Crystal Airport
2035 Long-Term Comprehensive Plan (LTCP)
Volume 2 – Appendices 1-9

Metropolitan Council Determination – September 2017
Final MAC Adoption – October 2017

Prepared jointly by the Airport Development, Environment, and Reliever Departments

LIST OF APPENDICES (VOLUME 2)

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Appendix 1: Glossary of Terms

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Glossary of Terms

A-Weighted Decibels (dBA): A measure of noise levels adjusted relative to the frequencies most audible to the human ear.

Above Ground Level (AGL): A height above the ground as opposed to above Mean Sea Level (MSL).

Accelerate-Stop Distance: The runway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff.

Advisory Circular: External publications issued by the FAA consisting of non-regulatory material providing for the recommendations relative to a policy and guidance and information relative to a specific aviation subject.

Aircraft Approach Category (AAC): An alphabetic classification of aircraft based upon 1.3 times the stall speed in a landing configuration at their maximum certified landing weight. The categories are as follows:

- Category A: Approach speed less than 91 knots
- Category B: Approach speed 91 knots or more but less than 121 knots
- Category C: Approach speed 121 knots or more but less than 141 knots
- Category D: Approach speed 141 knots or more but less than 166 knots
- Category E: Approach speed 166 knots or more

Airplane Design Group (ADG): A classification of aircraft based on wingspan and tail height. The groups are as follows:

- Group I: Wingspan up to but not including 49 feet or tail height up to but not including 20 feet
- Group II: Wingspan 49 feet up to but not including 79 feet or tail height from 20 feet up to but not including 30 feet
- Group III: Wingspan 79 feet up to but not including 118 feet or tail height from 30 feet up to but not including 45 feet
- Group IV: Wingspan 118 feet up to but not including 171 feet or tail height from 45 feet up to but not including 60 feet
- Group V: Wingspan 171 feet up to but not including 214 feet or tail height from 60 feet up to but not including 66 feet
- Group VI: Wingspan 214 feet up to but not including 262 feet or tail height from 66 feet up to but not including 80 feet

Aircraft Operation: The landing, takeoff, or touch-and-do procedure by an aircraft on a runway at an airport.

Airport Classifications: Definitions of airport classifications vary by agency. Classifications relevant to the Crystal Airport are highlighted in bold text.

- Federal Aviation Administration (FAA) General Aviation Airport Classifications:
  - National: National airports support the national and state system by providing communities with access to national and international markets. They accommodate a full range of aviation activity including large corporate jet and multi-engine aircraft operations, significant charter passenger services, or all-cargo operations. They often work in conjunction with, and in support of, hub airports serving the aviation needs of larger metropolitan areas.
  - **Regional: Regional airports support regional economies by connecting communities to statewide and interstate markets. These airports accommodate a full range of regional and local business activities, limited scheduled passenger service, or cargo operations. They serve corporate jet and multi-engine aircraft, as well as single-engine propeller aircraft.**
  - Local: Local airports supplement communities by providing access to primarily intrastate and some interstate markets. These airports accommodate small businesses, flight training, emergency service, charter service, cargo operations, and personal flying activities. They typically accommodate smaller general aviation aircraft.
  - Basic: Basic airports support general aviation activities such as emergency service, charter or critical passenger service, cargo operations, flight training, and personal flying. These airports typically accommodate mostly single-engine propeller aircraft. They may be located in and provide service to remote areas of the United States with limited or no surface transportation options, and therefore may be critical to the transportation of goods required for local day-to-day life.

- Minnesota State Aviation System Plan (SASP) Classifications:
  - Key Airports: These airports have paved and lighted primary runways 5,000 feet or longer in length. They are capable of accommodating all single-engine aircraft along with larger multi-engine aircraft and most corporate jets.
    - Key Airports include Minneapolis-St. Paul International, St. Paul Downtown, Flying Cloud, and Anoka County – Blaine Airports.
  - **Intermediate Airports: These airports have paved and lighted runways all of which are between 2,500 and 5,000 feet long. Intermediate airports can accommodate all single engine aircraft, some multi-engine aircraft, and most corporate jets.**
    - Intermediate Airports include Airlake, Lake Elmo, and Crystal Airports.
  - Landing Strips: These airports have turf runways which can accommodate most single-engine aircraft and some twin engine aircraft. They may be unusable during wet weather, winter months, and during the spring melt.

