CHAPTER 1: INVENTORY

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1.1 INTRODUCTION

Minneapolis-St. Paul International Airport (MSP) is a commercial service airport located approximately seven miles south of downtown Minneapolis, Minnesota and seven miles southwest of downtown St. Paul. It is owned and operated by the Metropolitan Airports Commission (MAC) which was formed by the State Legislature in 1943 as a public corporation to provide and promote aviation services for the Minneapolis-St. Paul metropolitan area. In addition to MSP, the MAC operates six other airports in the Twin Cities region: Airlake, Anoka County-Blaine, Crystal, Flying Cloud, Lake Elmo, and St. Paul Downtown. **Figure 1-1** shows the location of MSP and the other airports in the MAC system.

In 2008, MSP ranked as the 16th busiest airport in the U.S. in terms of passengers, with 17 million enplanements (passenger boardings). MSP also handled about 234,000 metric tons of air cargo. That same year, about 450,000 aircraft operations (takeoffs or landings) occurred at the airport. The airport covers approximately 3,400 acres.

The Long Term Comprehensive Plan (LTCP) for MSP serves as a guide for the long-range facility development needed to meet the Twin Cities' forecast growth in commercial aviation demand safely and efficiently, and with minimal environmental consequences.

The MAC initiated an update to the LTCP in 2008. In the first phase, a general inventory of existing airport facilities was conducted and some initial concepts for expanding airport facilities were developed. In addition, activity forecasts were updated. This inventory chapter provides an overview of existing airport facilities. Chapter 2 documents the activity forecast update. Phase 2 of the study consisted of determining the capacity of the existing airport facilities, calculating long-range (Year 2030) facility requirements, identifying and evaluating alternative development concepts, selecting a preferred comprehensive plan, and providing a general approach for phasing the expansion.

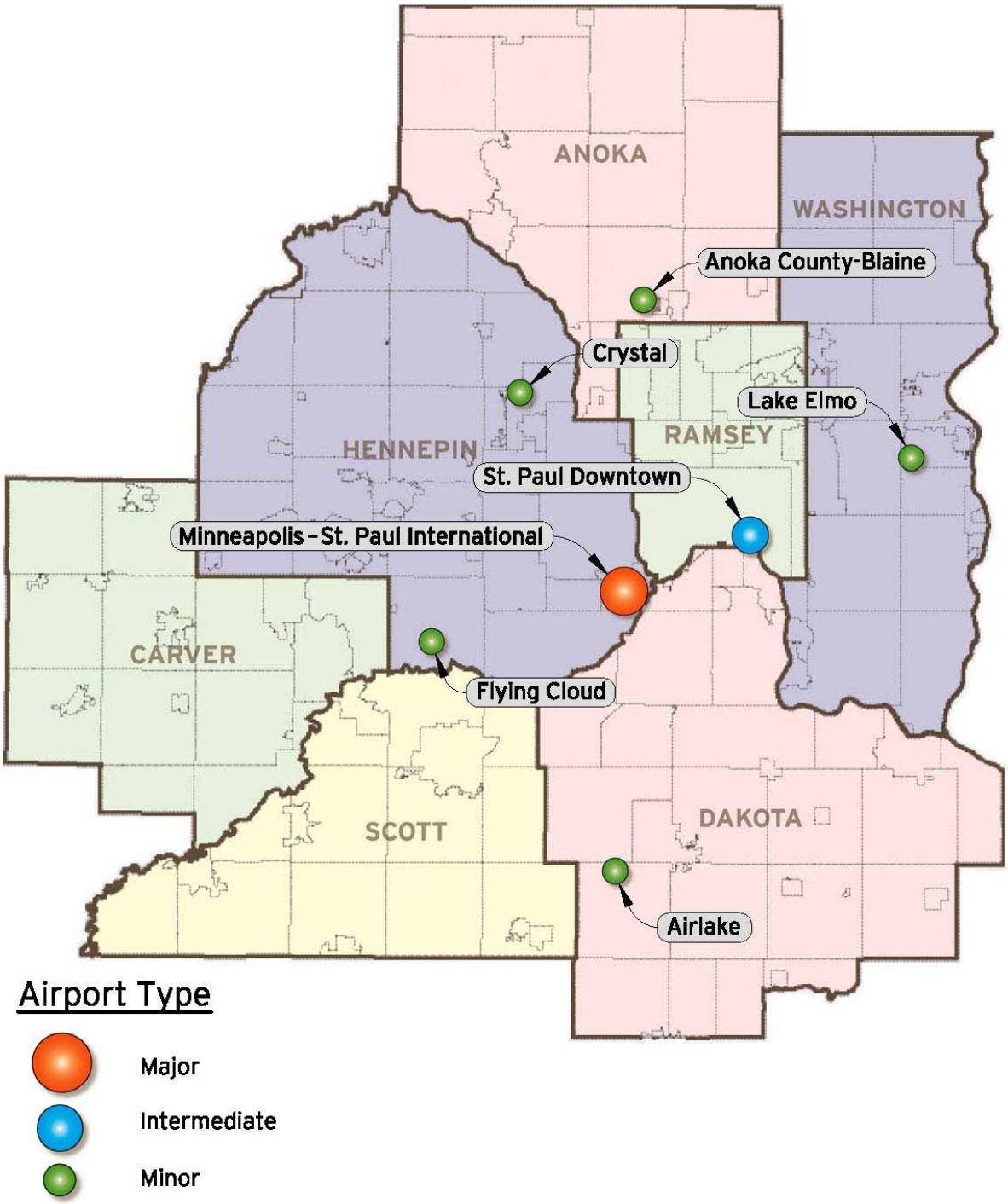
1.2 NEED FOR LTCP UPDATE

The Metropolitan Council adopted guidelines for the MAC to integrate information pertinent to planning, developing, and operating the region's airports in a manner compatible with their surrounding environs. In recognition of the dynamic nature of the aviation industry, the plans are to be updated regularly.

The aviation industry has changed significantly since the last LTCP was published in 1996. These changes include airline consolidation (including the recent merger of Delta Air Lines and Northwest Airlines), shifts in the aircraft fleet, new technologies, and evolving security protocols stemming from the September 11, 2001 terrorist attacks and other threats since that time. Combined, these changes have affected airline service patterns and passenger processing and behavior, and have resulted in some development at MSP that is different from the current LTCP.

The changes listed above, as well as variations in growth rates for different aviation activities, have resulted in some imbalances and deficiencies among various airport elements. In the terminal area, these near-term issues include bag claim facilities, public parking, the international arrivals hall, passenger security screening capacity, and a need for refurbishing

FIGURE 1-1: MAC AIRPORTS IN THE SEVEN COUNTY METROPOLITAN AREA



some concourses. On the airfield, consideration will be given to new taxiways to improve aircraft circulation. These near-term issues will be the primary focus of the LTCP Update.

The LTCP must examine not just immediate needs, but the long-range vision for MSP must be considered as well, especially given the long lead time for planning, environmental review, design, and actual construction. Key long-range issues include balancing airline activity between the Lindbergh and Humphrey terminals and enhancing the airport's ultimate capacity. To ensure the LTCP activities address changes in the aviation industry, demand and local and national economic conditions, the MAC will budget and update the LTCP every five years, consistent with Metropolitan Council guidelines. Based on this schedule, the next update will be completed in 2015.

1.3 AIRPORT HISTORY

Wold-Chamberlain Field flying activities date back to the formation of the Aero Club of Minneapolis, which leased land at an old concrete race track on the present MSP site in 1920. Government mail service began in 1921 but lasted only three months. In 1923, the airfield was named after two pilots killed in World War I, Ernest Groves Wold and Cyrus Foss Chamberlain. Air mail service was reinitiated by Northwest Airways in 1926, with service under government contract between Chicago and the Twin Cities.

In 1928, the airport was taken over by the Minneapolis Park Board and named Minneapolis Municipal Airport. Passenger service began in 1929 with Northwest Airways flying Ford Tri-motors to Chicago.

Airport facilities and service continued to expand through the 1930s, and in 1943, the Minnesota Legislature created the Minneapolis-St. Paul Metropolitan Airports Commission. The airport was designated Minneapolis-St. Paul International Airport—Wold-Chamberlain Field on August 23, 1948.

The Charles Lindbergh Terminal was built in 1962, and the original Hubert Humphrey Terminal opened in 1977, initially to accommodate international fights. It is now used by charter flights and a few scheduled airlines.

In 1989, the Minnesota Legislature adopted the Metropolitan Airport Planning Act. This legislation required the MAC and the Metropolitan Council (Met Council) to complete a comprehensive and coordinated program to plan for major airport development in the Twin Cities. The planning activities were designed to compare the option of future expansion of Minneapolis-St. Paul International Airport (MSP) with the option of building a new airport.

The analysis was completed in 1996, and the MAC and the Met Council formally submitted their recommendations to the Legislature on March 18, 1996. On April 2, 1996, legislation was passed by both the House and Senate, and subsequently signed by Governor Arne Carlson, stopping further study of a new airport and directing the MAC to implement the MSP 2010 Long Term Comprehensive Plan. This plan led to an over $3 billion expansion program including gate and automobile parking expansion and rental car facility consolidation and expansion, culminating in 2005 with the opening of the new Runway 17-35.

