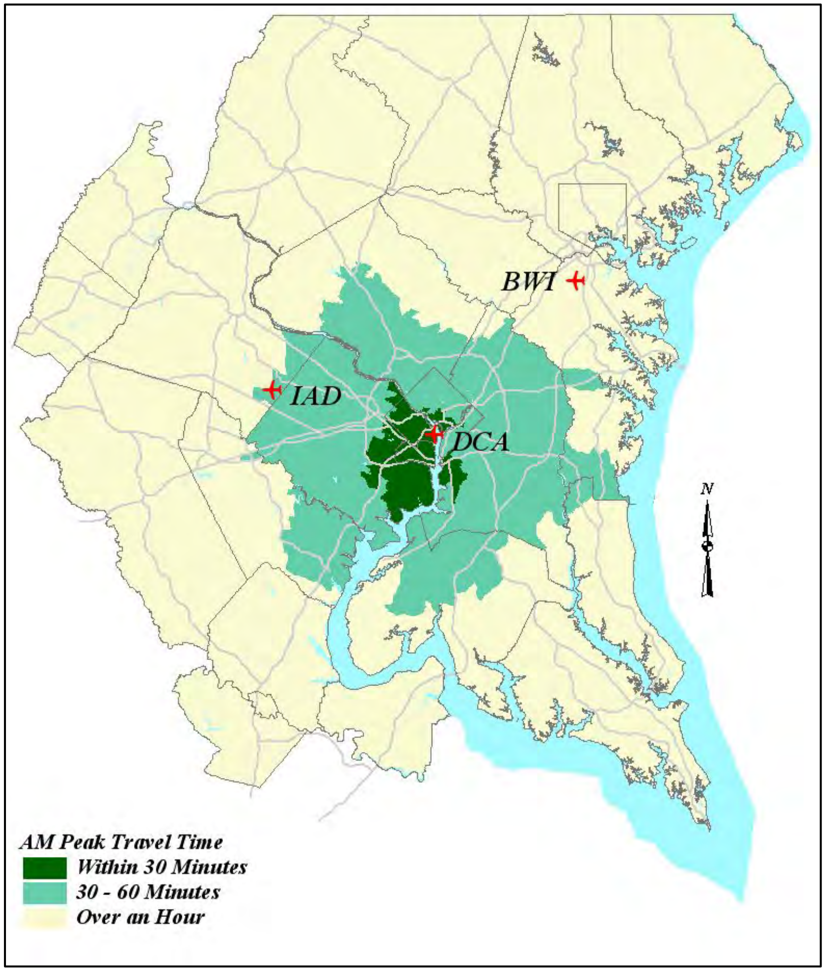


Figure 11
Regional Highway Accessibility
From DCA Airport – 2030 AM Peak

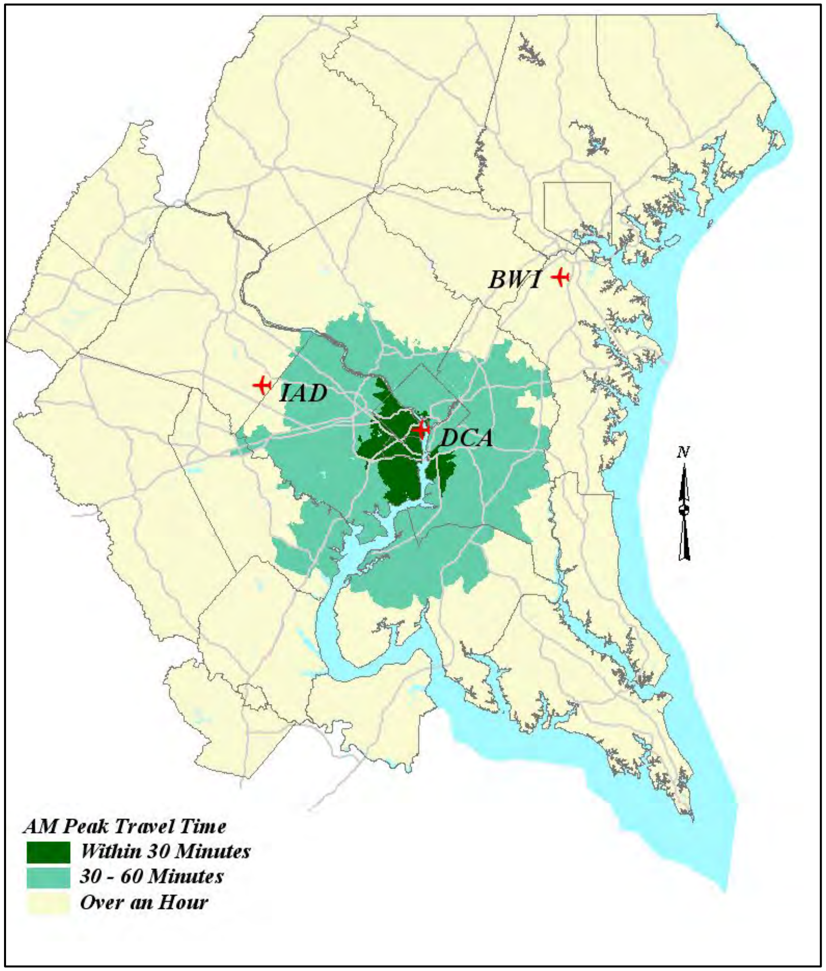


Figure 12
Regional Highway Accessibility
From DCA Airport – 2010 Off-Peak

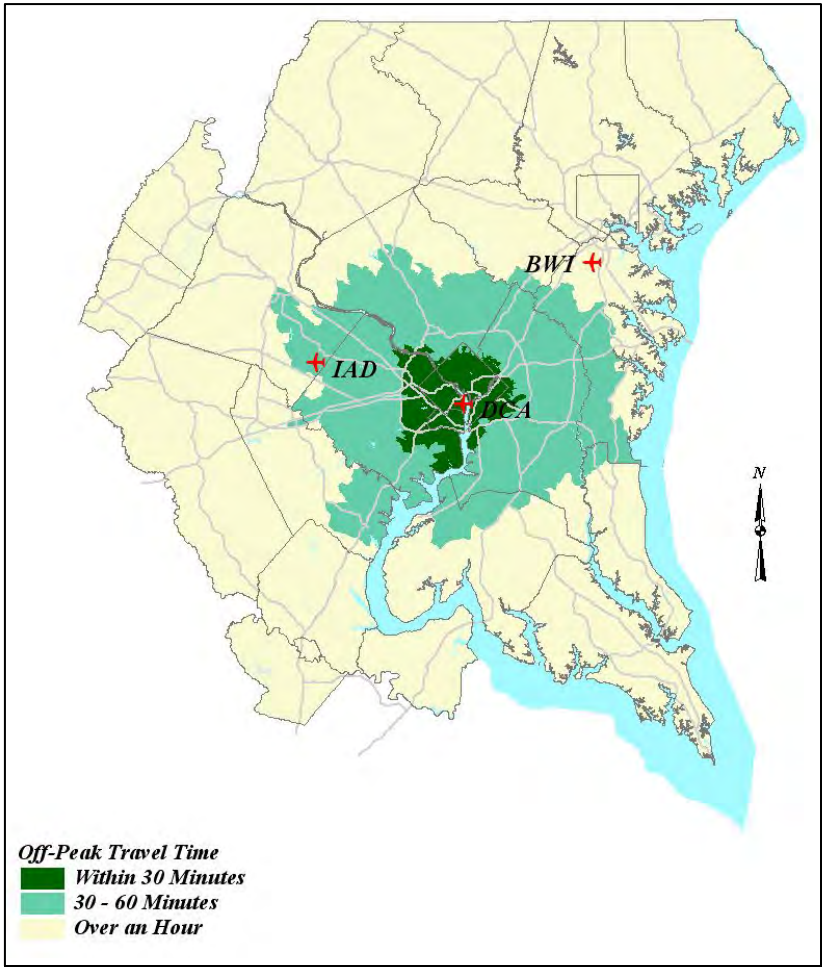
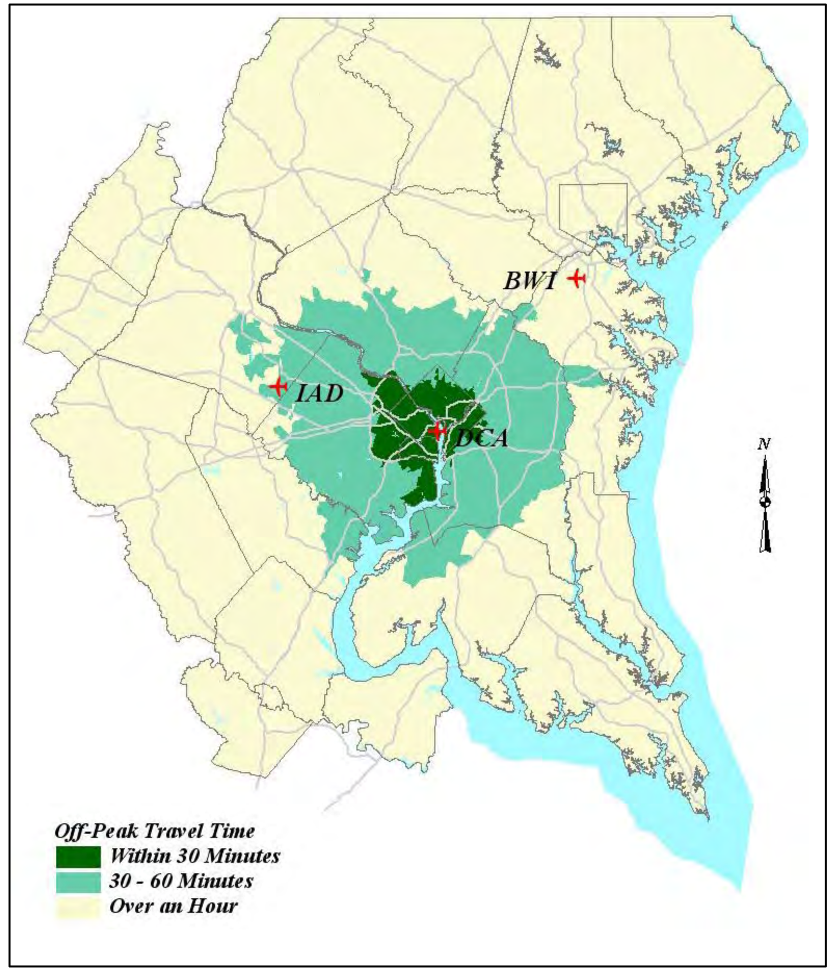


Figure 13
Regional Highway Accessibility
From DCA Airport – 2030 Off-Peak



4.3. IAD

Figures 14 through 17 show accessibility patterns in 2010 and 2030 for IAD. During the AM Peak, Figures 14 and 15 show that good and favorable accessibility generally predominates west of the airport; however, it should be noted that the regional highway model used to perform the accessibility analysis included the Dulles Toll Road (VA 267), which is a heavily-used toll facility during the AM and PM peaks. In reality, these maps may understate accessibility of air cargo originating at IAD to areas east of the airport because there is a dedicated, limited access freeway, the Dulles Airport Access Road, which better accommodates morning vehicular trips that can only originate at IAD to its terminus, I-66 inside the Capital Beltway (I-495). It is reasonable to conclude that air cargo shipments coming directly from the IAD property destined east of the airport would be transported along this facility, rather than along the toll road. Therefore, it is important to underscore that the good and favorable accessibility contours should likely extend farther east on the AM Peak maps for 2010 and 2030.

Nevertheless, it is also notable to mention that considerable volumes of air cargo are transferred to trucks at off-airport facilities. In those cases, the freight destined east toward the District of Columbia or the closer-in suburbs must be routed onto the Dulles Toll Road (VA 267), rather than the Dulles Airport Access Road because access to the latter is limited to trips originating on the airport property only. The Dulles Toll Road is typically congested during the AM Peak, and it connects to a truck-restricted, high occupancy vehicle (HOV)-restricted highway at its eastern terminus, I-66 inside the Capital Beltway. As a result, even though a truck may travel east on the Toll Road at an additional cost in the AM Peak and endure congested conditions, it must still get off the limited access highway network and take circuitous routes on primary and secondary roads into the District because of HOV and truck restrictions. This results in compromised access to points east during the AM Peak for those shipments that arrived at IAD but were sorted or handled at facilities near IAD but off airport property.