- Metropolitan Council Regional Aviation System Plan (RASP) Classifications:
    - Major Airport: An airport with a primary runway length of 8,000 feet or greater with a precision approach. A Major Airport serves a primary air service access area that is international and national in scope. Its role in the airport system is to provide facilities and services primarily to scheduled air carrier and regional commuter users, but also includes air cargo and charter carriers.
        - Major Airports include Minneapolis-St. Paul International Airport.
    - Intermediate Airport: An airport with a primary runway length between 5,000 and 8,000 feet with a precision approach. The role of an Intermediate Airport is to provide facilities and services primarily to corporate and business general aviation aircraft. Typical users of these airports fly a variety of business jets, turboprop aircraft, and single- and twin-engine piston aircraft.
        - Intermediate Airports include St. Paul Downtown Airport.
    - **Minor Airport: An airport with runways all of which are 5,000 feet in length or less. Their system role is to provide general aviation facilities and services primarily to personal, business, and instructional users. The most common users of these airports fly single-engine and light twin-engine aircraft. Minnesota state statute prohibits upgrading a minor airport to intermediate airport status without legislative approval.**
        - Minor Airports include Flying Cloud, Anoka County – Blaine, Airlake, Lake Elmo, and Crystal Airports.
    - Special Purpose Airport: A facility open to public use, including heliports, seaplane bases, or airport landing areas whose primary geographic and service focus is normally state and metropolitan in scope. Personal, business and instruction uses are accommodated at these facilities.

- Metropolitan Airports Commission (MAC) Reliever Airport Classifications:
    - Primary Relievers: MAC Reliever airports that provide the infrastructure and serves that are key to corporate aviation needs.
        - Primary Relievers include St. Paul Downtown, Flying Cloud, and Anoka County – Blaine Airports.
    - **Complimentary Relievers: MAC Reliever airports that provide limited MSP relief and complement the three Primary Relievers by offering options for aviation activity but not to the level of infrastructure and services typically expected at a Primary Reliever.**
        - Complimentary Relievers include Airlake, Lake Elmo, and Crystal Airports.

Airport Elevation: The highest point of an airfield's usable landing area measured in feet above Mean Sea Level (MSL).

Airport Layout Plan (ALP): A scaled drawing of the existing and planned land and facilities necessary for the operation and development of an airport.

Airport Reference Code (ARC): A designation that signifies the airport's highest Runway Design Code (RDC). The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

Air Route Traffic Control Center (ARTCC): A facility established to provide air traffic control service to aircraft operating on Instrument Flight Rule (IFR) flight plans within controlled airspace and principally during the en-route phase of flight.

Air Traffic Control (ATC): A service provided for the purpose of promoting the safe, orderly, and expeditious flow of air traffic, including airport, approach, and en-route air traffic control services.

Air Traffic Control Tower (ATCT): A structure from which air traffic control personnel control the movement of aircraft on or around the airport.

Annual Service Volume (ASV): The number of annual operations that can be reasonably expected to occur at an airport based on a given level of delay.

Approach Surface: An imaginary obstruction-limiting surface defined in 14 CFR Part 77 which is longitudinally centered on an extended runway centerline and extends outward and upward from the primary surface at each end of a runway at a designated slope and distance based on the type of available or planned approach by aircraft to a runway. See Figure 2-6.

Approach Visibility Minimums: A set of conditions specified for operations of aircraft during Instrument Flight Rule (IFR) weather conditions.

Apron: A specified portion of an airfield used for aircraft parking and the refueling, maintenance, servicing, and loading/unloading of aircraft.

Area Navigation (RNAV): A method of navigation that permits aircraft operations on any desired course within the coverage of station-referenced navigation signals.

Automated Weather Observation System (AWOS): Equipment that takes and broadcasts automated weather readings at an airport.

Average Day Peak Month (ADPM): Defined as peak month passengers or operations divided by the number of days in the month.

Based Aircraft: The general aviation aircraft that use a specific airport as a home base.

Circling Approach: A maneuver initiated by a pilot to align the aircraft with a runway for landing when a straight-in landing from an instrument approach is not possible or is not desirable.

Clear Zone: As defined by MnDOT Aeronautics, Clear Zones off runway ends are intended to enhance operational safety of aircraft and to protect life and property in runway approach areas. The MnDOT Clear Zones have a similar function to, but are not always the same dimensions, as the FAA Runway Protection Zone (RPZ).

Common Traffic Advisory Frequency (CTAF): A radio frequency designated for the purpose of carrying out airport advisory practices while operating to or from an airport without an operating control tower.

Compass Calibration Pad: An airport facility used for calibrating an aircraft compass.

Crosswind Runway: An additional runway at an airport that compensates for primary runways that provide less wind coverage than desired.

Day-Night Average Sound Level (DNL): The predicted average sound effect on an area near the airport for a typical 24-hour period. A weighting factor equivalent to a penalty of 10 decibels is applied to aircraft operations occurring between 10:00 PM and 7:00 AM.

Decibel (dB): A unit used to measure the intensity of a sound or the power level of an electrical signal by comparing it with a given level on a logarithmic scale.

Declared Distances: Distances for a runway representing the maximum lengths available and suitable for meeting takeoff and landing distance requirements. They are determined in accordance with FAA design standards, with length added to or subtracted from the physical length of the runway to provide standard safety areas and protection zones. As a result, the declared distances for a runway may be more or less than the physical length of the runway depicted on aeronautical charts. There are four defined declared distances:

- Takeoff run available (TORA) – length for the ground run of a departing aircraft;
- Takeoff distance available (TODA) – length through the start of the takeoff climb;
- Accelerate stop distance available (ASDA) – length for acceleration to takeoff speed and then deceleration associated with an aborted takeoff; this is often the longest length for twins and turbines
- Landing distance available – length suitable for landing an aircraft

Design Aircraft: An aircraft with characteristics that determine the application of airport design standards for a specific runway, taxiway, apron, or other facility. This aircraft can be a specific aircraft model or a composite of several aircraft using, expected, or intended to use the airport or part of the airport (also called critical aircraft or critical design aircraft).