1.4 INVENTORY OF EXISTING FACILITIES

1.4.1 OVERVIEW

This section summarizes the major functional elements of the airport, including the airfield, passenger terminal, roadways and parking, cargo facilities, general aviation (GA) facilities, and support functions. **Table 1.1** found on the following page summarizes the major airport components.

1.4.2 AIRFIELD

MSP's airfield consists of four runways, a network of taxiways, and deicing pads.

Runways

Figure 1-2 shows the general airport layout for MSP. The airfield consists of two parallel runways, one north-south runway and one crosswind runway. Runway 4-22 is 11,006 feet long (with environmental approvals for an extension to 12,000 feet); Runway 12R-30L is 10,000 feet long; Runway 12L-30R is 8,200 feet long; and Runway 17-35 is 8,000 feet long.

Taxiways

Each runway is served by at least one full-length parallel taxiway. In addition, a network of taxiways connects each runway with the terminal areas (described in the next section) and other airport facilities.

Deicing Pads

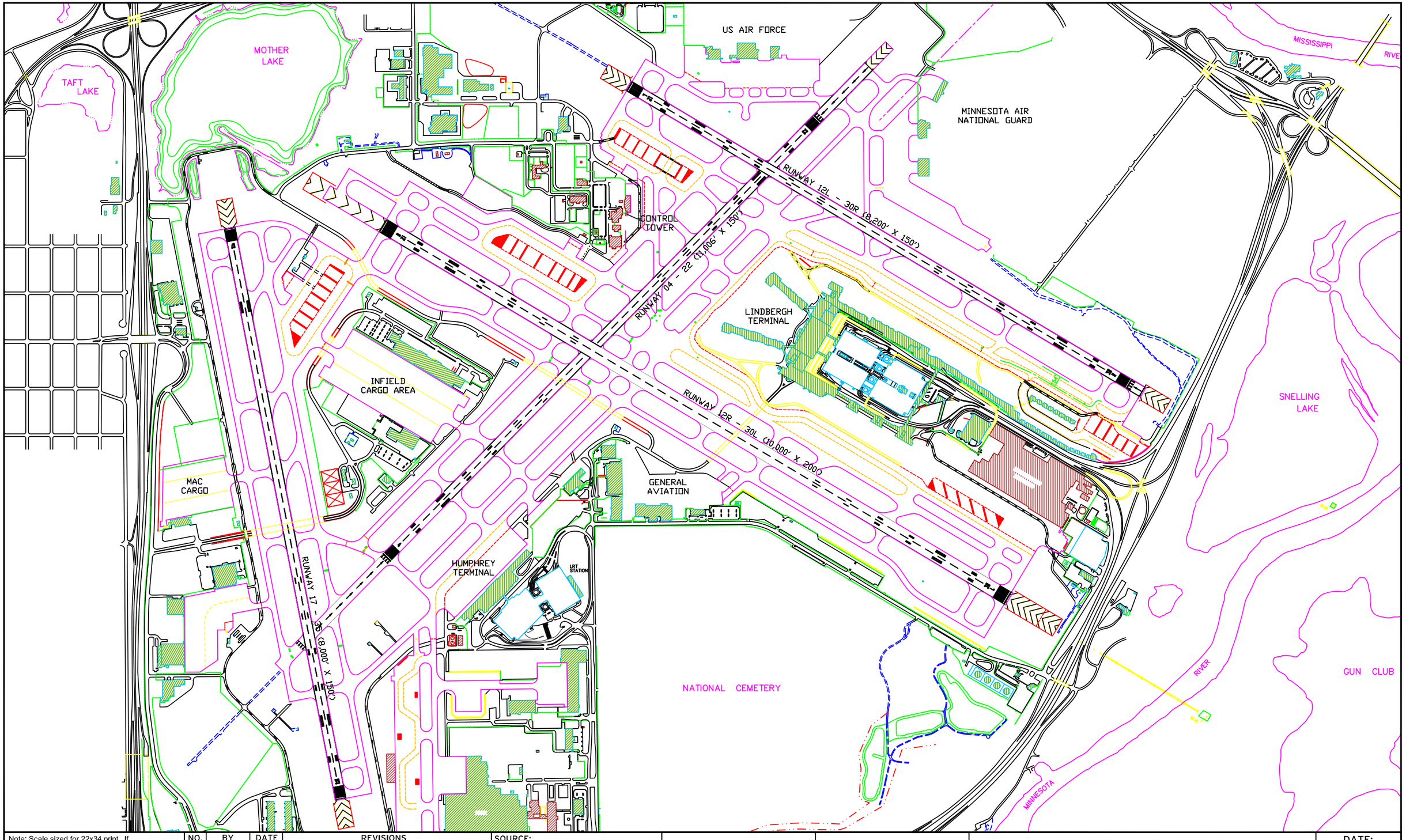
The parallel runways have deicing pads at each end sized to maintain runway departure rates during deicing conditions. Runway 17-35 has a 7-position deicing pad at the north end only because current operating restrictions normally preclude departures to the north over Minneapolis. All the deicing pads have adjacent facilities to recharge the deicing trucks and rest the deicing crews. A combined deicing operations and maintenance facility adjacent to the 12L deicing pad provides the capability to coordinate deicing operations on all pads.

TABLE 1.1: EXISTING AIRPORT FACILITIES

Airport Facility		Quantity
Runways		
East-West Parallel (12L-30R)		8,200 x 150 linear ft.
East-West Parallel (12R-30L)		10,000 x 200 linear ft.
North-South (17-35)		8,000 x 150 linear ft.
Crosswind (4-22)[1]		11,006 x 150 linear ft.
Terminals		
Lindbergh Terminal		2.8 sq. ft. (millions)
Humphrey Terminal		0.4 sq. ft. (millions)
	Total	3.2 sq. ft. (millions)
Gates		
Lindbergh Terminal		117 gates
Humphrey Terminal		10 gates
	Total	127 gates
Auto Parking Spaces (Public)		
Lindbergh Terminal		14,400 spaces
Humphrey Terminal		9,200 spaces
	Total	23,600 spaces
Cargo		
Warehouse/Office Space		480,000 sq. ft.
Aircraft Apron		229,000 sq. yds.
General Aviation Facility		18,500 sq. ft.

Notes: (1) Runway 4-22 has environmental approval to be extended to 12,000 feet.

Source: 2008 Legislative Report and MAC Analysis



J:\Jobs\44692 MAC Planning Consultant\PL 024 - MSP LTCP Phase 2 (2009)\2-Production\C-Work\0-Combined Report 1 11 10\Figures\1- EXISTING AIRPORT LAYOUT.dwg Layout1 Jan 19, 2010 - 12:55pm

Note: Scale sized for 22x34 print. If printed on 11x17 double scale factor.

0' 600' 1200'

SCALE: 1" = 1200'

NO.	BY	DATE	REVISIONS

SOURCE:
BASE MAPPING - TKDA

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FAX (703) 671-6210

EXISTING AIRPORT LAYOUT

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-2

1.4.3 TERMINAL FACILITIES

Two terminals serve MSP: the Lindbergh Terminal and the Humphrey Terminal. Together, they provide a total of 2.4 million square feet of terminal facilities and 127 aircraft gate positions.

Lindbergh Terminal

The Lindbergh Terminal is located between the two parallel runways, east of the crosswind runway. As shown in **Figures 1-3 through 1-5**, the terminal is laid out with single-loaded and double-loaded concourses that provide 117 gate positions. The gates are distributed among seven concourses labeled A through G. Ten gates can support international arrivals into the International Arrival Facility. A concourse tram and moving sidewalks assist passenger travel along Concourse C. Moving sidewalks also facilitate passenger movement on Concourses A, B, G and through the connector bridge between Concourses C and G. Domestic bag claim functions are located on the lower level where there are 12 sloped-plate carousels, of which 10 are the older circular-shaped devices that have the capacity of 1.2 bags per linear foot. The size of each of these units is 90 linear feet, or a total capacity of 108 bags each. The remaining two sloped-plate units are similar to the carousels that are in the Humphrey Terminal, with a capacity of 1.5 bags per linear foot. The claim frontage of these units in the Lindbergh Terminal is 218 and 306 linear feet, or a total capacity of 327 and 459 bags respectively.