By contrast, air cargo shipments originating at IAD have excellent accessibility *to* IAD. The dedicated, limited-access Dulles Airport Access Road provides direct access to IAD from the Capital Beltway and I-66 in Virginia. Access onto this highway is controlled with limited interchanges; and once on this highway, all trips must terminate at the airport. As a result, all travel on this highway is for airport purposes only—i.e. air passengers, discharging/picking up passengers, airport employees commuting to their jobs, air cargo shipments, or airport services—so congestion seldom occurs except in the event of vehicle incidents.

In general, good accessibility from IAD is shown to extend well into Loudoun and Fairfax counties in Virginia in both 2010 and 2030 in the AM Peak and Off-Peak periods. Favorable accessibility extends even farther in the Virginia suburbs, as well as to portions of Maryland and West Virginia in the AM Peak, plus the District of Columbia during the Off-Peak. Between 2010 and 2030, the area considered to be accessible from IAD can be expected to reduce in both the AM Peak and the Off-Peak periods; but accessibility overall will occur over a wider geographic coverage during the Off-Peak than during the AM Peak.

Good accessibility to Interstate 66, US 15, and VA 7 from IAD will be sustained in the AM Peak and Off-Peak periods in both 2010 and 2030. These are important highway facilities that provide service for long-haul destinations or important connections to long-haul facilities. I-66 connects Washington, DC, and I-81 in the Shenandoah Valley; I-81 provides north-south service to major metropolitan areas, including Syracuse, NY, Harrisburg, PA, Roanoke, VA, and Knoxville, TN, among others; plus it connects with major cross-country interstate highways, including Interstates 90, 80, 70, and 40. Similar to I-66, VA 7 connects Northern Virginia to I-81 in Winchester, VA, and provides other important connections to popular north-south truck routes, including US Highways 15 and 340. Also, a direct connection to the Washington region's Capital Beltway is provided via the Dulles Airport Access Road.

VA 28 (Sully Road) is a north-south primary route running immediately adjacent to IAD. It provides key connections to VA 7, the Dulles Greenway, US 50, and I-66, among others. This road has experienced substantial widening in recent years to accommodate increased traffic volumes, and many of the at-grade intersections are in the process of being upgraded to interchanges. This will result in improved traffic flows and more efficient accessibility for freight and delivery trucks originating at or near IAD to other key regional connections.

Figure 14
Regional Highway Accessibility
From IAD Airport – 2010 AM Peak

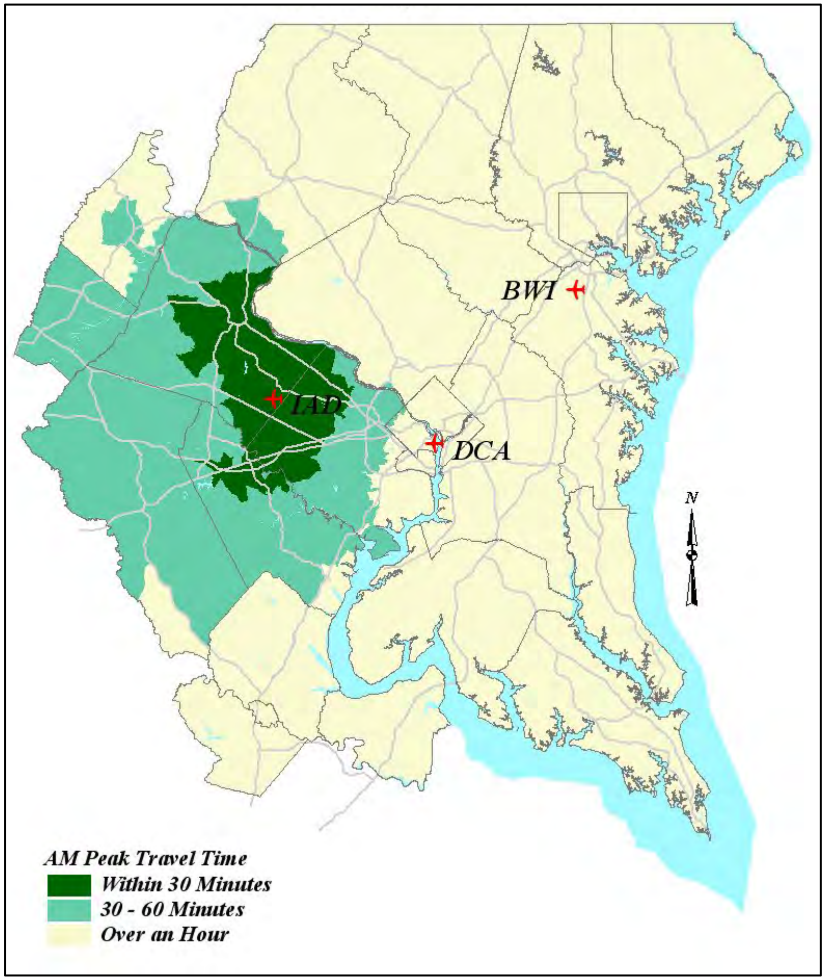


Figure 15
Regional Highway Accessibility
From IAD Airport – 2030 AM Peak

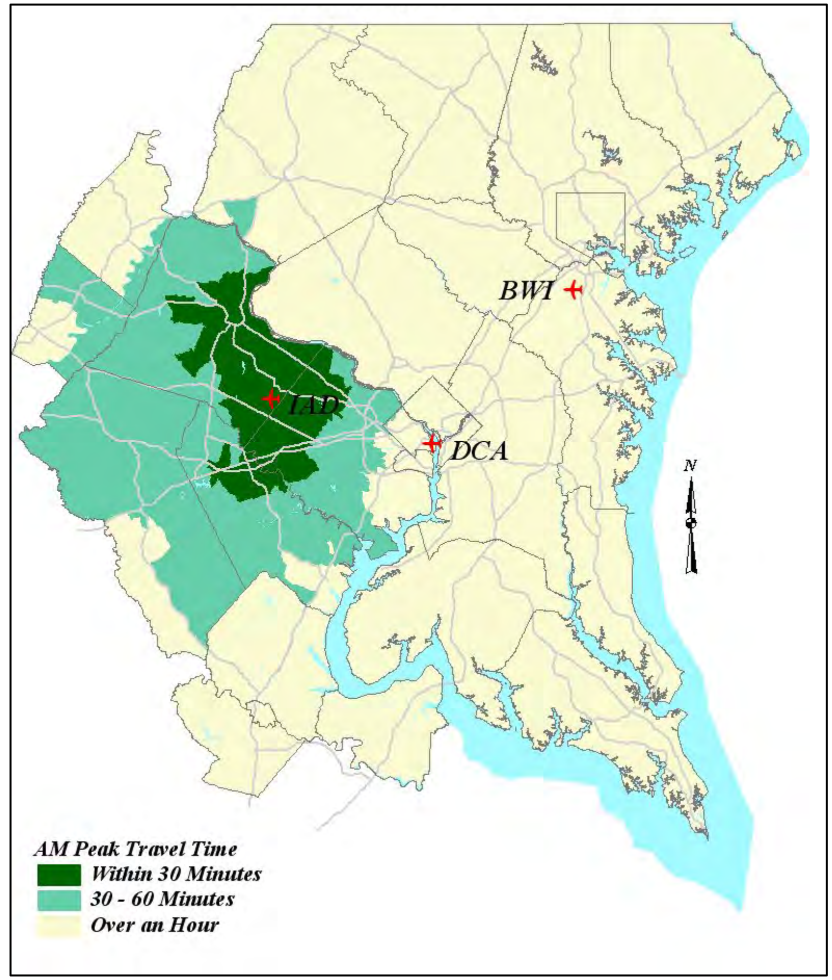


Figure 16
Regional Highway Accessibility
From IAD Airport – 2010 Off-Peak

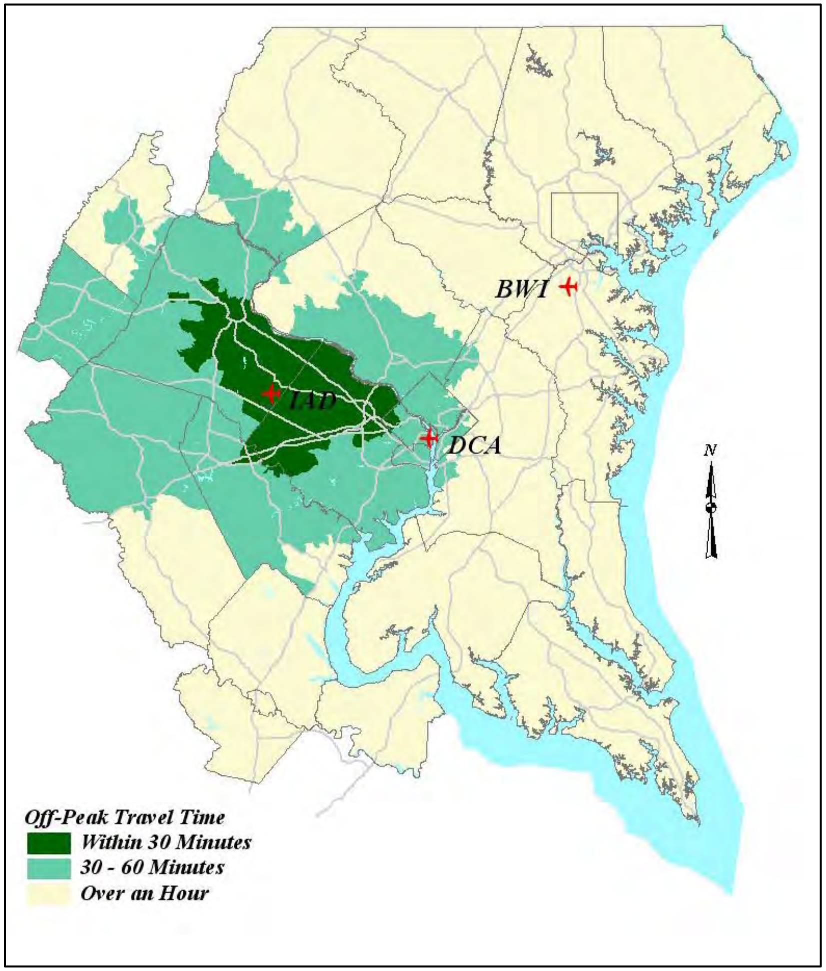
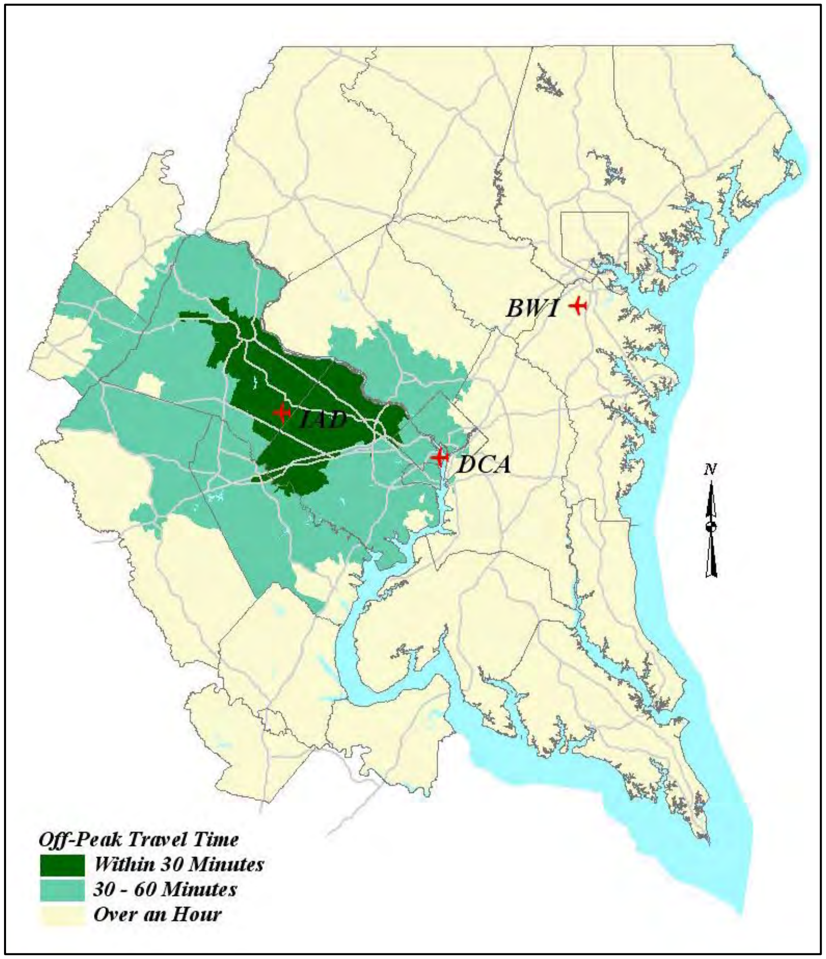


Figure 17
Regional Highway Accessibility
From IAD Airport – 2030 Off-Peak



4.4. Accessibility Conclusions

Although regional accessibility from BWI and IAD is expected to generally constrict slightly between 2010 and 2030, key highway connections located in proximity to these airports will continue to have good accessibility. This will aide ground transport of air cargo shipments across the regional highway networks.