Dual Wheel Gear (DW): The configuration of an aircraft landing gear where two wheels are used at each wheel position to support the aircraft load.

Federal Aviation Administration (FAA): The federal agency responsible for the safety and efficiency of the national airspace and air transportation system.

Federal Aviation Regulations (FAR): The general and permanent rules established by the executive departments and agencies of the Federal Government for aviation, which are published in the Federal Register. These are the aviation subset of the Code of Federal Regulations.

Fixed Base Operator (FBO): A commercial business enterprise located on an airport that provides services to pilots including aircraft rental, training, fueling, maintenance, parking, and the sale of pilot supplies. Also known as a Full Service Commercial Operator.

Fleet Mix: A collective term generally used to describe the proportions of aircraft types operating at an airport.

Flight Service Station (FSS): Air traffic facilities which provide pilot briefings, flight plan processing, inflight radio communications, search and rescue (SAR) services, and assistance to lost aircraft and aircraft in emergency situations.

General Aviation: The segment of aviation that encompasses all aspects of civil aviation except for certified air carriers and other commercial operators such as air cargo.

Global Positioning System (GPS): A satellite based navigational system that provides signals in the cockpit of aircraft defining aircraft position in terms of latitude, longitude, and altitude.

Instrument Flight Rules (IFR): Procedures for the conduct of flight in weather conditions below Visual Flight Rule weather minimums. The term IFR is often used to define weather conditions and the type of flight plan under which an aircraft is operating.

Instrument Meteorological Conditions (IMC): Meteorological conditions expressed in terms of specific visibility and ceiling conditions that are less than the minimums specified for visual meteorological conditions.

Integrated Noise Model (INM): The INM is a computer model that evaluates aircraft noise impacts in the vicinity of airports. It was developed based on the algorithm and framework from the SAE AIR 1845 standard, which uses noise-power-distance (NPD) data to estimate noise accounting for specific operation mode, thrust setting, and source-receiver geometry, acoustic directivity, and other environmental factors.

Itinerant Operation: An aircraft operation where the destination point is greater than 20 miles from the aircraft's point of origin.

Joint Airport Zoning Board (JAZB): A Joint Airport Zoning Board is comprised of the municipality that owns or controls an airport along with surrounding municipalities within which an airport hazard area may be located. Once formed, the Joint Airport Zoning Board has the power to adopt, administer, and enforce airport zoning regulations applicable to the airport hazard areas in its jurisdiction.

Knots: Nautical miles per hour, equal to 1.15 statute miles per hour.

Lateral Navigation (LNAV): Azimuth navigation without positive vertical guidance. This type of navigation is associated with non-precision approach procedures.

Local Operation: An aircraft operation that remains in the local traffic pattern, executes simulated instrument approaches or low passes at the airport, and operations to or from the airport and a designated practice area within a 20−mile radius of the tower.

Long-Term Comprehensive Plan (LTCP): The airport sponsor's concept of the long-term development and use of an airport's land and facilities.

MACNOMS: The MAC Noise and Operations Monitoring System collects aircraft noise levels at 39 remote noise monitoring towers located around the Minneapolis-St. Paul International Airport (MSP). In addition, the system collects flight track data to approximately 40 miles around MSP up to 20,000 feet.
Metropolitan Airports Commission (MAC): The owner and operator of the Lake Elmo Airport. The Metropolitan Airports Commission (MAC) was created in 1943 by the Minnesota Legislature to promote air transportation in the seven-county metropolitan area.

MIC: The FAA airport location identifier for Crystal Airport.

Microjet: A category of small jet aircraft approved for single-pilot operation, typically seating 4-8 people, with a maximum takeoff weight of under 10,000 pounds. Also referred to as very light jets or personal jets.

Medium Intensity Runway Lights (MIRL): Lights that are located along the edge of a runway to assist pilots in identifying the edge of the surface available for takeoffs and landings.

Modification to Design Standards (MOS): Any approved nonconformance to FAA standards applicable to an airport design, construction, or equipment procurement project that is necessary to accommodate an unusual local condition for a specific project on a case-by-case basis while maintaining an acceptable level of safety.

Mean Seal Level (MSL): A measure used in aviation for pilots to identify the flight or airfield elevation above sea level as opposed to above ground level (AGL).

Movement Area: The runways, taxiways, and other areas of an airport that are used for taxiing or hover taxiing, takeoff, and landing of aircraft including helicopters, exclusive of aprons and aircraft parking areas.