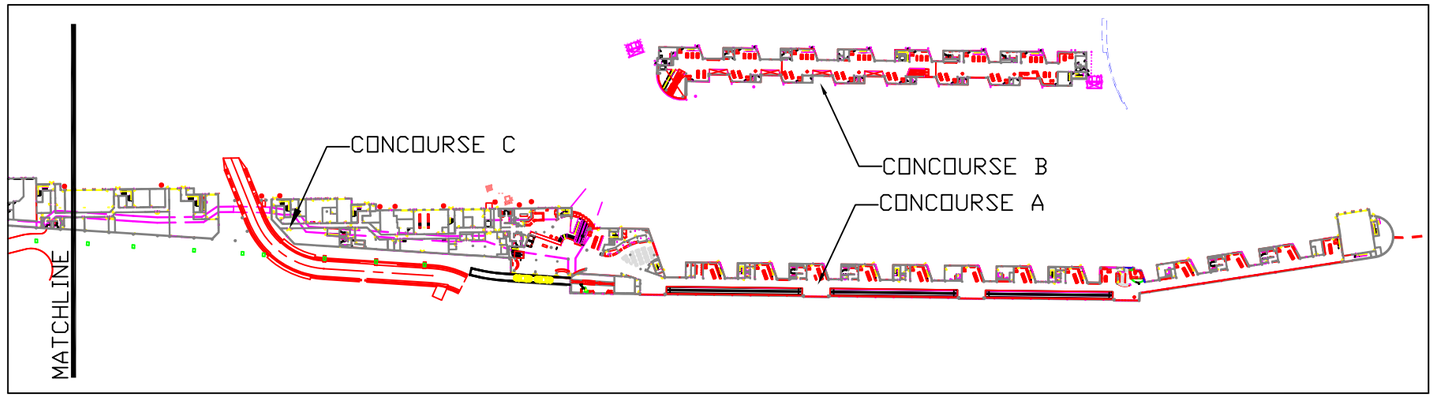
Ticketing/check-in, passenger security screening, gate hold rooms, and a wide array of concessions are located on the second level. A ground transportation center, located directly across from the terminal and accessed by a tunnel and skyway, serves as a focal point for multi-modal access. The MAC also has office space and a conference center on the Mezzanine Level of the Lindbergh Terminal.

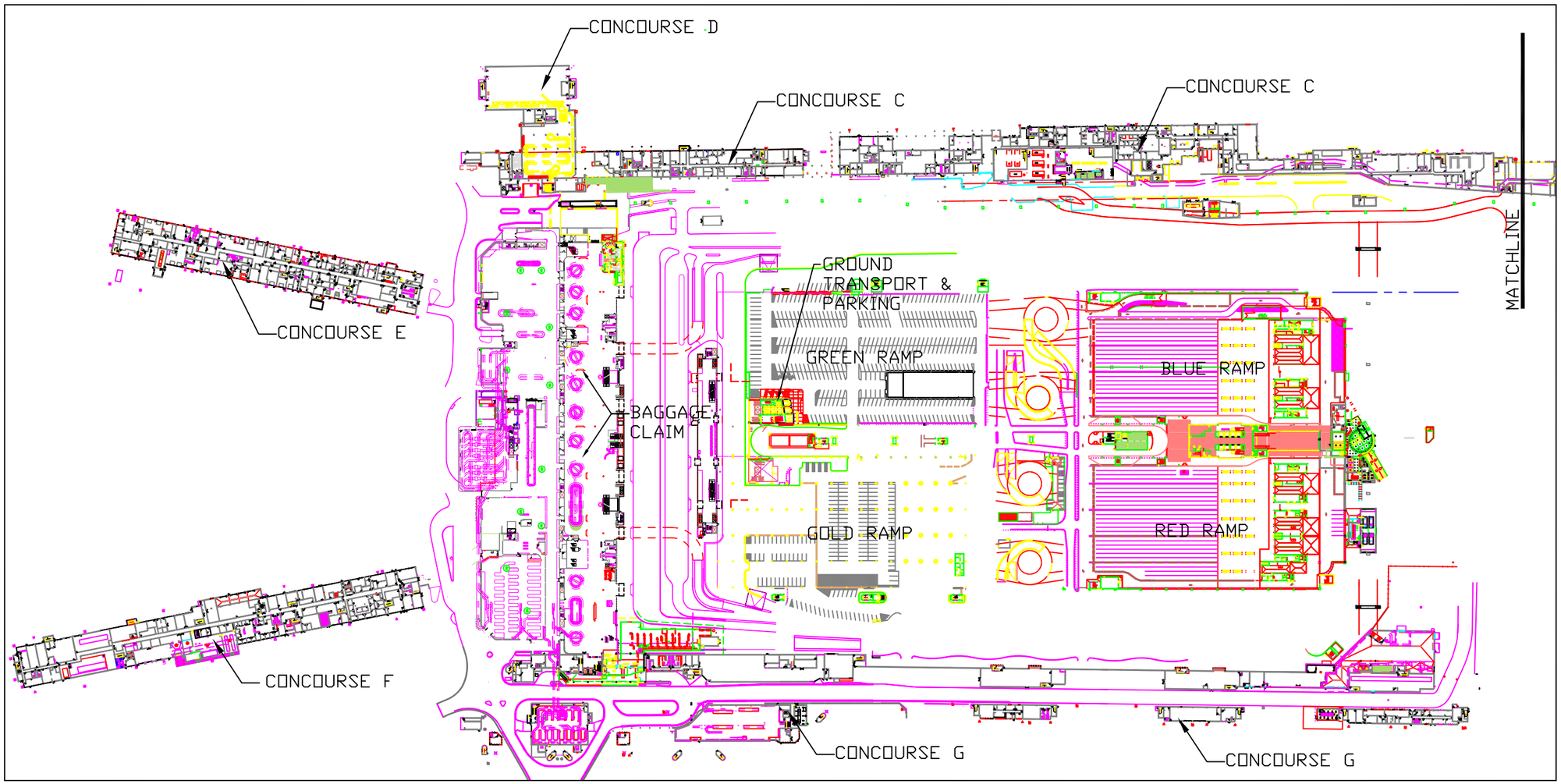
At the time of this writing, the following airlines are currently located at the Lindbergh Terminal: Air Canada, Alaska Airlines, American Airlines, Continental Airlines, Delta Air Lines, Frontier Airlines, KLM Royal Dutch Airlines, United Airlines, and US Airways.

Humphrey Terminal

The Humphrey Terminal, shown in **Figures 1-6 through 1-8**, provides 10 gates (with four of those serving the International Arrivals Facility) used by Air Tran Airways, Iceland Air, Midwest Airlines, Southwest Airlines, Sun Country Airlines, and several charter airlines. The lower level features the ticketing/check-in area, international arrivals processing, and the bag claim area which has four sloped-plate carousels that are oval-shaped, and have the capacity of 1.5 bags per linear foot. The overall size of each of these units is 145 linear feet, or a total capacity of 218 bags per device.

The second floor of the terminal includes the security screening checkpoint and gate hold rooms. The Humphrey Terminal also features a ground transportation center for commercial vehicle service. The Humphrey Terminal is served by a single-level curb facility serving both departing and arriving passenger functions.





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2900 SOUTH QUINCY STREET,
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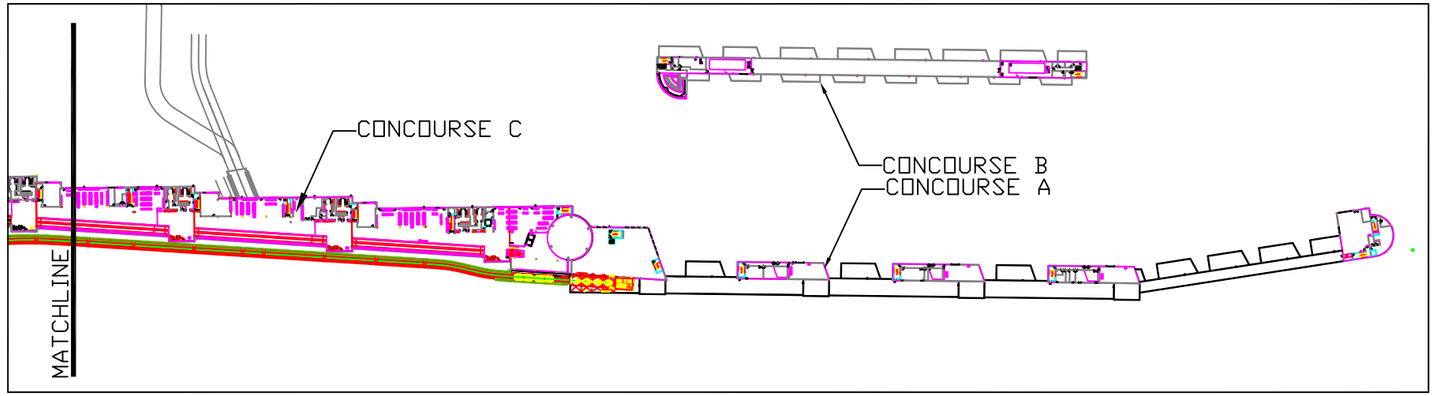
FAX (703) 671-6210