Of greater concern though, is the general pattern of reduced accessibility that will occur from each of the airports to other parts of the region considered in this analysis between 2010 and 2030. This has implications for transport of air cargo shipments to destinations inside the planning area, and could adversely affect timely delivery of such shipments to their residential or commercial destinations. The highway system in and around BWI and IAD include roadways heavily-used by commuters as well as commercial passengers and airport employees. Increasing congestion is a concern as the region continues to grow and demand increases at these airports and on the highway system. Expanded use of the ground access system by regional commuters, air passengers, and other users will make it increasingly challenging for timely transfer and delivery of (1) air cargo shipments to their destinations in the region along the road network, as well as (2) freight shipments originating in the region and transferred to an air cargo carrier as part of the delivery chain.

Further consideration may be needed to identify appropriate time-of-day delivery as the region's roads get further congested during the planning period. Such considerations could have implications for siting warehousing, sorting and distribution facilities. These location decisions should optimize access to the highway network to mitigate obstacles, such as traffic congestion, that could undermine timely delivery of air cargo shipments to their destinations.

5. Recommendations

Air cargo is the fastest-growing mode in the freight sector. It is characterized by the fact that although it carries the least freight in terms of weight, it is the highest-ranking freight mode in terms of value per unit of weight (tons). Air cargo serves a niche market requiring high-value and/or just-in-time delivery.

The Washington-Baltimore air system planning area ranks high among metropolitan areas in terms of educational attainment of its population and workforce, per capita income, and its services sector employment base. These demographic and economic attributes suggest the region is ripe for air cargo services. Moreover, the regional population and households, as well as the number of jobs, are forecast to increase by approximately one-fifth by 2030, and this points to increased demand for air cargo from purely a demographic and economic standpoint.

Despite current economic conditions, which include high fuel prices and sluggish growth, the long-term prospect for air cargo growth is good. This is fueled by robust growth in the economy of China as well as other markets, including Europe and other Asian markets. Moreover, industry forecasts of air cargo call for sustained growth through the period for both domestic and international shipments, but the heaviest growth will occur in the international sector.

Both BWI and IAD have responded to past growth and future increases in demand by planning and implementing ambitious capital improvement programs intended to modernize and increase the capacity and efficiency of all operations. This includes the development of new runway capacity, terminal expansion and modernization, air traffic control (ATC) improvements, and cargo facilities.

While these improvements serve to ensure the airports continue to operate as efficiently as possible, they are confined to the footprint of airport property or to areas immediately adjacent to the airports. The accessibility analysis in Section 4 of this study reveals that as regional traffic volumes increase throughout the planning period, planned regional transportation improvements will not be sufficient to maintain the same level of accessibility to all areas from the airports through 2030. This has implications for the continuation of journeys, whether they are air passenger trips or air cargo shipments transferred to trucks that must then travel over the road network.

As a result, to ensure (1) air cargo and over-the-road freight handlers continues to efficiently provide timely service all the way to their final destinations, and (2) suitable access to airports is maintained for shipments originating in the region, the following recommendations are made:

- **As part of the airports' ongoing planning and construction programs, specific consideration should be given to the need to plan internal circulation systems and parking facilities in a manner that alleviates congestion in and around cargo facilities and improves truck access to**

and from cargo facilities. This will help mitigate compromised accessibility to other parts of the region by improving travel time from on-airport cargo facilities to the airport exit. During periods of heavy air operations traffic, congestion at the airports themselves can result in long waits to reach the airport exits.

- **Airports should continue to incorporate air cargo needs into their comprehensive planning activities.** This will help ensure that air cargo facilities, passenger facilities, air operations facilities, and infrastructure improvements are planned in a systematic manner that seeks to maximize operational efficiencies and reduce unnecessary capital and operational costs. Such savings can result in fiscal benefits that can be otherwise allocated to addressing other documented needs.

- **Airports should continue to actively participate in the regional transportation planning process to ensure ground access needs are identified and analyzed as part of the regional process and that suitable ground access systems are planned and implemented.** Ongoing participation provides leverage in assuring that identified surface transportation needs of airports are addressed and incorporated into the regional CLRP and TIP. As participants in the regional process, airports can advocate the need to analyze ground access projects in the regional travel demand model, which informs decision-makers of key transportation priorities. Both airports are important components of sustained regional prosperity, and as such, critical needed ground access improvements can be given regional priority for limited resources.

- **As a corollary to the preceding recommendation, it is further recommended that area jurisdictions continue to work together to collaboratively identify opportunities that are financially beneficial to the region for improving airport ground access in the Washington-Baltimore region.**

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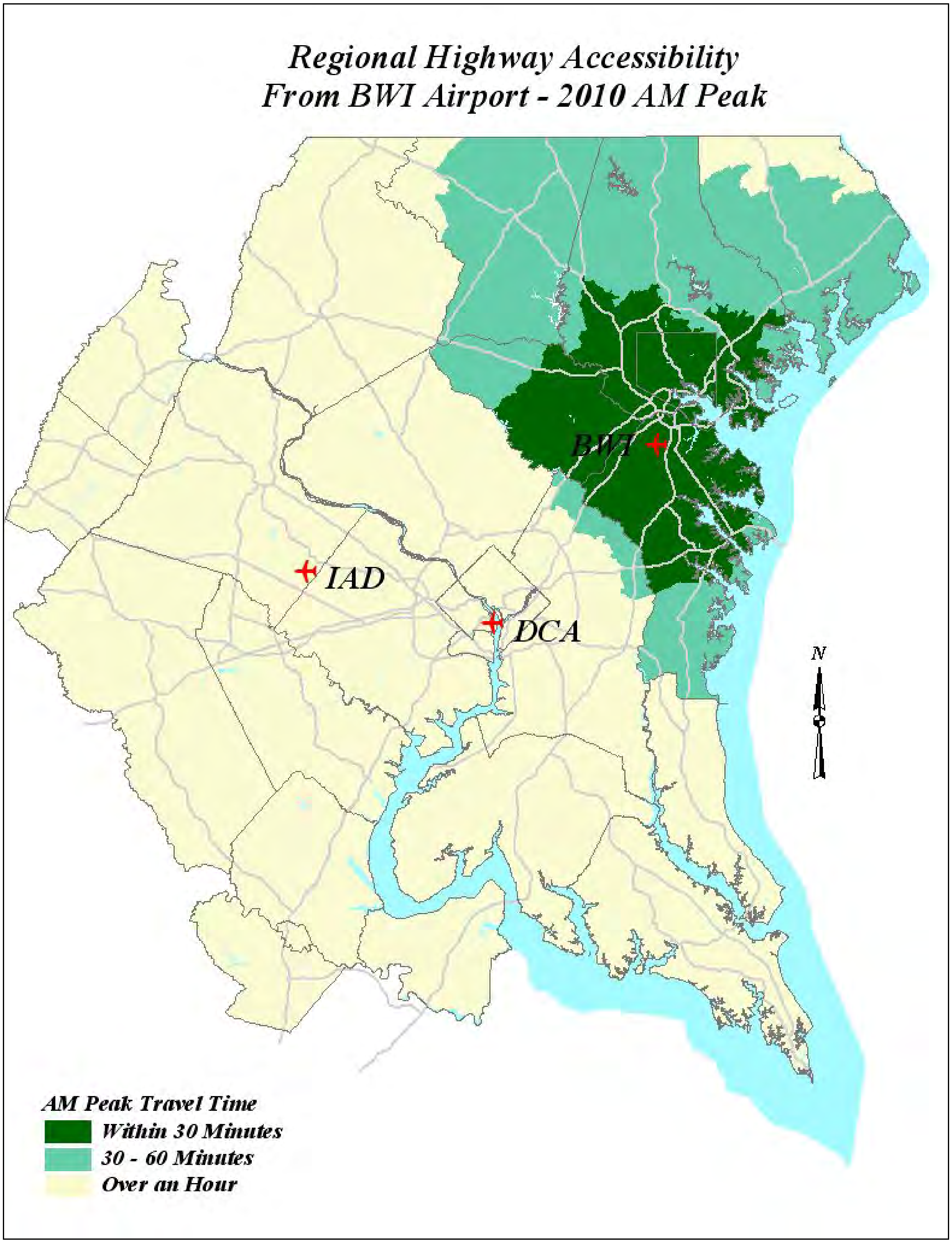
APPENDIX A