MSP: Minneapolis-St. Paul International Airport

National Climatic Data Center (NCDC): The federal agency responsible for preserving, monitoring, assessing, and providing public access to the Nation's climate and historical weather data and information.

National Plan of Integrated Airport Systems (NPIAS): The national airport system plan developed by the Secretary of Transportation on a biannual basis for the development of public use airports to meet national air transportation needs.

Navigational Aid (NAVAID): A visual or electronic facility or device used as, available for use as, or designed for use as an aid to air navigation.

Non-Directional Beacon (NDB): A general purpose, low-frequency radio beacon that can be used by a pilot to determine a bearing from the transmitter.
Non-Precision Approach: A straight-in instrument approach procedure that provides course guidance, without without vertical path guidance, with visibility minimums not later than ¾ mile.

Object Free Area (OFA): An area centered on the ground on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by remaining clear of objects except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Obstacle Free Zone (OFZ): The OFZ is the three-dimensional airspace along the runway and extended runway centerline that is required to be clear of obstacles for protection for aircraft landing or taking off from the runway and for missed approaches.

Other-Than-Utility Runway: A runway that is intended to be used by propeller driven aircraft with a maximum gross weight greater than 12,500 pounds and/or jet aircraft of any gross weight.

Part 77: Regulations for the protection of airspace around a public-use civilian or military airport are specified in 14 CFR Part 77 *Safe, Efficient Use, and Preservation of the Navigable Airspace*. These defined surfaces are used by the FAA to identify obstructions to airspace around an airport facility. Part 77 surfaces are comprised of primary, approach, transitional, horizontal and conical three-dimensional imaginary surfaces.

Pavement Condition Index (PCI): PCI evaluation includes a visual inspection of pavements and assignment of a numerical indicator that reflects the structural and operational condition of the pavement including the type, severity, and quantity of pavement distress.

Precision Approach: An instrument approach procedure that provides course and vertical path guidance with visibility below ¾ mile.

Precision Approach Path Indicator (PAPI): A navigational aid to visually identify the glideslope to the touchdown zone of the runway.

Primary Runway: A runway constructed to meet airport capacity needs. The design objective for a primary runway is to provide a runway length that will not result in operational weight restrictions.

Primary Surface: An imaginary obstruction limiting surface defined in 14 CFR Part 77 that is specified as a rectangular surface longitudinally centered about a runway. (See Figure 2-7.)

Regular Use: Regular use is considered as at least 500 or more annual itinerant operations of the runway by the critical design aircraft.

Reliever Airport: General Aviation airports in major metropolitan areas that provide pilots with attractive alternatives to using congested hub airports. To be eligible for reliever designation, an airport must be open to the public, have 100 or more based aircraft, or have 25,000 annual itinerant operations.

Remote Transmitter/Receiver (RTR): An air-to-ground communications system having transmitters and/or receivers and other ancillary equipment. These on-airport facilities allow radio communications between a pilot and ATCT and are usually located at non-towered airports.

Runway: A defined rectangular area at an airport designated for the landing and takeoff of an aircraft.

Runway Design Code (RDC): The selected AAC, ADG, and desired approach visibility minimums (in feet of runway visual range) are combined to form the Runway Design Code (RDC) for a particular runway. The RDC is used to determine the standards that apply to a specific runway and parallel taxiway to allow unrestricted operations by the design aircraft under defined meteorological conditions.

Runway End Identifier Lights (REIL): Two synchronized flashing lights, one of each side of a runway threshold, which provide positive identification of the runway approach end.

Runway Object Free Area (ROFA): An area centered on the ground on a runway centerline provided to enhance the safety of aircraft operations by remaining clear of objects, except for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes.

Runway Object Free Zone (ROFZ): The ROFZ is the three-dimensional airspace along the runway and extended runway centerline that is required to be clear of obstacles for protection for aircraft landing or taking off from the runway and for missed approaches.

Runway Protection Zone (RPZ): An area at ground level prior to the threshold or beyond the runway end to enhance the safety and protection of people and property on the ground.

Runway Safety Area (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

Runway Visual Range (RVR): An estimate of the maximum distance at which the runway, or the specified lights or markers delineating it, can be seen from a position above a specific point on the runway centerline.

Single Wheel Gear (SW): The configuration of an aircraft landing gear where a single wheel is used at each wheel position to distribute the aircraft load.

Small Aircraft: An aircraft with a maximum certificated takeoff weight of 12,500 pounds or less.

State Airport System Plan (SASP): The primary objective of the Minnesota State Aviation System Plan is to provide the state with excellent planning tools to assist in making informed decisions guiding the development of Minnesota's system of airports and expending funds in a cost-effective manner.

State Safety Zones: Model standards promulgated by the Minnesota Department of Transportation per Minnesota Administrative Rules Chapter 8800, Section 2400 for the zoning of public airports as to airspace, land use safety, and noise sensitivity. A complete description and copy of the Minnesota Rules (Chapter 8800 Department of Transportation Aeronautics, Section 2400 Airport Zoning Standards) can be accessed via the following website link: https://www.revisor.mn.gov/rules/?id=8800.2400.