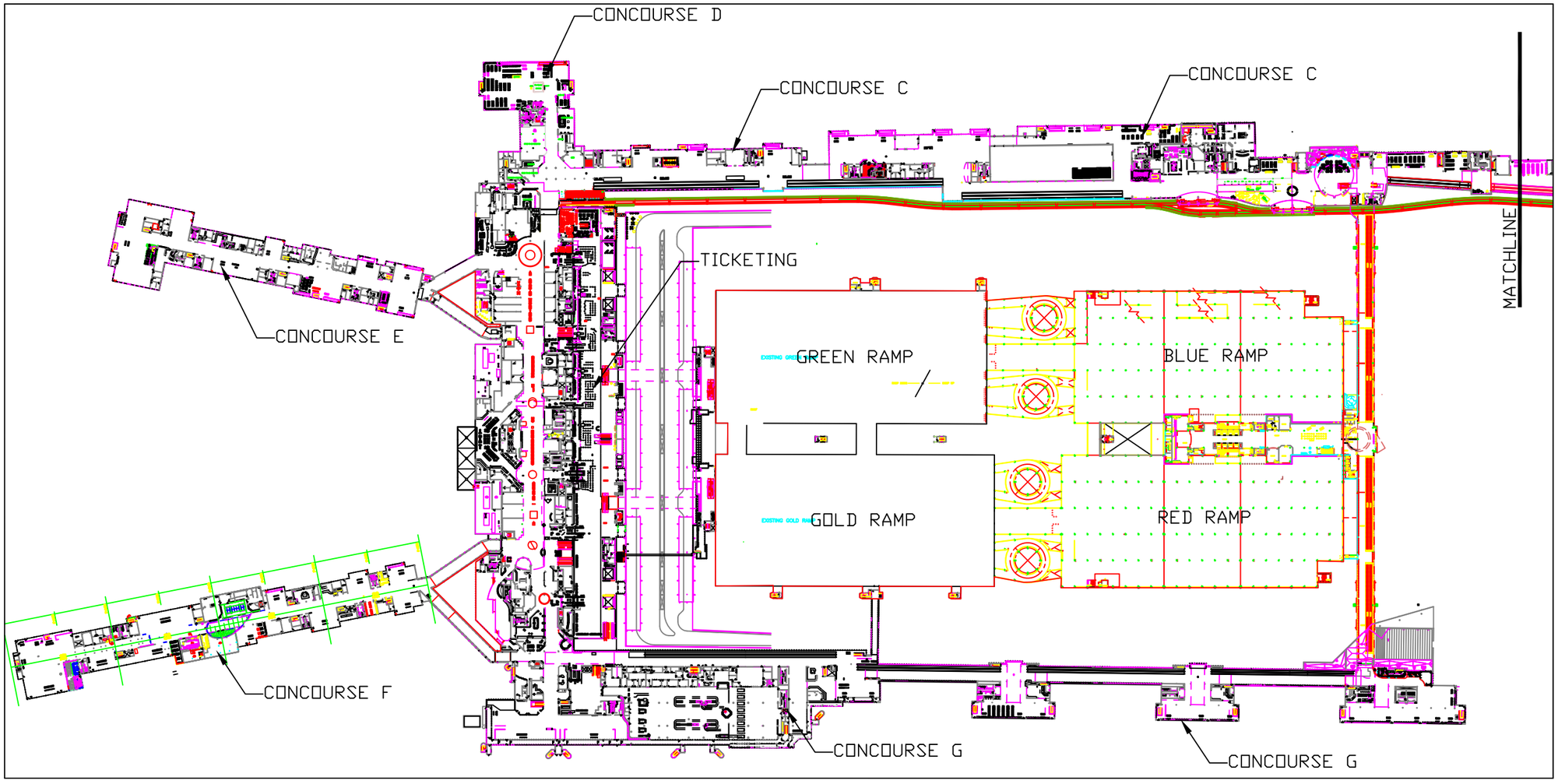
LINDBERGH TERMINAL - LEVEL 1

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE: Jan 20, 2010

FIGURE 1-3





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LINDBERGH TERMINAL - LEVEL 2

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-4

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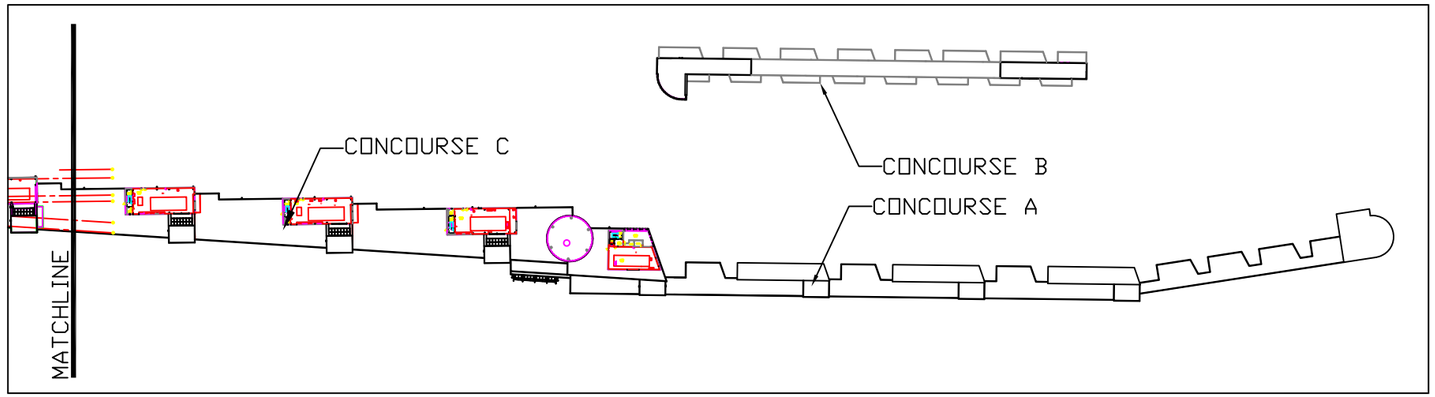