Accessibility Maps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From BWI Airport - 2010 AM Peak
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AM Peak Travel Time
Within 30 Minutes
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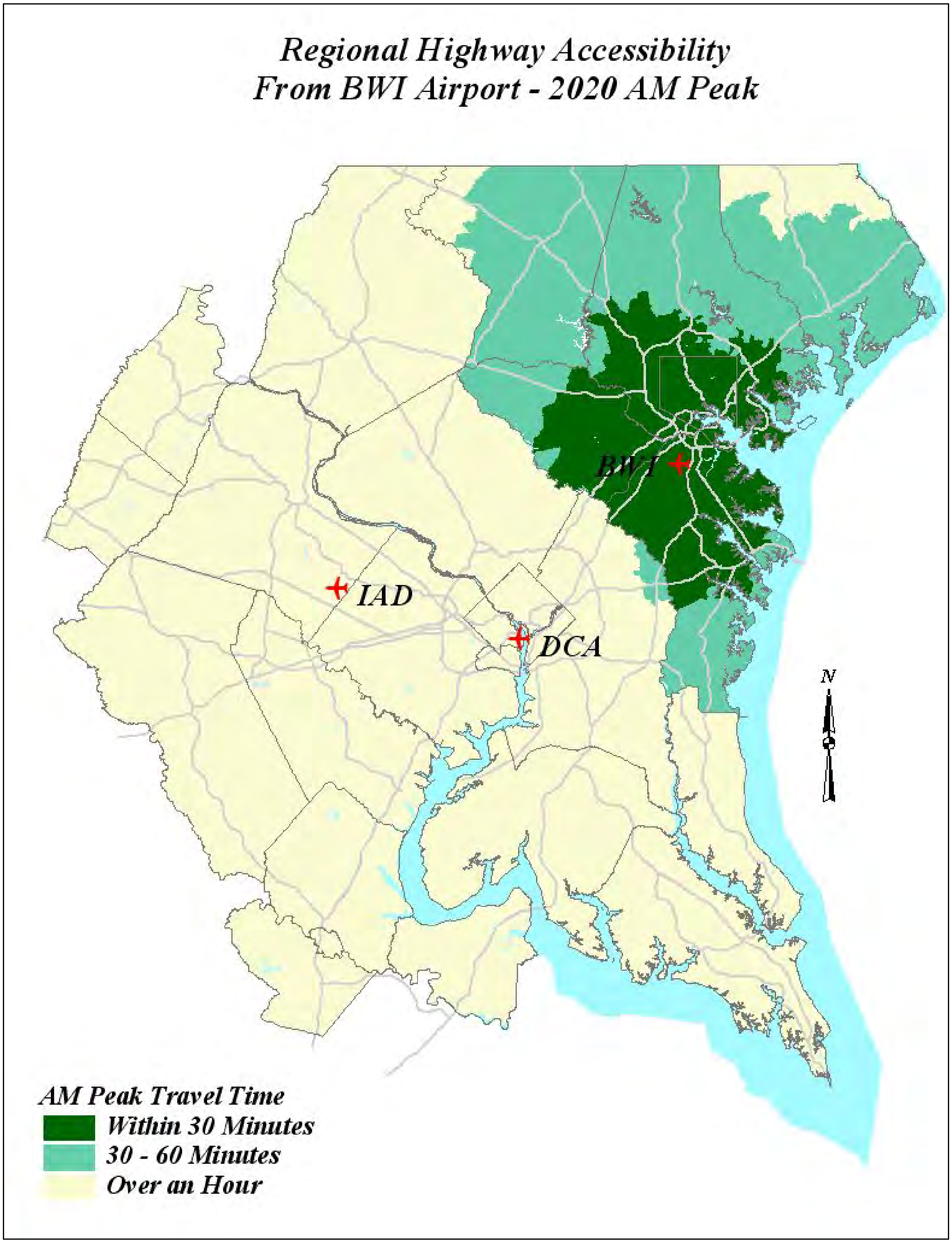
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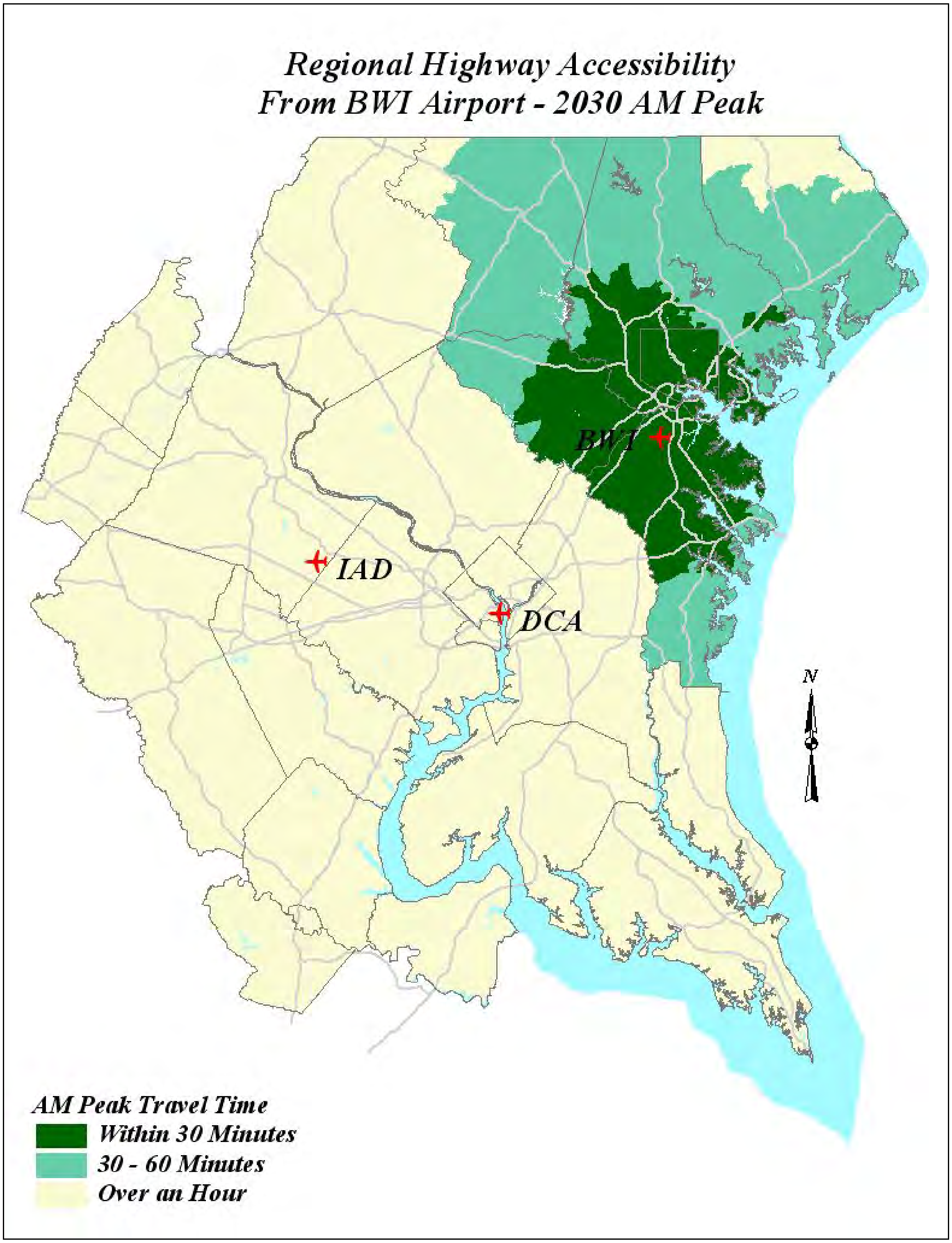