T-Hangar: A linear structure with interior bays that are of a “T” shape and provide shelter for aircraft.

Taxilane: A taxiway designed for low speed and precise taxiing. Taxilanes are usually, but not always, located outside the movement area, providing access from taxiways to aircraft parking positions and other terminal areas.

Taxiway: A defined path established for the taxiing of aircraft from one part of an airport to another.

Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer main landing gear width and cockpit to main gear distance.

Taxiway/Taxilane Safety Area (TSA): A defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft deviating from the taxiway.

Threshold: The beginning of that portion of the runway available for landing. In some cases, the threshold may be displaced from the physical end of the runway.

Touch and Go: A practice maneuver consisting of a landing and a takeoff performed simultaneously without coming to a complete stop. A touch and go is defined as two aircraft operations.

Traffic Pattern: Projections on the ground of the aerial path associated with an aircraft flying the crosswind, downwind, base, and final approach legs of the takeoff and landing process.

Turbine-Powered Aircraft: Aircraft powered by turbine engines including turbojets and turboprops but excluding turbo-shaft, rotary-wing aircraft. Such aircraft normally use Jet-A fuel.

Uncontrolled Airport: An airport without an airport traffic control tower at which the control of Visual Flight Rules (VFR) traffic is not exercised.

Useful Load: The aircraft maximum takeoff weight minus the aircraft empty weight. An aircraft's useful load can be used to transport either fuel or payload (passengers, baggage, and/or cargo).

Utility Runway: A runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.

Visual Flight Rules (VFR): Procedures for the conduct of flights in weather conditions above Visual Flight Rules (VFR) weather minimums. The term VFR is often used to define weather conditions and the type of flight plan under which an aircraft is operating.

Visual Meteorological Conditions (VMC): Meteorological conditions expressed in terms of specific visibility and ceiling conditions which are equal to or greater than the threshold values for instrument meteorological conditions.

Visual Runway: A runway without an existing or planned straight-in instrument approach procedure.

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Appendix 2: Historical Airport Planning Documents