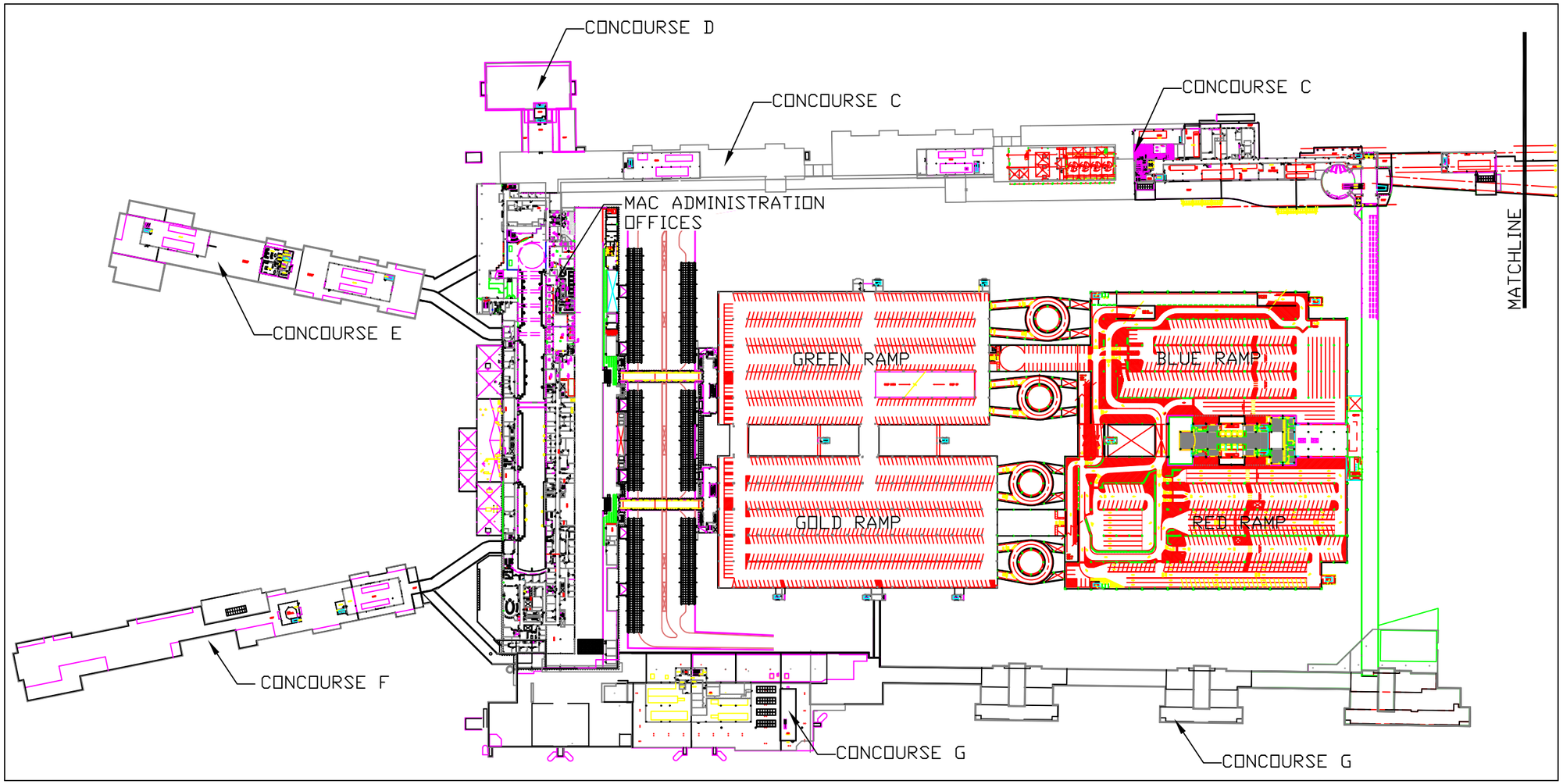

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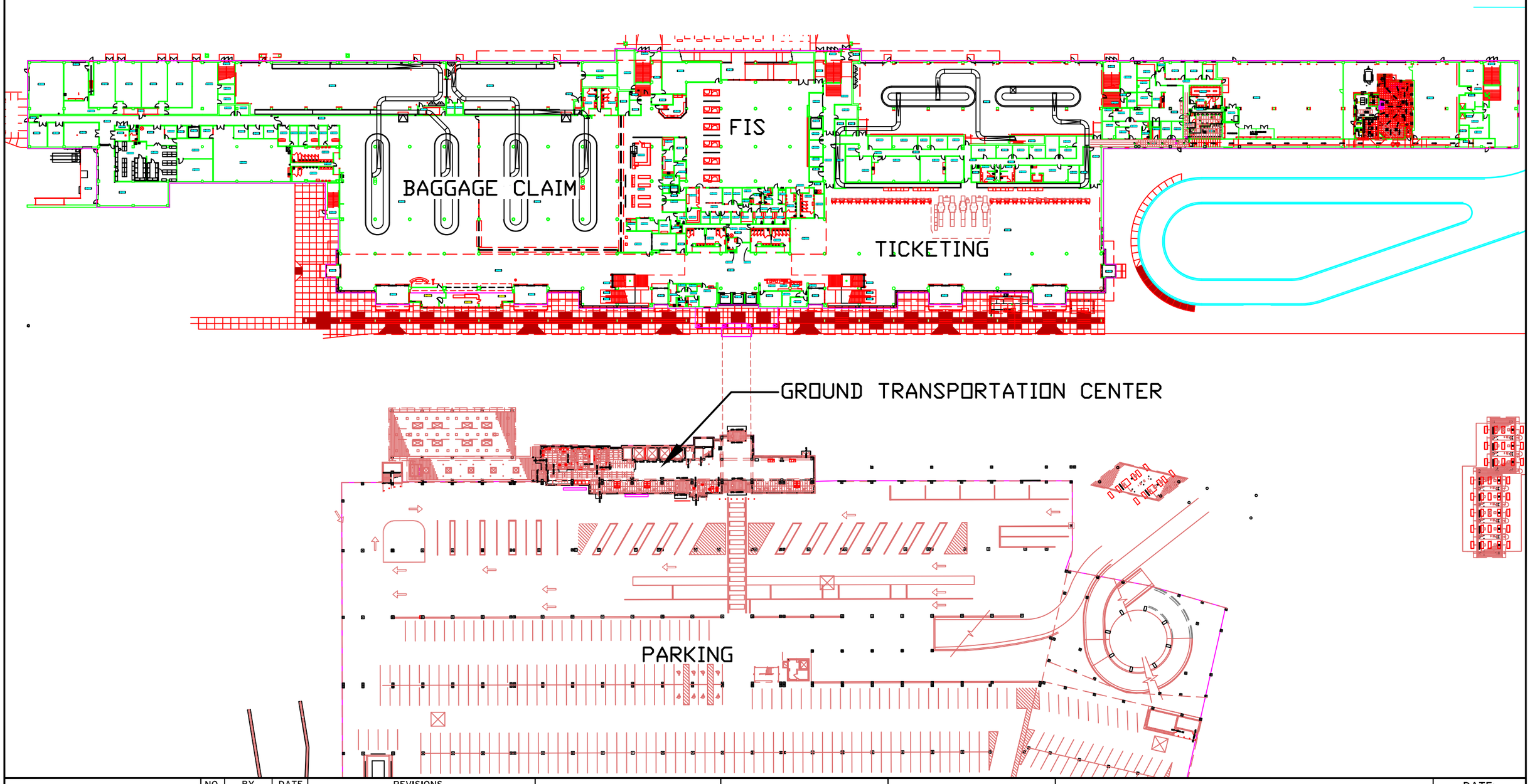
FAX (703) 671-6210

LINDBERGH TERMINAL - LEVEL 3

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-5



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ARLINGTON, VIRGINIA 22206
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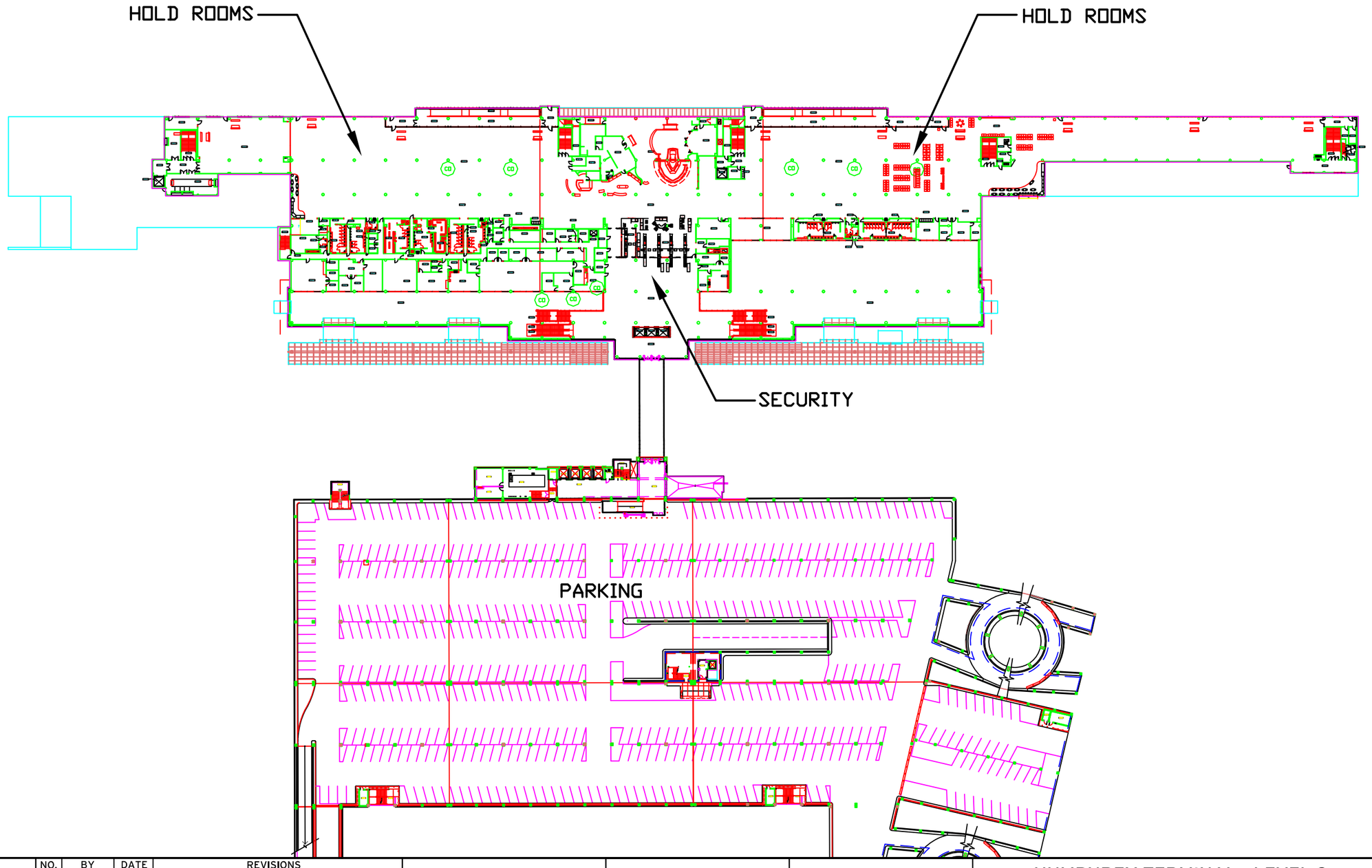
FAX (703) 671-6210

HUMPHREY TERMINAL - LEVEL 1

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-6



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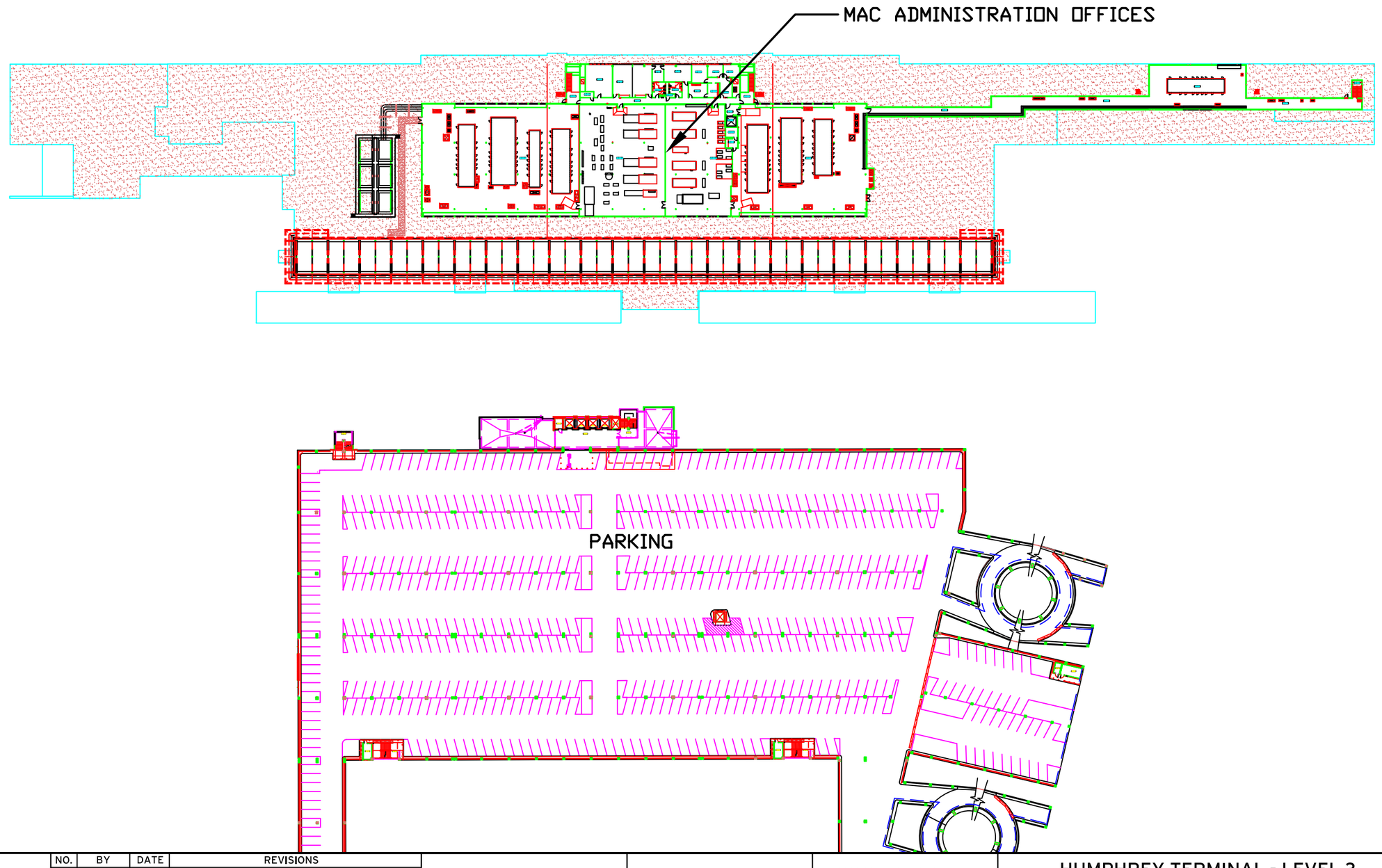
HUMPHREY TERMINAL - LEVEL 2