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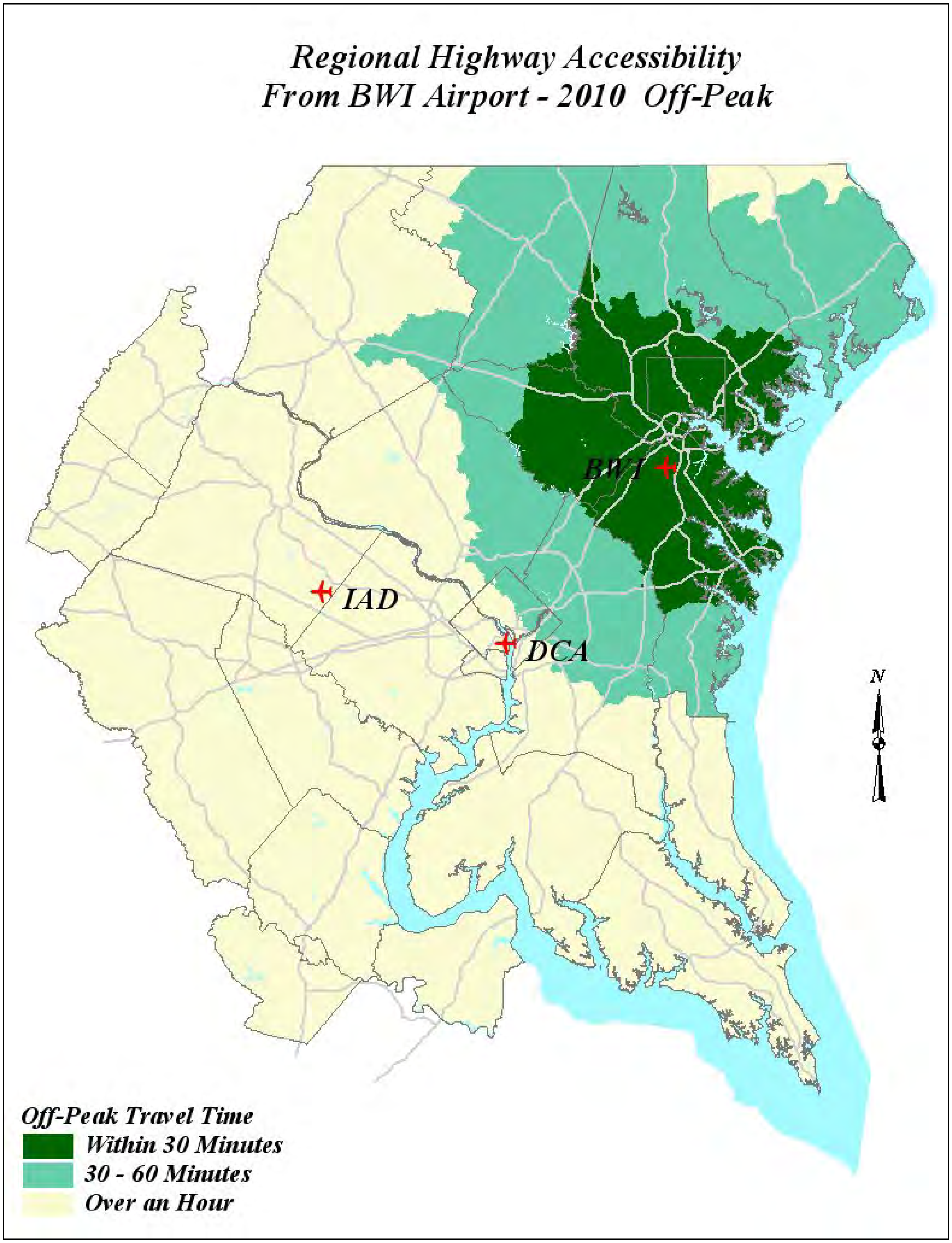
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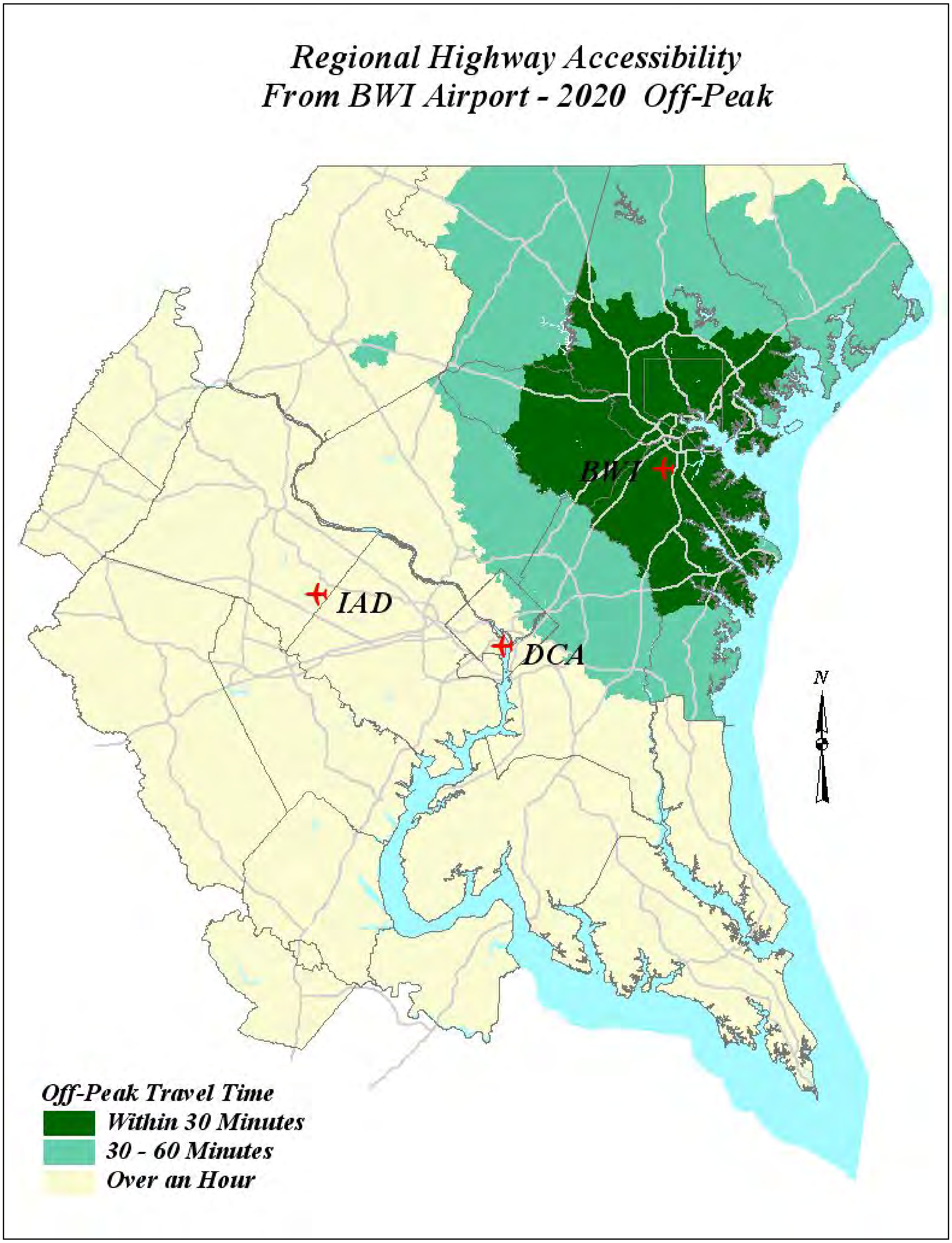
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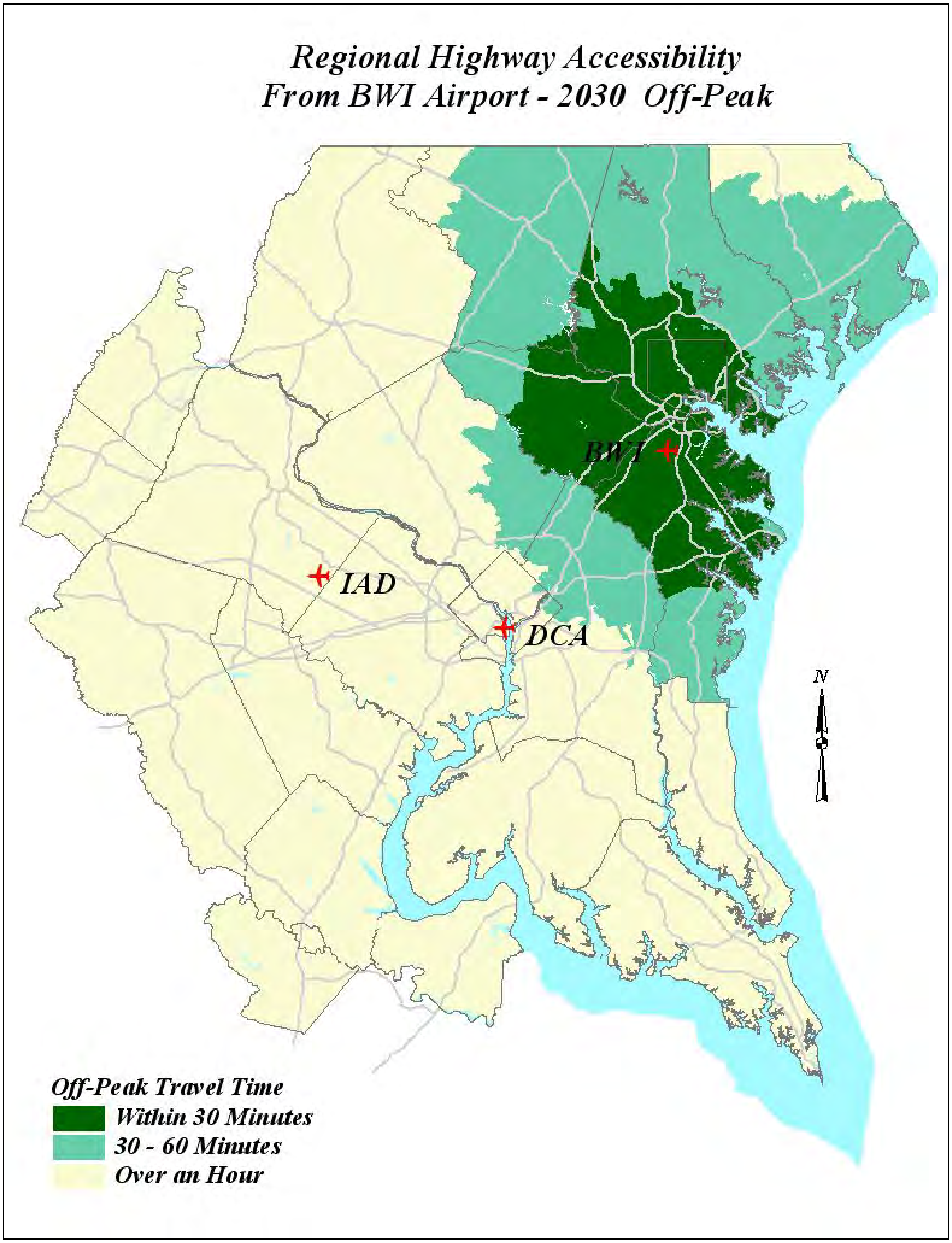
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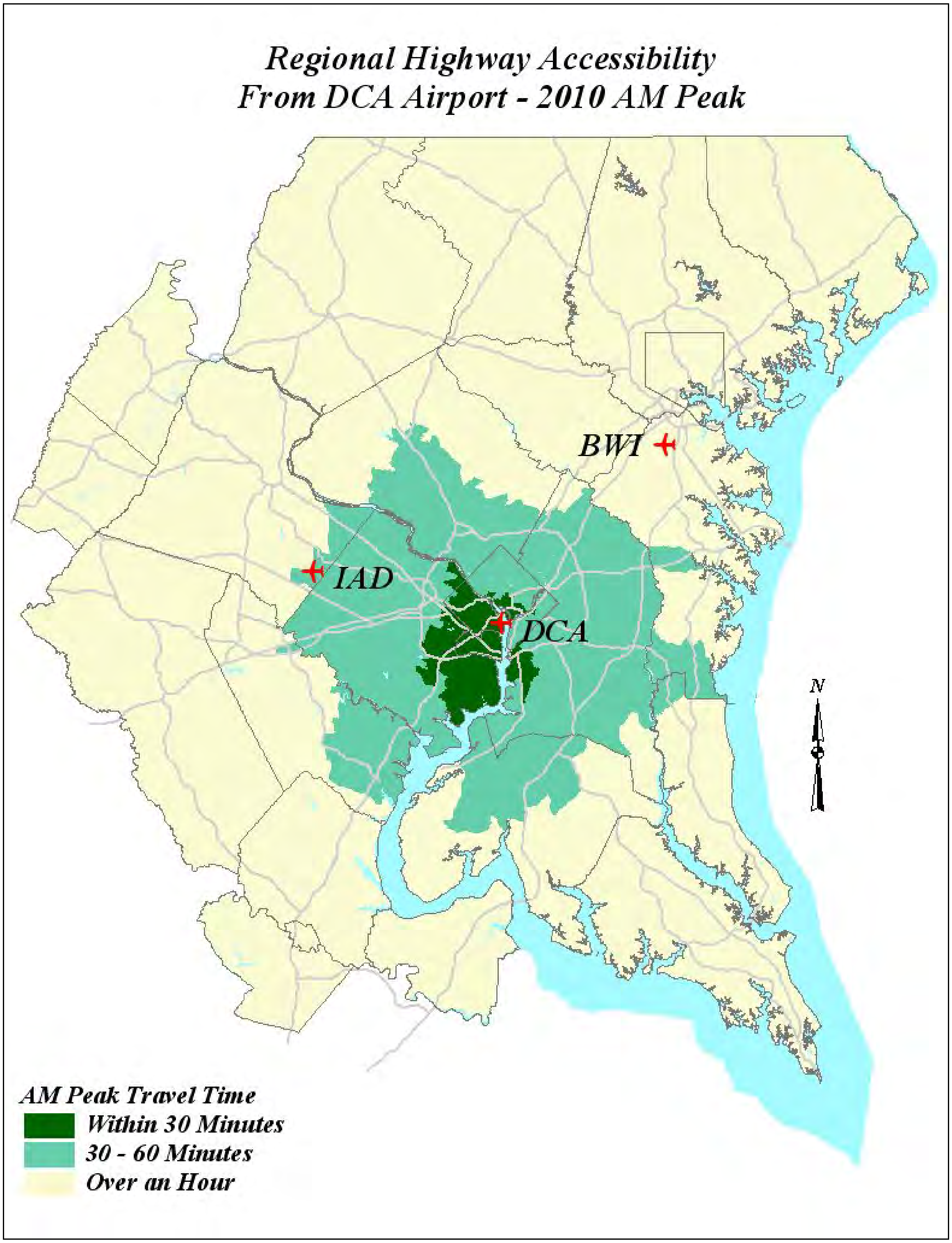