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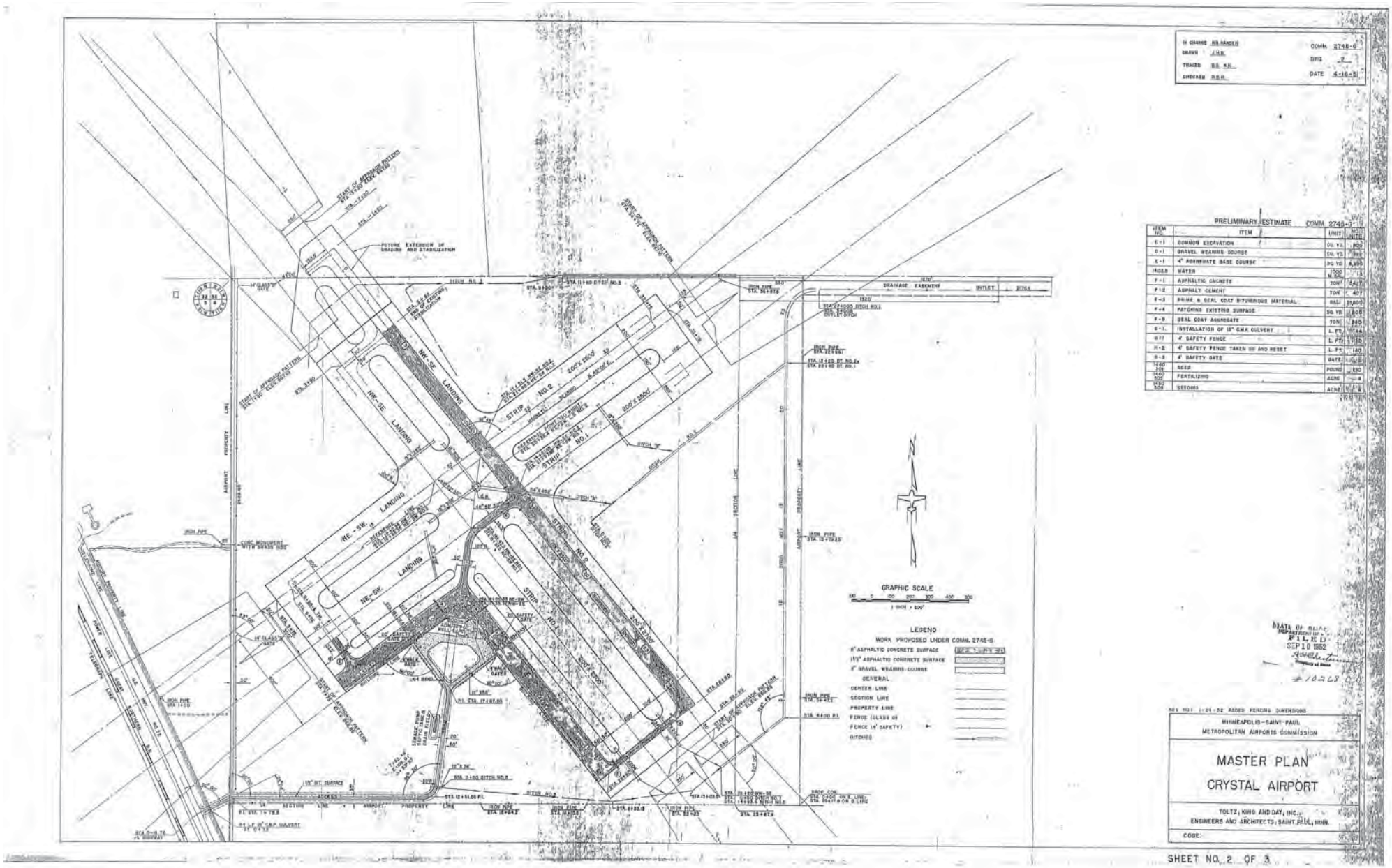
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DRAWN J.H.B.
TRACED B.S. R.H.
CHECKED R.B.H.
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DATE 4-18-52
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UNIT
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S-1 GRAVEL WEARING COURSE CU. YD. 7,900
E-1 4" AGGREGATE BASE COURSE SQ. YD. 6,300
H-2.5 WATER 1000 M. GAL. 15
F-1 ASPHALTIC CONCRETE TON 1,427
F-12 ASPHALT CEMENT TON 407
F-3 PRIME & SEAL COAT BITUMINOUS MATERIAL GAL. 23,800
F-4 PATCHING EXISTING SURFACE SQ. YD. 500
F-8 SEAL COAT AGGREGATE TON 340
C-3 INSTALLATION OF 18" C.M.P. CULVERT L. FT. 44
W-1 4' SAFETY FENCE L. FT. 1,320
H-2 4' SAFETY FENCE TAKEN UP AND RESET L. FT. 180
H-3 4' SAFETY GATE GATE 3
SEED POUND 250
FERTILIZING ACRE 4
SEEDING ACRE 4
STRIP NO. 1
STRIP NO. 2
NW-SE LANDING
NE-SW LANDING
GRAPHIC SCALE
LEGEND
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1½" ASPHALTIC CONCRETE SURFACE
6" GRAVEL WEARING COURSE
GENERAL
CENTER LINE
SECTION LINE
PROPERTY LINE
FENCE (GLASS 0)
FENCE (4' SAFETY)
DITCHES
STATE OF MINNESOTA DEPARTMENT OF AERONAUTICS FILED SEP 10 1952
#10263
REV NO 1 1-24-52 ADDED FENCING DIMENSIONS
MINNEAPOLIS-SAINT PAUL METROPOLITAN AIRPORTS COMMISSION
MASTER PLAN
CRYSTAL AIRPORT
TOLTZ, KING AND DAY, INC., ENGINEERS AND ARCHITECTS, SAINT PAUL, MINN.
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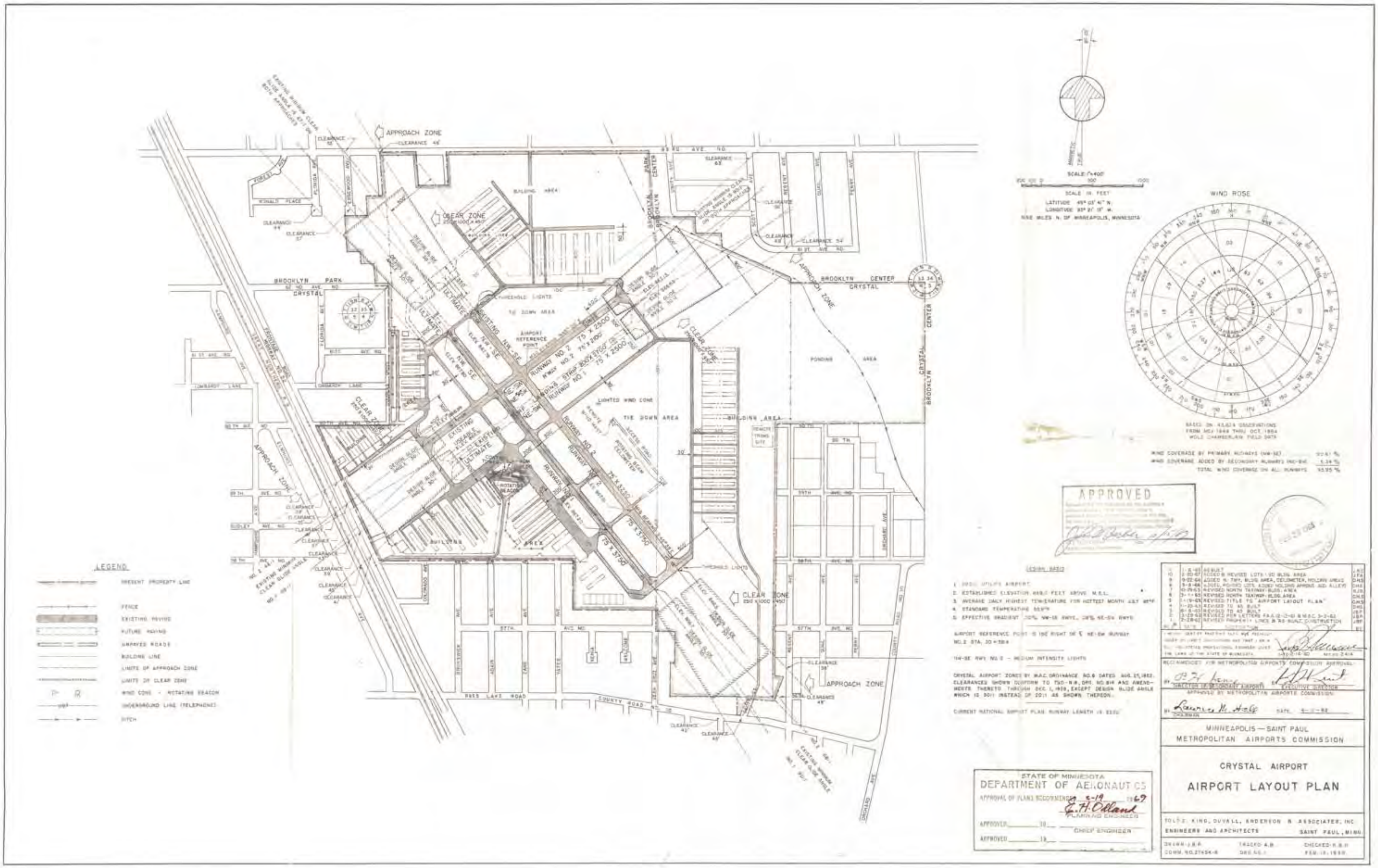
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CLEAR ZONE
BROOKLYN PARK
CRYSTAL
BROOKLYN CENTER
TIE DOWN AREA
BUILDING AREA
PONDING AREA
LIGHTED WIND CONE
AIRPORT REFERENCE POINT
LEGEND
WIND ROSE
APPROVED
STATE OF MINNESOTA
DEPARTMENT OF AERONAUTICS
MINNEAPOLIS — SAINT PAUL
METROPOLITAN AIRPORTS COMMISSION
CRYSTAL AIRPORT
AIRPORT LAYOUT PLAN