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-7



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HUMPHREY TERMINAL - LEVEL 3

MINNEAPOLIS - ST. PAUL
MINNEAPOLIS, MN

DATE:
Jan 20, 2010

FIGURE
1-8

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1.4.4 GROUND ACCESS AND PARKING

Highway Access

Minneapolis-St Paul International Airport (MSP) is surrounded by a comprehensive highway network. The Crosstown Highway (State Highway 62) is located directly north of MSP, while Interstate 494 lies directly south of the airport; both run in an east-west direction. State Trunk Highways 55 and 77 are located directly east and west of the airport, respectively, and run in a north-south direction. The Lindbergh Terminal is accessed directly off of Highway 5 via Glumack Drive. The Humphrey Terminal is accessed directly off of 34th Avenue from I-494, Highway 5, or Post Road (East 70th Street), via Humphrey Drive/East 72nd Street. The airport has a network of internal roads providing access to general aviation, cargo and other facilities.

MSP is the only major airport in the United States to have two terminals – the Lindbergh and the Humphrey – located on entirely separate roadway systems. Highway signs and other way-finding aids related to MSP will be updated in 2010 in order to assist travelers in locating the terminals. Numeric designations will be added to the existing terminal names: Terminal 1-Lindbergh and Terminal 2-Humphrey.

Transit

MSP has direct access to downtown Minneapolis and the Mall of America via the region's light rail transit (LRT). Currently, two stations serve the airport; the first is located directly east of the Humphrey Terminal and the second is below ground in the tunnel at the southeast end of the Lindbergh Terminal parking garage. Trains run every seven or eight minutes during peak hours and every 10 to 15 minutes off-peak. Metro Transit provides public bus service to the airport. The bus station is located in the Lindbergh Terminal's Transit Center.

Parking

There are approximately 23,600 public parking spaces at MSP, split between the Lindbergh and Humphrey parking ramps. At the Lindbergh Terminal, four parking ramps designated Green, Gold, Red and Blue provide short-term and general parking for passengers and space for rental cars. Short-term parking is located on Level 1 and the Mezzanine Level of the Green Ramp and rental car parking is provided on Levels 2 and 3 of the Red and Blue Ramps. Valet parking is also available in the lower level of the Lindbergh Terminal. There are a total of 14,400 public parking spaces in the areas described above. A tram assists passenger movements to the Red and Blue parking ramps that are located furthest from the Lindbergh Terminal.

There are two parking ramps – designated the Orange and Purple ramps – at the Humphrey Terminal that provide a total of 9,200 public parking spaces. The LRT provides access to the Lindbergh Terminal from the Humphrey parking ramps.

There is also a cell phone lot located off of Post Road between the two terminals.

1.4.5 CARGO FACILITIES

Cargo activity occurs at three locations at MSP. FedEx and UPS operate in a 100-acre "infield" area which provides 269,000 square feet of warehouse/office space and 154,000 square yards of apron space, including the center taxiway.

Second, there is a 30-acre "west" cargo area, west of Runway 17-35, that provides a 26,000 square foot cargo building and a 75,000 square yard apron (including the center taxi lane).

Lastly, on the southwest side of the airfield, there are two 40,000 square-foot cargo buildings (for a total of about 80,000 square feet). This site, known as the "air cargo center" does not provide direct aircraft access.

1.4.6 GENERAL AVIATION FACILITIES

General aviation (GA) facilities are located on a 37-acre site off East 70th Street. Fixed Base Operator (FBO) services are provided by Signature Flight Support. In 2002, Signature built a new GA facility, which now provides 18,500 square feet of facilities featuring a lobby, office space, conference rooms, private phone suites, pilot lounge, showers, lockers, a game room and a quiet room. A 3,700 square-foot garage provides indoor storage for ground equipment. There are also about 185 public automobile parking spaces. The site includes about 267,000 square feet of hangar/storage/shop space and 88,000 square yards of apron. The FBO also provides aircraft maintenance.

1.4.7 SUPPORT FACILITIES

Support facilities (which include airline maintenance, airport maintenance, Aircraft Rescue & Fire Fighting (ARFF) facilities), Federal Aviation Administration facilities, and miscellaneous facilities are in various locations of the airport.

Delta Air Lines (which acquired Northwest Airlines) occupies two maintenance complexes and a cargo facility on the south side of the airport. Most of the old Northwest Building B maintenance facility (adjacent to the Lindbergh Terminal inbound/outbound roadway) has been demolished. Two hangars, an engine test cell and associated facilities that remain (approximately 751,000 sq. ft.), are used by Delta for aircraft maintenance, shops and repairs.

Three additional airline maintenance hangars are sited on the western edge of the airfield and provide a total of approximately 247,000 square feet of floor space for hangars, shops, and offices.

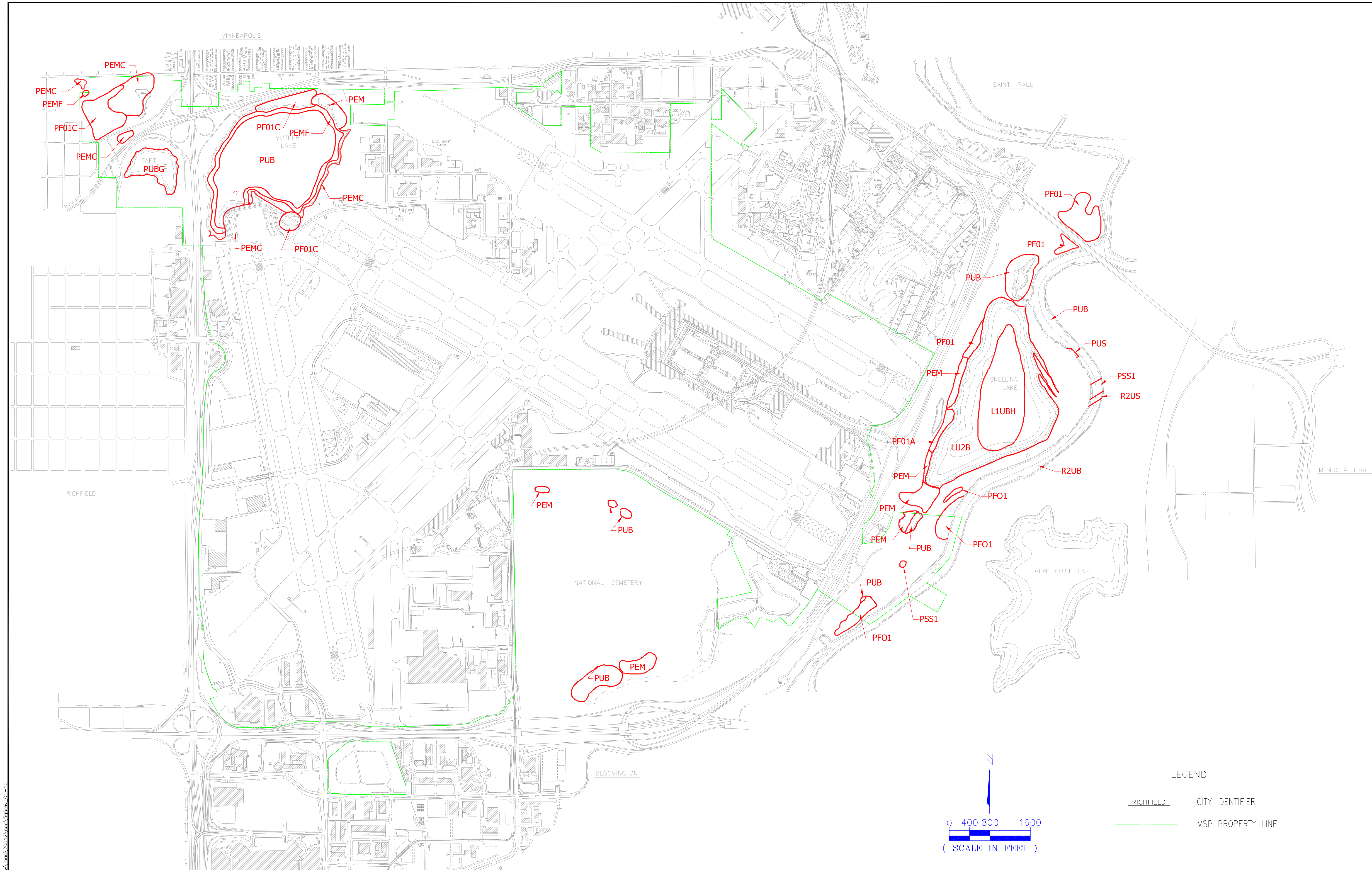
The main Aircraft Rescue & Fire Fighting (ARFF) facility is located near the center of the airfield on the south side of the runways; a satellite ARFF facility is located on the north side of the airfield between the parallel runways.