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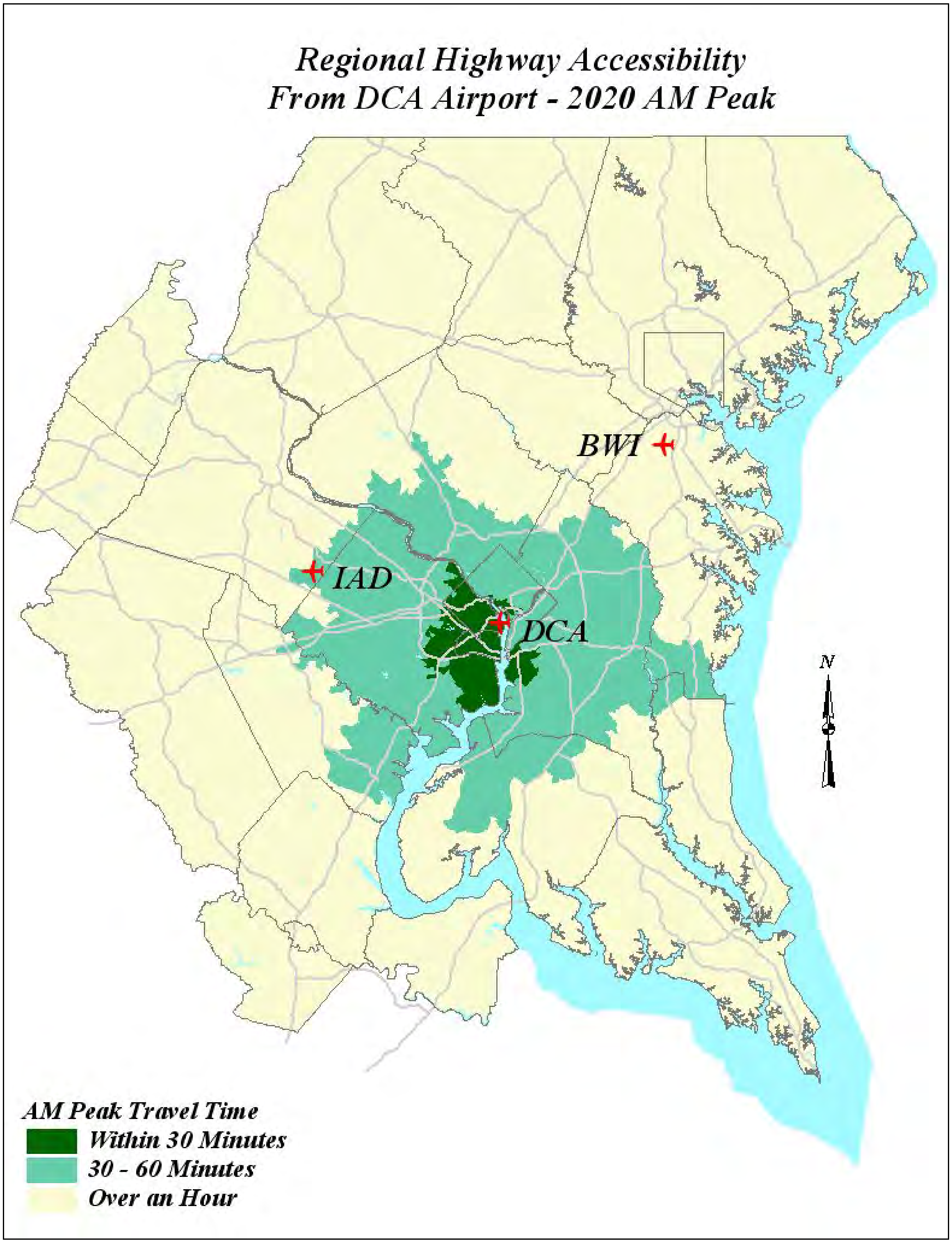
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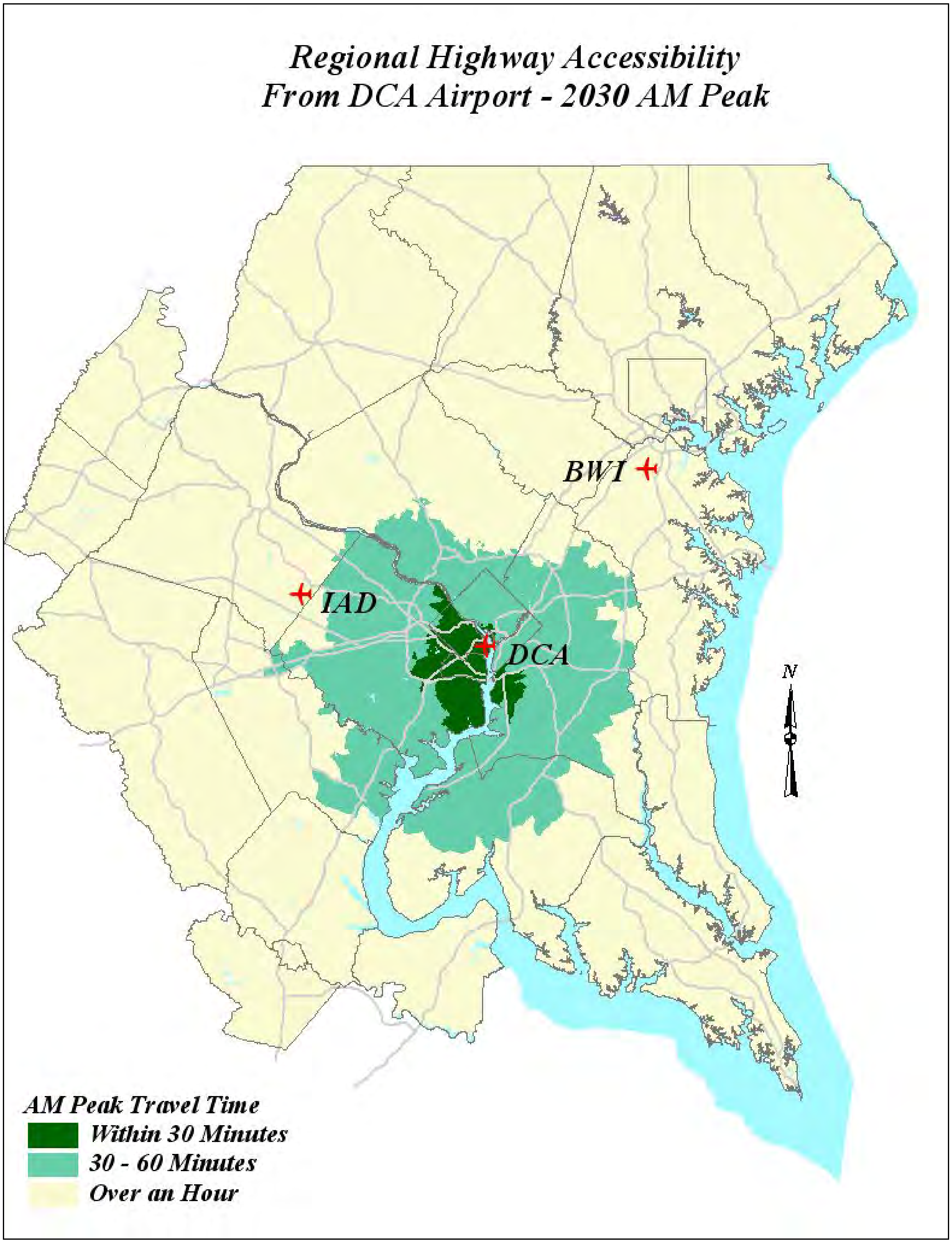
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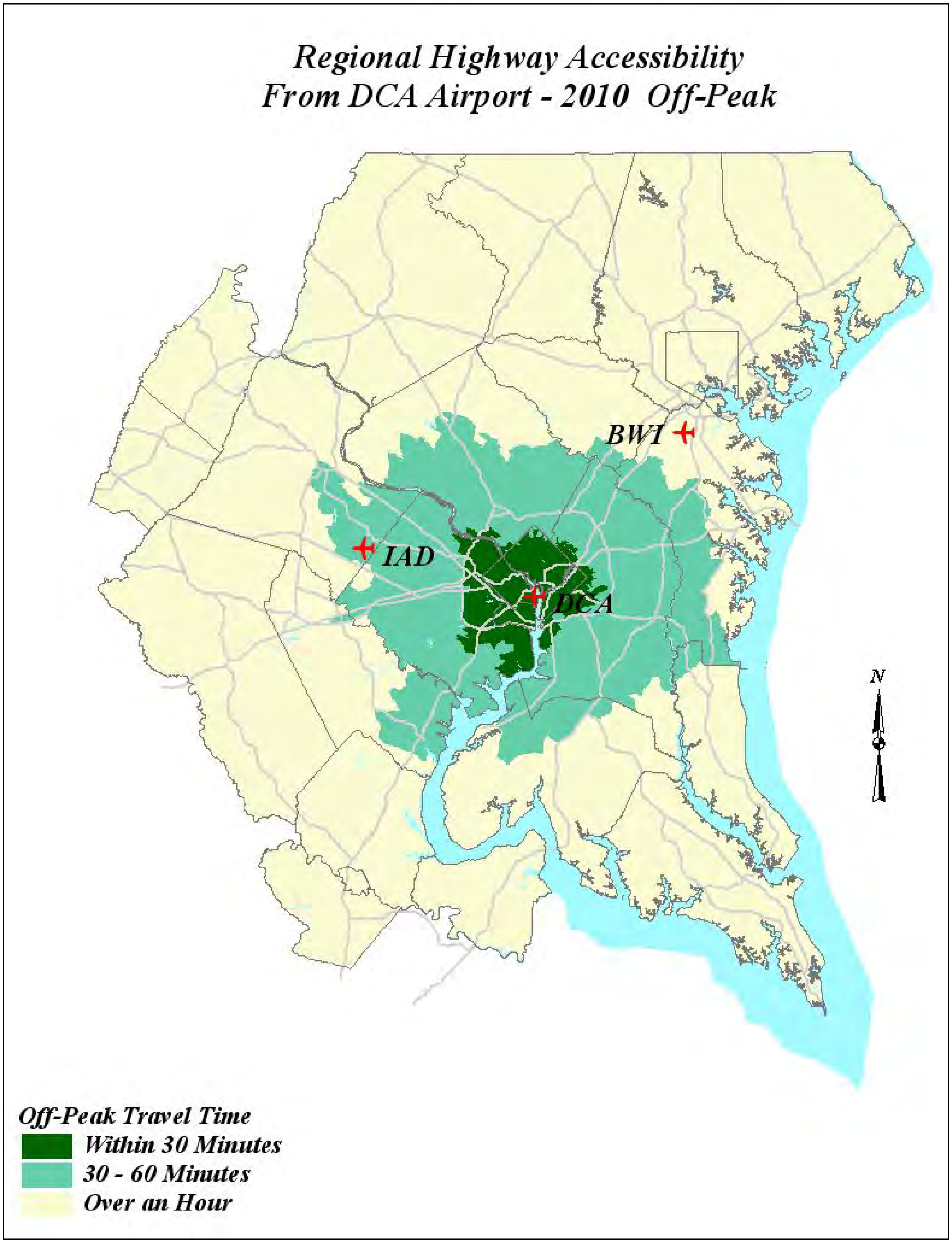
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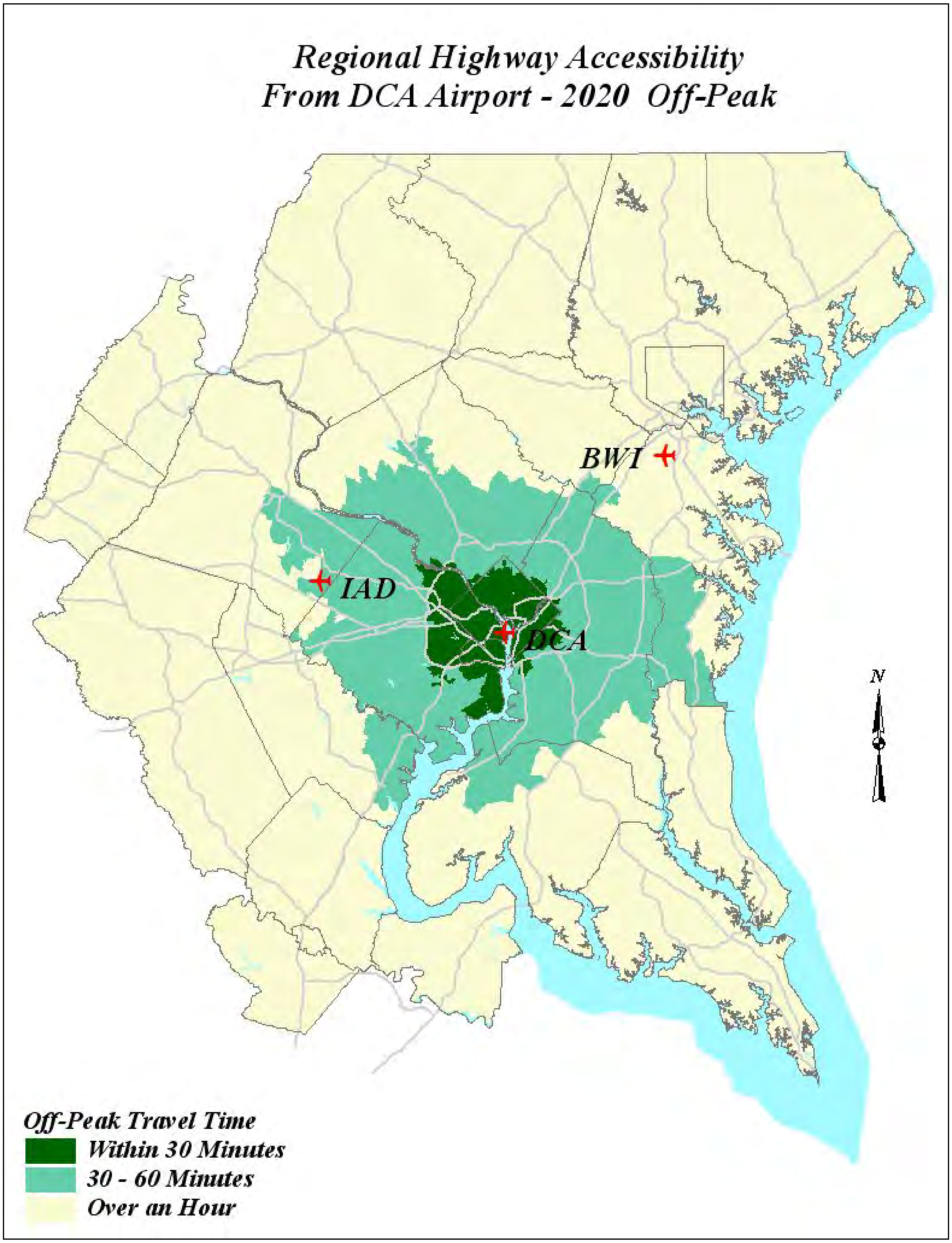