Appendix 3: Crystal Airport Activity Forecast Methodology

Note: The complete *Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report* that contains full forecast development documentation can be downloaded from the MAC website at:

https://www.metroairports.org/General-Aviation/General-Aviation-Documents/MSP-Reliever-Technical-Report-10-30-2015.aspx

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August 7, 2017

Mr. Neil Ralston, A.A.E., Airport Planner
Metropolitan Airports Commission
6040 28th Avenue South
Minneapolis, MN 55450

Crystal Airport (MIC) – Crystal, MN
Approval of Master Plan Forecast & Critical Design Aircraft

Dear Mr. Ralston:

The aviation forecast has been determined to be consistent with the FAA Terminal Area Forecast and is approved. The critical design aircraft is also approved. A summary of this information is provided in the table below.

	Base Case Estimate (2015)	**Base Case 20 Year Forecast (2035)**	**Master Plan Source**
Based Aircraft	185	171	Table 3-8
Aircraft Operations	41,838	39,904	Table 3-8
Critical Design Aircraft	Design Group A/B-II (Small)	Design Group A/B-II (Small)	Section 4.2 & 4.5.1
Source: Final Draft Master Plan prepared by MAC, draft dated June 5, 2017			

If you have any questions or would like to discuss this information further, please feel welcome to contact me at (612) 253-4641 or gina.mitchell@faa.gov.

Sincerely,

Gina M. Mitchell, AICP, Community Planner
Dakota-Minnesota Airports District Office, Minneapolis Office

cc: Phil Tiedeman, Airport Manager (email)
Melissa Underwood, Bolton & Menk (email)
Nancy Nistler, FAA (email)
Robert Burrell, MnDOT Aeronautics (email)
Rylan Juran, MnDOT Aeronautics (email)

Table 3-8: Forecast Comparison by Scenario

Year	Total Based Aircraft			Total Number of Operations						Variance from TAF (Operations)	
	Base Case	High Range	Low Range	Base Case	High Range	Low Range	Stopway Scenario	Extended Runway	2015 TAF	Base Case	Extended Runway
2015	185	185	185	41,838	41,838	41,838	41,838	41,838	38,917	8%	8%
2020	180	184	177	39,495	40,389	38,818	39,652	39,707	39,158	1%	1%
2025	177	184	169	39,025	40,589	37,232	39,196	39,258	39,739	-2%	-1%
2030	171	183	162	38,578	41,322	36,455	38,774	38,845	40,330	-4%	-4%
2035	171	187	158	39,904	43,507	36,732	40,135	40,218	40,931	-3%	-2%
				Average Annual Growth Rate							
	-0.4%	0.1%	-0.8%	-0.2%	0.2%	-0.6%	-0.2%	-0.2%	0.3%		

Notes:

TAF - 2015 Terminal Area Forecast published by FAA

Sources: HNTB Analysis.