1.5 AIRPORT ENVIRONMENT

1.5.1 WETLANDS

In the now completed MSP 2010 Airport Expansion Program, impacted wetlands were mitigated through various means in conjunction with the appropriate regulatory agencies. Only a couple of minor remnant wetlands, at the north end of Runway 17, adjacent to the Mother Lake area, are still in existence on the airfield.

The wetlands were mitigated through permits granted by the US Army Corps of Engineers and the Minnesota Department of Natural Resources and in accordance with federal and state laws. The MAC serves as its own local government unit for any Wetland Conservation Act (WCA) jurisdictional wetlands. The Department of Natural Resources would have jurisdiction over any remnants that qualify under its authority. **Figure 1-9** depicts the National Wetlands Inventory within the airport property.



MINNEAPOLIS – ST. PAUL INTERNATIONAL AIRPORT
MSP WATERSHED MANAGEMENT PLAN

NATIONAL WETLANDS INVENTORY

Figure 1-9

1.5.2 WATER QUALITY AND DRAINAGE

Water Quality

Issues of concern at MSP that have the potential for environmental impact on water resources and that are associated with the airport facility and operations are biochemical oxygen demand (glycol products used for aircraft de/anti-icing operations); total suspended solids in storm water runoff; and oil and grease associated with aviation fueling facilities and operations.

The MAC has a National Pollutant Discharge Elimination System (NPDES) permit from the Minnesota Pollution Control Agency (MPCA) for storm water discharges from MSP. The MAC also maintains a construction NPDES permit from the MPCA and a Special Discharge permit from the Metropolitan Council Environmental Services (MCES) for construction dewatering activities.

Deicing activities at airports have the potential to effect receiving bodies of water. The MSP Glycol Management Program - a combination of capital improvements and Best Management Practices (BMP) implemented by both the airport and airlines - has been and may continue to be the most effective means to minimize the five-day carbonaceous biochemical oxygen demand ($CBOD_5$) discharges to the Minnesota River.

The basic objective of the Program is to control the runoff of Aircraft Deicing Fluid (ADF) so that glycol (and therefore $CBOD_5$) discharges to the river are minimized. The source control program seeks to minimize ADF application consistent with safety mandates, and to maximize glycol capture at the location of ADF application. Contained glycol-impacted storm water (GISW) with significant enough glycol content is recycled. Contained GISW with glycol content insufficient for recycling is routed to MCES for treatment.

The key components of the MSP Glycol Management Program are five dedicated deicing pads, a plug and pump network adjacent to both terminals, enhanced or new storm water ponds, snow melters, glycol recovery vehicles, runway/pavement BMPs and sophisticated equipment for ADF application.

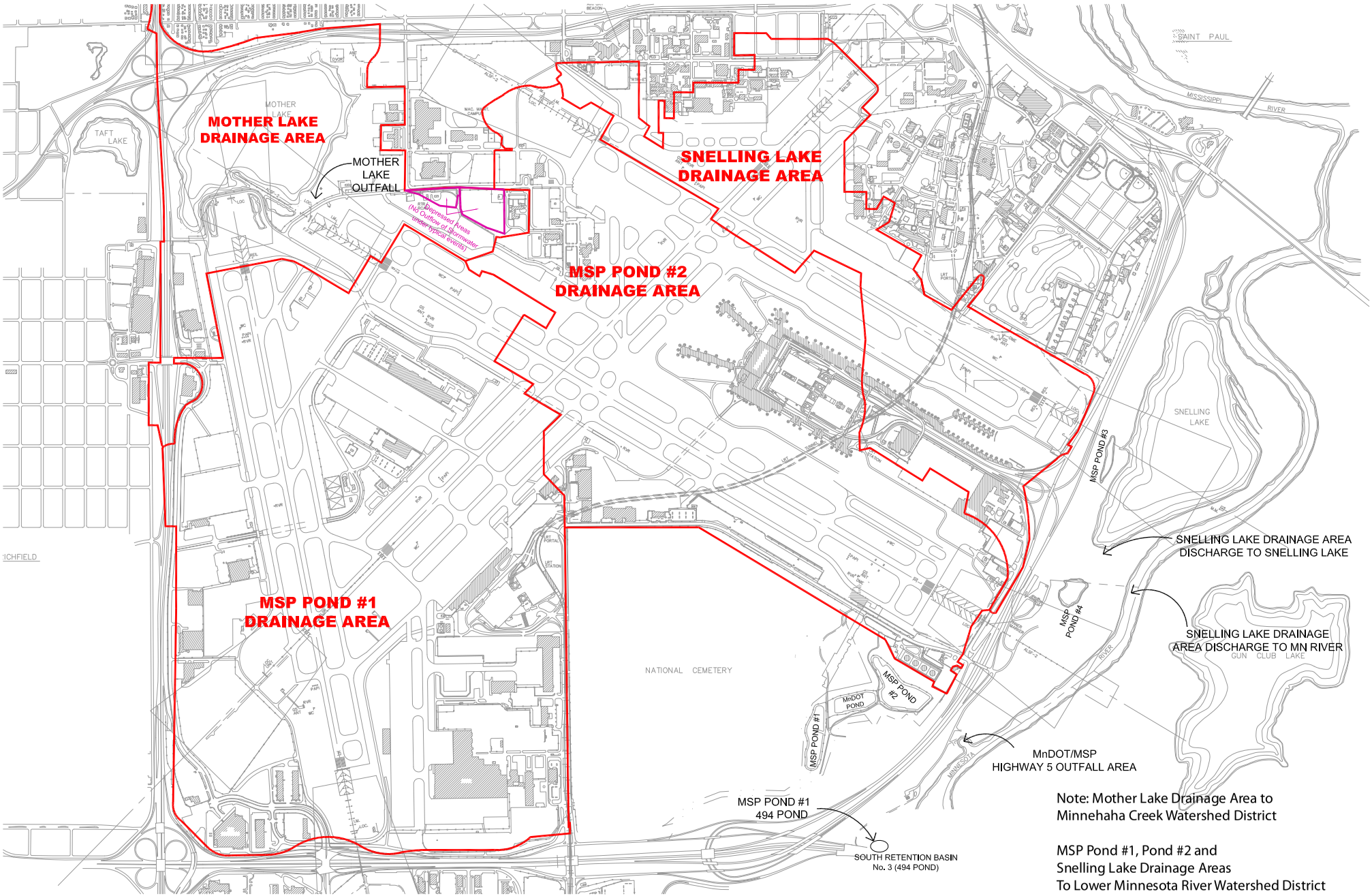
MSP tenant airlines support this program by using sophisticated equipment for ADF application, Glycol Recovery Vehicles (GRVs) to collect spent glycol and/or glycol-impacted storm water (GISW) for recycling and off-site treatment by local Publicly Owned Treatment Works (POTW) through an industrial discharge permit.

MAC implemented runway/pavement BMPs including prohibiting use of urea; use of mechanical runway snow removal procedures to reduce chemical pavement deicing and sand usage; advanced weather forecasting to facilitate preventative anti-icing practices; and extensive personnel training on efficient application techniques to minimize pavement deicer usage.

Drainage

The goal of the airport's water management plan is to effectively protect and manage water resources while ensuring safe and efficient operation of the airport facility.

There are two receiving waters for surface water runoff from MSP—Mother Lake and the Minnesota River. MSP has four drainage areas; one of the four MSP drainage areas discharges to Mother Lake and the remaining three discharge to the Minnesota River. The drainage areas are shown in **Figure 1-10.**



MOK 1-12-10 1=1 PRJ/MAC/AIRPORT DATA/CAD/WATERSHED MAPS/JAN 2010.DWG

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METROPOLITAN AIRPORTS COMMISSION

JAN 10

MSP NPDES PERMITTED OUTFALLS DRAINAGE AREA MAP

FIGURE 1-10

Mother Lake Drainage Area
The Mother Lake drainage area from MSP is comprised of approximately 300 acres, of which an estimated 51 acres are hard-surfaced. A large percentage of the surface area is grassland and Mother Lake. Service roadways, and the outward half of taxiways associated with the end of Runways 12R and 17 are the only significant hard-surfaced areas in the Mother Lake drainage area from the airport. Other facilities also discharge to the Mother Lake Drainage Area such as the Richfield maintenance facility, Mn/DOT materials storage and maintenance facility, as well as adjacent portions of Cedar Avenue and Highway 62 roadways.