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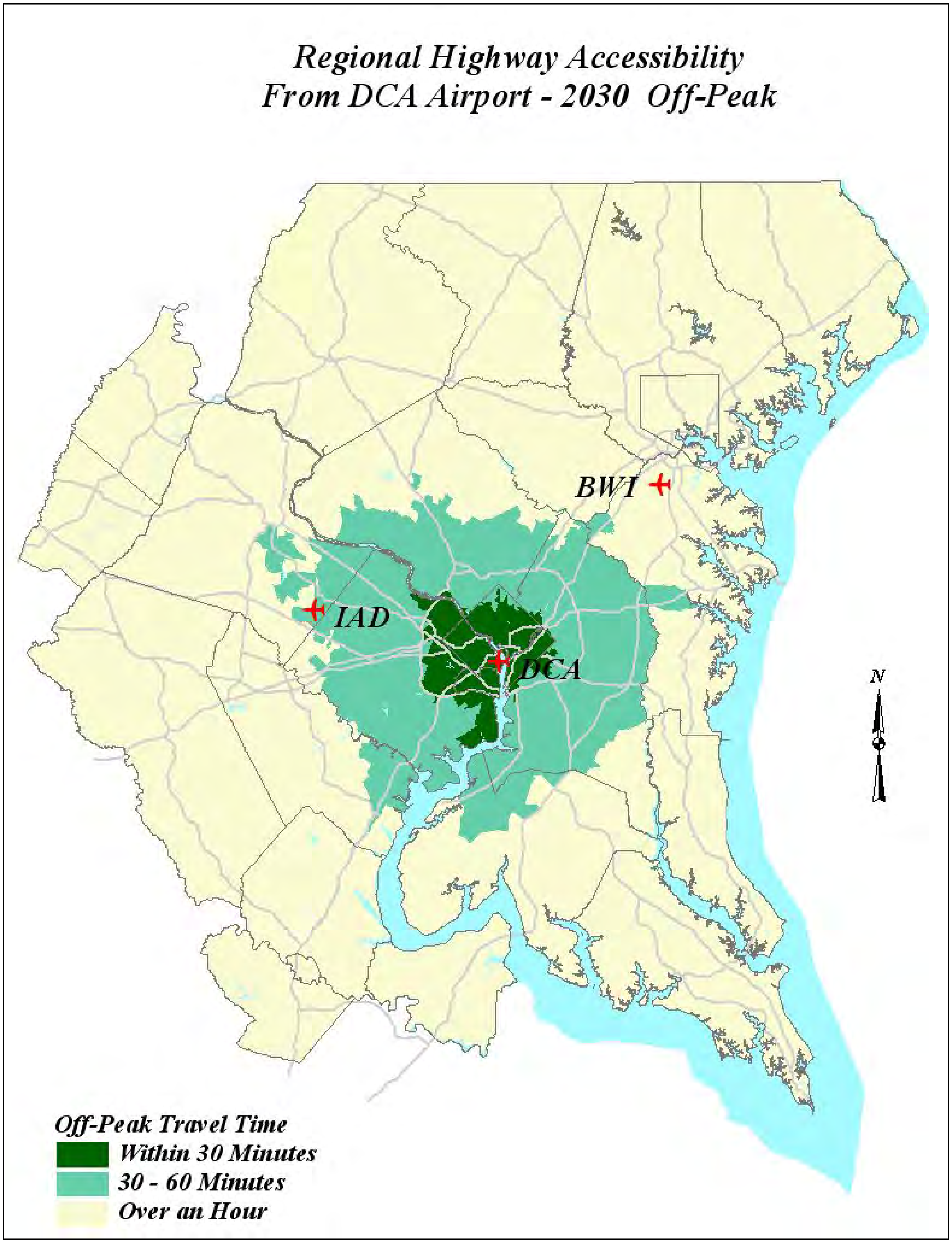
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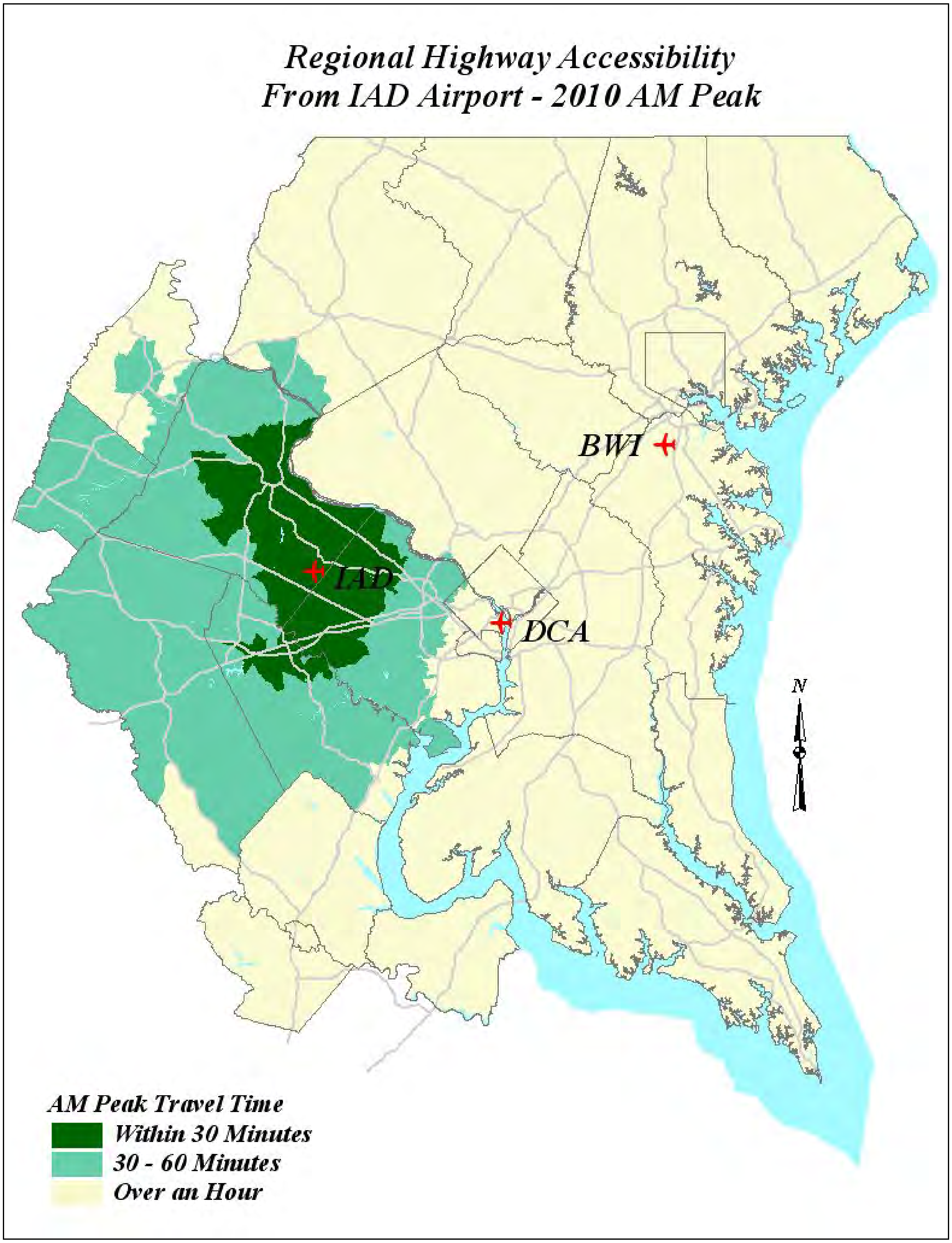
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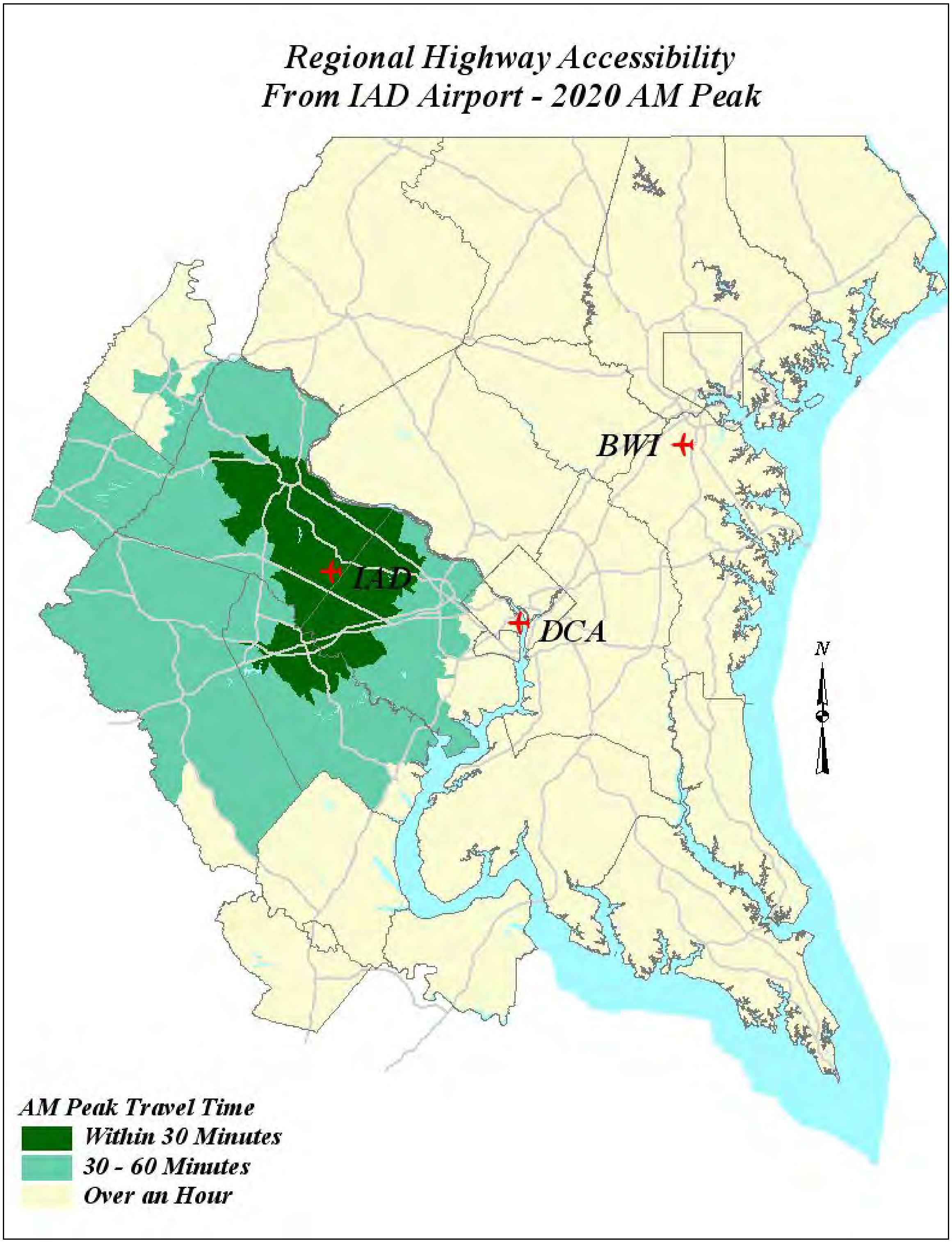
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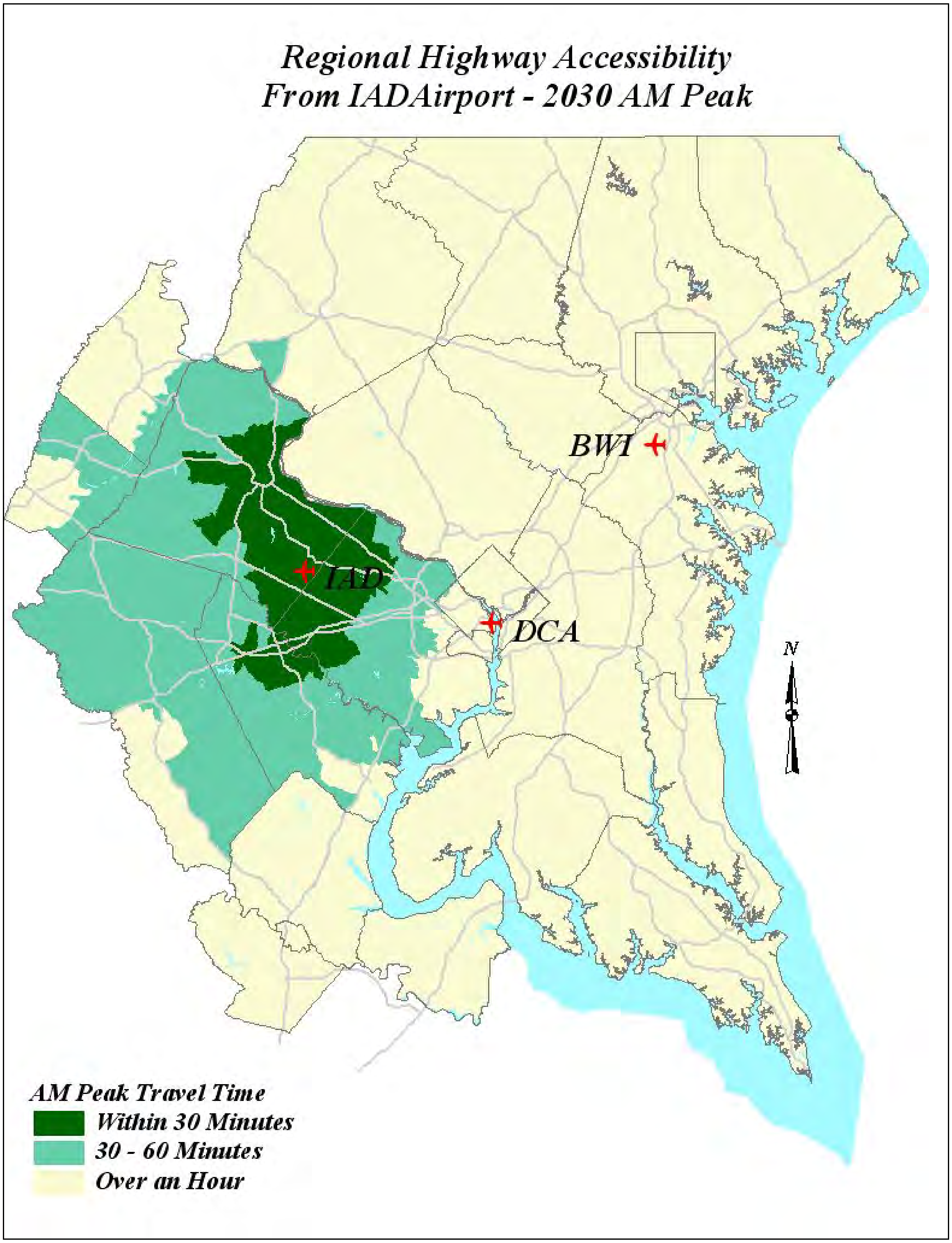
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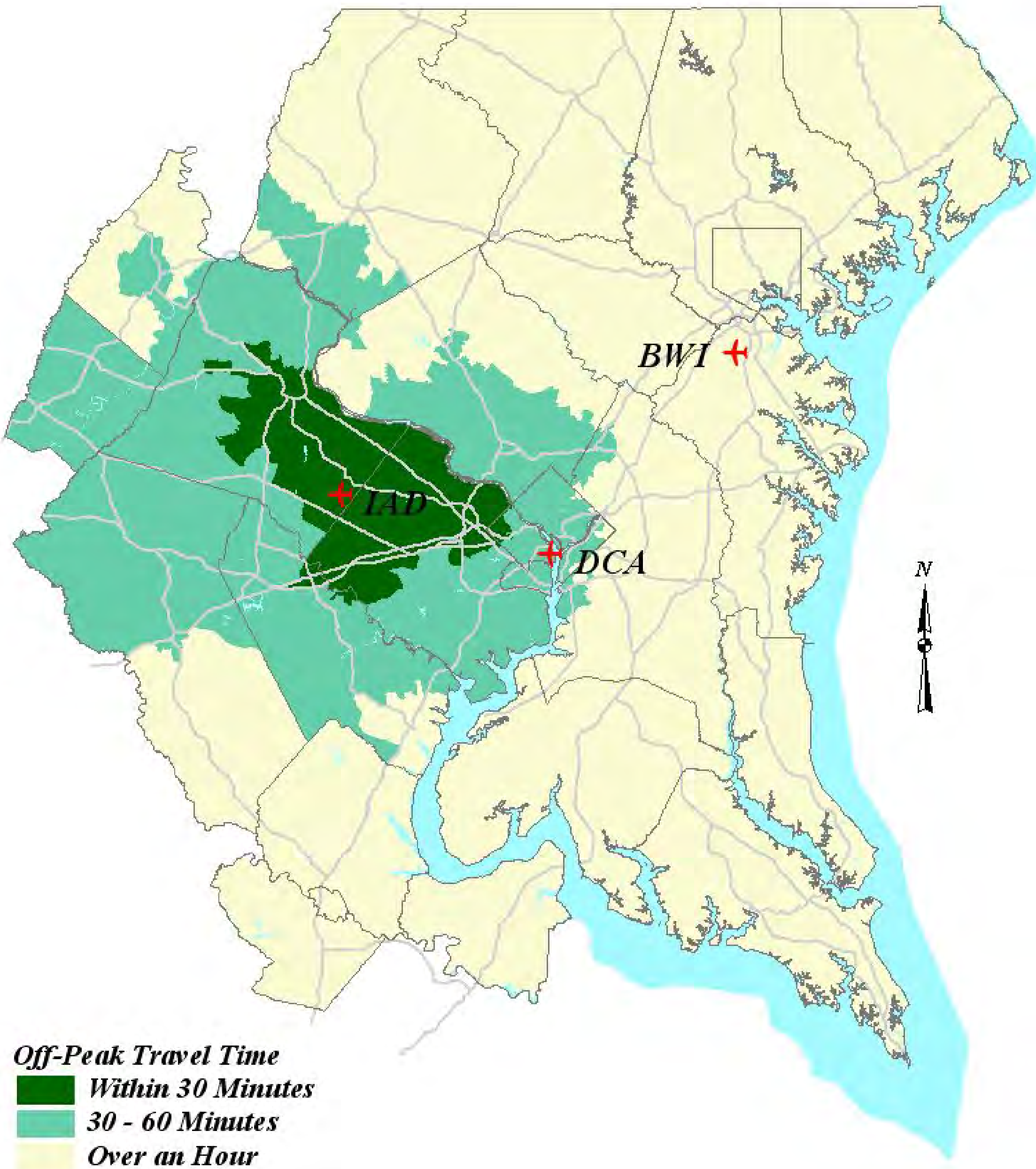

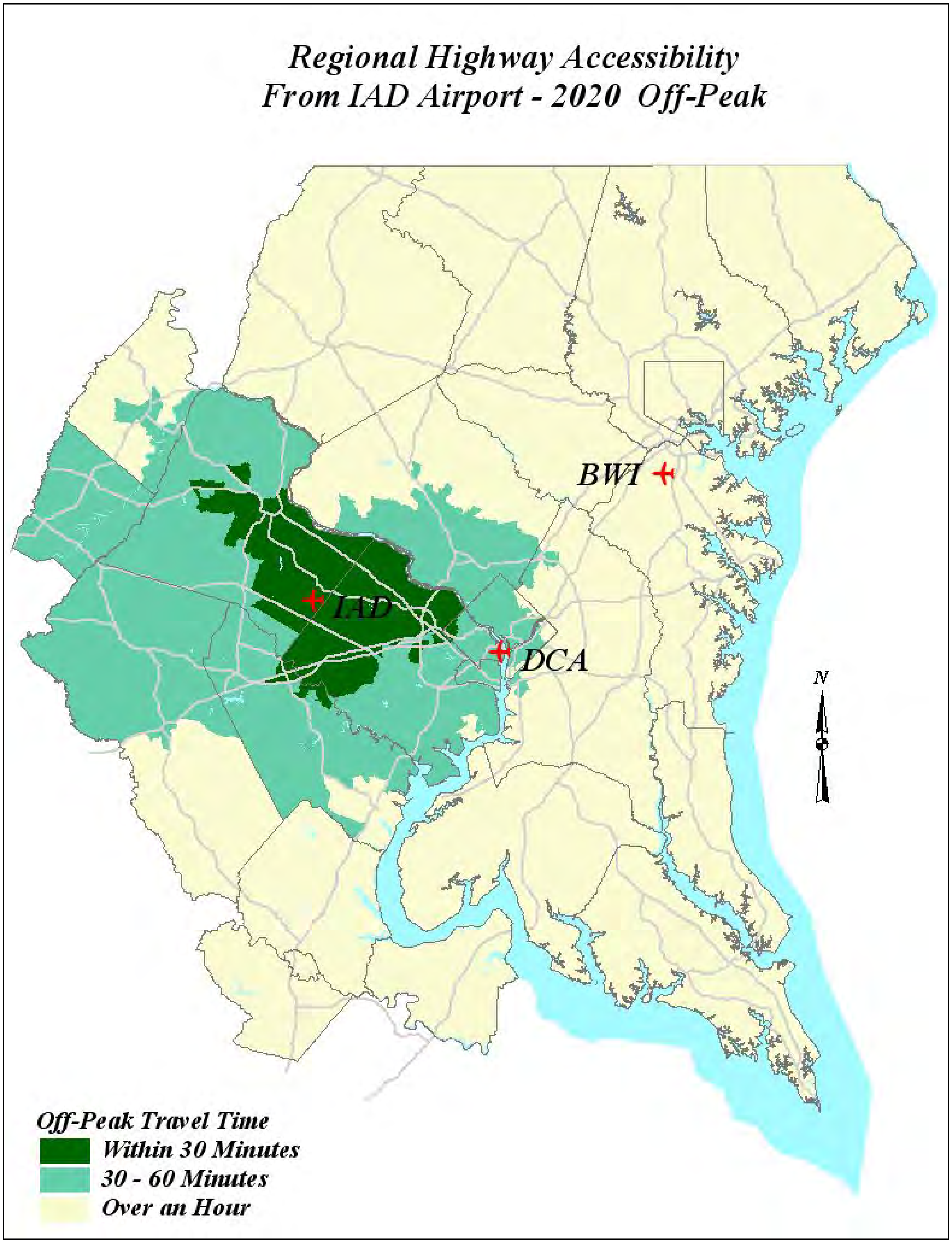
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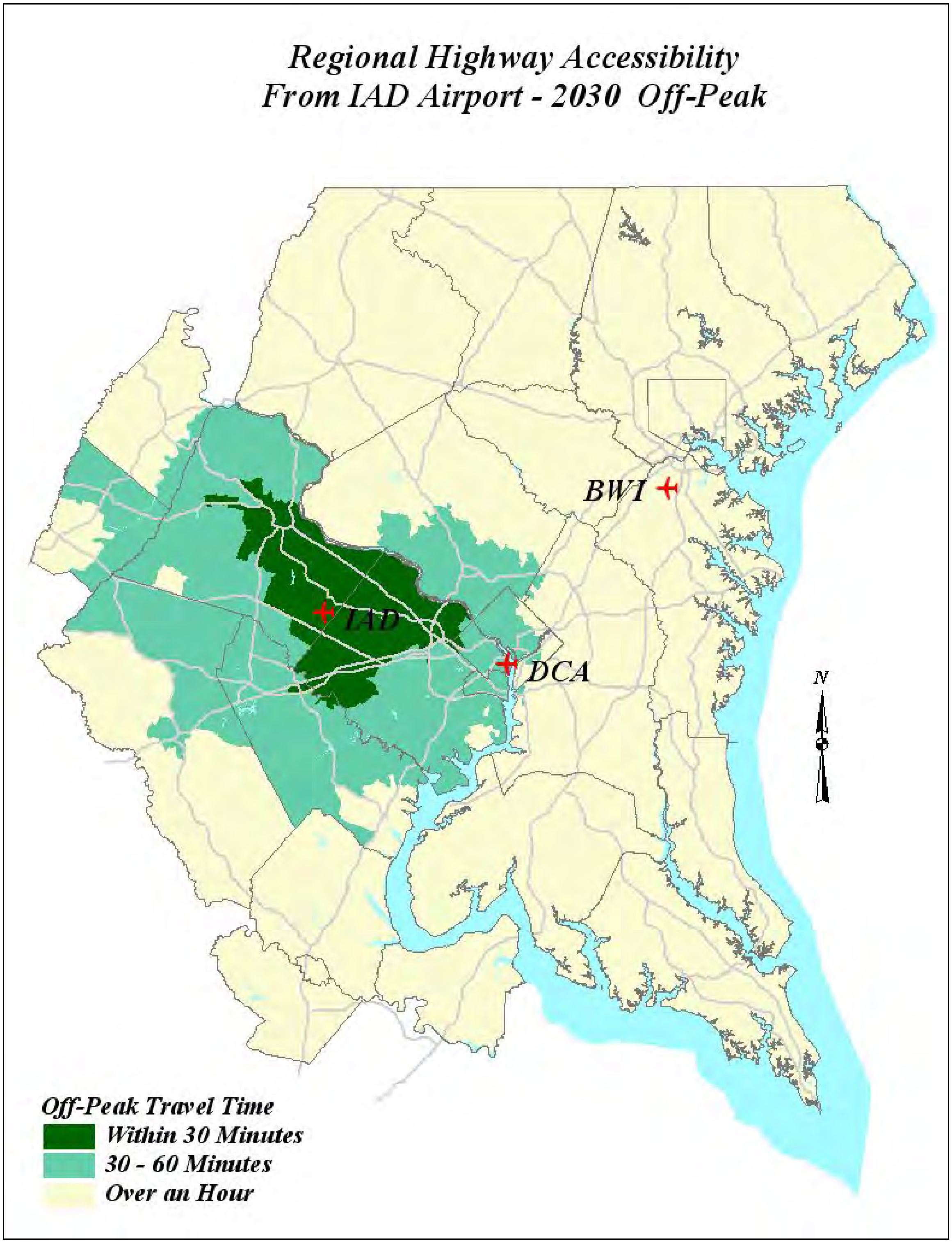
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