Figure 1-10 identifies two areas as depressed that will not convey storm water flow during typical precipitation events. Storm water conveyed from these two locations flow into the Mother Lake Drainage Area or the MSP Pond #2 Drainage Area.

The only significant airport operations within the Mother Lake drainage area are vehicular traffic and aircraft movement on the limited portions of the taxiway.

Storm water drainage from the MAC General Office, Field Maintenance and Trades building area flows into the City of Minneapolis storm sewer system, with the exception of the drainage directed into two infiltration basins located east of the Field Maintenance and Trades buildings. There is no access for aircraft within the area directed to the Minneapolis system; therefore, there is no aircraft maintenance, deicing or fueling conducted in this storm water discharge area.

Minnesota River North Drainage Area
The Minnesota River North drainage area – also defined as the MSP Pond #2 Drainage Area – is the second largest and most intensely developed drainage area on MSP. It is comprised of approximately 797 acres, of which 307 acres are hard-surfaced. This watershed includes a majority of Terminal 1 (Lindbergh), parts of Runways 12L-30R, 12R-30L and 4-22 and associated taxiways, parking and the Fuel Farm.

Included in this drainage area are the majority of all fueling activities, aircraft deicing/anti-icing activities, runway sanding and general snow/ice control activities, and other associated airport operations.

Snelling Lake Drainage Area
The Snelling Lake drainage area has an approximate area of 427 acres, of which an estimated 226 acres are hard-surfaced. This watershed includes the portion of the Lindbergh Terminal servicing regional aircraft, Runways 12L-30R and 4-22 and associated taxiways, inbound and outbound roadways, the US Post Office and Air Force Reserve and Air National Guard Airside Operations.

Minnesota River South Drainage Area
The Minnesota River South drainage area – also defined as the MSP Pond #1 Drainage Area - is comprised of approximately 1,191 acres, of which 596 acres are hard-surfaced. This watershed includes the Humphrey Terminal and associated parking facilities, Delta Building C, FedEx and UPS Cargo Operations, Metropolitan Transit Commission bus storage facility and the Glycol Recovery Facility.

The MAC has an extensive monitoring program to measure the quality and quantity of the MSP discharge to the Minnesota River. In addition, the MAC constructed detention ponds to reduce the potential loading of pollutants into the Minnesota River. Construction of Pond 1 was completed in 2001 and Pond 2 was completed in 2004. The storm water ponds that receive

flow from the airport's network of storm sewer piping are visually checked daily for signs of petroleum impacts.

Pond 1 receives storm water discharges from the Minnesota River South Drainage area, which encompasses virtually all airport activity on the west side of MSP, including the Humphrey Terminal and Runway 17-35. Pond 2 receives storm water from the Minnesota River North Drainage area, which encompasses the majority of airport activity at MSP, including most of the Lindbergh Terminal. Ponds 3 and 4 receive storm water from the Snelling Lake Drainage area, which includes the inbound/outbound roadways, the US Post Office and a portion of the Lindbergh Terminal.

MSP Ponds 1 and 2 were designed as an MSP storm sewer upgrade to control discharge of total suspended solids (TSS) to the Minnesota River. These ponds, along with the Mn/DOT pond, discharge through one spillway with three pipes under Highway 5 at the same location.

MSP Ponds 1 and 2 each include a forebay area where influent is received. The forebays are the primary TSS separation areas and have an underflow design to protect against floating debris and provide sheen management. The forebays are followed by a large main body that storm water travels through prior to exiting through discharge structures. The discharge structures are equipped with an underflow baffle to prevent floating debris and sheens from discharging. Booms have been deployed across the forebay areas and around the discharge structures to enhance the capability of capturing floating debris and sheens. The ponds also have remotely-actuated valve controls on the discharge structures to supplement the manual controls. Ponds 3 and 4 have a storm water collection system that is comprised of a detention storm water basin followed by a retention storm water basin in series.

1.6 SANITARY SEWER, WATER AND SOLID WASTE

1.6.1 SANITARY SEWER

Wastewater discharges from MSP are conveyed to the MCES Metro Plant on Childs Road. This plant has a design capacity of 250 million gallons per day.

Wastewater is discharged to the Metro Plant through MCES' sewer interceptor system. Discharges from MSP are conveyed to the interceptor system through the sewer systems of three different jurisdictions. The majority is discharged from the airport to a tunnel near the Mississippi River that discharges into the interceptor system. A small volume of wastewater is discharged into the City of Minneapolis sewer system prior to reaching the MCES interceptors. Wastewater from the southwest portion of MSP is discharged through the City of Richfield sewer system prior to reaching the MCES interceptors.

1.6.2 WATER SUPPLY

All of the potable water used on the MSP campus is provided by the City of Minneapolis via three trunk main connections located along the northern boundary of the airport. Water usage is generated at the terminal buildings due to passenger amenities such as restrooms and concessions, cleaning requirements, and tenant facilities. Other airfield water uses include irrigation, rental car wash facilities, tenant hangar areas and cargo uses. The average daily water use reached 989,000 gallons per day in 2007, and declined slightly to 916,000 gallons per day in 2008. Peak flow requirements are largely dependent on fire flow demand. The peak fire flow demand is 4,500 gallons per minute for four hours at either the Lindbergh or the Humphrey Terminal, which is met by the existing system.

1.6.3 SOLID WASTE

MSP is located in Hennepin County, whose solid waste management plan provides for an integrated waste management system of transfer stations, waste processing, combustion facilities, recycling programs and facilities, yard waste composting and land-filling.

Using a centralized solid waste management system, the MAC contracts with a single vendor for all solid waste hauling at the Lindbergh and Humphrey Terminals. Trash is moved from the point of generation to six locations and from there is moved off-site by the airport's vendor. Compactors are used in all terminal locations to reduce waste volume which reduces the number of loads that must be transported off-site.

The airport provides the traveling public with a "dual stream" offering of receptacles in the terminal public areas. Newspapers/magazines and plastic/glass bottles/cans are collected separately. Recycling containers are located throughout the terminals but concentrated in gate areas where most recyclable materials are discarded.

The MAC's contracted vendor is required to deliver all municipal solid waste directly to the Hennepin Energy Recovery Center (HERC), a waste-to-energy facility. Part of an overall regional solid waste management plan, the HERC facility is owned by Hennepin County and burns trash for energy recovery.

1.7 METEOROLOGICAL DATA

In general terms, MSP enjoys good weather to accommodate the high level of operations associated with a major hub airport.

Table 1.2 below shows the historical percentages of different weather categories at MSP. VFR 1 is the best weather for flight operations. All aircraft can make what are called visual approaches to the airport in VFR 1 conditions. Departures can also use initial visual separation. The airport has the highest airfield capacity in VFR 1 conditions.

TABLE 1.2: AIRFIELD WEATHER

	Ceiling/Visibility	Occurrence (%)
VFR 1	3,200 feet and above/8 statute mile (sm) and above	70.7
VFR 2	1,000 to 3,200 feet/3 to 8 sm	20.9
IFR 1	200 to 1,000 feet/0.5 to 3 sm	8.2
IFR 2	Below 200 feet/below 0.5 sm	0.2
		Total: 100.0

Source: Minneapolis-Saint Paul International Airport Capacity Enhancement Plan, December 1993, Figure 10.

VFR 2 is almost as good as VFR 1 from an airfield capacity standpoint. In VFR 2 conditions, approaches typically need to be put on an instrument approach for the first part of the final approach phase. This increases aircraft separation slightly. Approaches to all three runways in the "north flow" condition (converging between Runway 35 and Runway 30L and 30R) can still be conducted in most VFR 2 conditions. Departures cannot use initial visual separation, so separations between departing aircraft also need to be increased slightly.

In IFR 1 conditions, all aircraft need to be on an instrument approach for the entire phase of the approach. Aircraft separation needs to be increased slightly beyond the separation used in VFR

2 conditions. Approaches to Runway 35 cannot be conducted at the same time approaches are occurring on Runways 30L and 30R, which causes an additional decrease in arrival capacity.

In IFR 2 conditions, operations can be significantly limited, depending on the direction of the wind. Aircraft need special equipment and pilots need special training to land during IFR 2 conditions. In addition, runways need to be specially-equipped for operations during IFR 2 conditions. Runways 12R and 12L are both equipped to accommodate operations in IFR 2 weather, and they can be used simultaneously, as long as aircraft maintain a staggered separation between adjacent runways. For north winds, Runway 30L is equipped for limited operation during IFR 2 conditions, and Runway 35 is fully equipped for IFR 2 conditions. However, the runways converge and cannot be used simultaneously for arrivals. Fortunately, the occurrence of IFR 2 conditions is very low, and the winds tend to be calm or are from a southerly direction a majority of the time in this condition.

1.8 LAND USE, AIRSPACE AND ZONING

Chapter 6 provides an analysis of land use, airspace and zoning considerations in the context of existing and planned airport facilities.