Crystal Airport (MIC)
2035 Long-Term Comprehensive Plan Forecast Summary

1. Introduction

This chapter summarizes the LTCP activity forecast for Crystal Airport (MIC). The base year is represented by the twelve months ending June 2015 and forecasts were prepared for 2020, 2025, 2030, and 2035. The forecasts for the airport are unconstrained, except for runway length, and assume that the necessary facilities will be in place to accommodate demand. The chapter begins with a description of the forecast approach, followed by a discussion of the forecasts for based aircraft and aircraft operations, and then concludes with a set of alternative forecast scenarios.

The assumptions inherent in the following calculations are based on data provided by the MAC, federal and local sources, and professional experience. Forecasting, however, is not an exact science. Departures from forecast levels in the local and national economy and in the aviation industry would have a significant effect on the forecasts presented herein.

2. Historical Trends

Table 1 shows historical based aircraft and aircraft operations at MIC from 1990 through 2015.

Table 1: Historical Aviation Activity at Crystal

Year	Based Aircraft	Operations
1990	324	189,906
1995	327	172,024
2000	296	176,554
2001	280	156,801
2002	278	127,095
2003	288	98,612
2004	263	74,879
2005	265	71,704
2006	261	62,900
2007	251	53,583
2008	238	49,244
2009	219	42,507
2010	219	44,229
2011	199	43,986
2012	219	48,220
2013	189	42,308
2014	185	41,117
2015	185	41,838(a)

(a) Twelve months ending June 2015. Includes estimate of nighttime activity.
Source: MAC and FAA ATADS

The total number of aircraft based in Crystal airport declined from 1990 to 2015. The total counts stayed above 300 aircraft before 2000 but declined to around 185 recently. Aircraft operations fell more rapidly than based aircraft over the same period, indicating reduced utilization for those aircraft that remained based at MIC. A number of factors have contributed to the decline including the slowing economy, increased fuel prices and other operating costs, and reduced interest in recreational flying by younger people.

3. Forecast Approach

The Minneapolis-St. Paul metropolitan area is served by a system of airports. These airports provide a variety of roles and therefore both complement and compete with each other. Since these airports operate as a system, they were forecast as a system so that the interrelationships between the airports could be properly captured. The forecast focused on five of the airports in the MAC system – Crystal, Airlake (LVN), Anoka County (ANE), Flying Cloud (FCM), and St. Paul Downtown (STP) – but also incorporated the other MAC airports – Minneapolis-St. Paul International (MSP) and Lake Elmo (21D) into the analysis. The details of the forecast approach are provided in the main forecast report, *Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report*, and are summarized below:

1. Identify Catchment Areas – Crystal Airport is located in Hennepin County and most of the based aircraft owners reside in the same county as the airport they use. Nevertheless, there is some overlap between the airport catchment areas. Jet and turboprop aircraft owners that require longer runways and more extensive maintenance and fueling facilities tend to gravitate towards airports such as St. Paul Downtown (STP) and Flying Cloud Airport (FCM). Likewise, operators of small single engine piston aircraft often shy away from larger more commercial airports because of congestion and costs, even though these airports may be closer to their place of residence. Aircraft registration data from the Minnesota Department of Transportation (MnDOT) and the Metropolitan Airports Commission (MAC) was used to identify the percentage of MIC based aircraft owners that resided in each county.
2. Develop Socioeconomic Projections – Population forecasts from the Metropolitan Council (Met Council) and per capita income forecasts from Woods & Poole Economics (W&P) were used to develop hybrid income forecasts for each county in the metropolitan area. The income forecasts were used to estimate the share of based aircraft growth accounted for by each county.
3. Project the number of based aircraft registered in each county by aircraft category based on the county income forecasts and the FAA Aerospace forecast adjusted for Minneapolis-St. Paul trends.
4. Allocate the projected based aircraft to each MAC-airport according to the existing distribution pattern for each aircraft category (piston, turboprop, jet, helicopter, etc.).
5. Estimate the number of aircraft on waiting list that would be added assuming airport capacity is unconstrained. Since MIC has extra capacity, there is no waiting list and the waiting list adjustment was not applied there.
6. Redistribute aircraft from the constrained MAC airports (MSP) to the remaining unconstrained airports based on the existing distribution patterns of the airports. Although MSP has sufficient airfield capacity to accommodate growth, the facilities that can accommodate based general aviation (GA) aircraft are limited.
7. Identify base year aircraft operations. Operations counts for Crystal were initially obtained from the FAA Air Traffic Control Tower. The air traffic control tower at MIC does not operate 24 hours per day; therefore late night operations were estimated based on the MAC's flight tracking system data. To estimate operations by aircraft type, the FAA Traffic

Flow Management System Counts (TFMSC) which provides aircraft information was used and supplemented with flight tracking system data from the MAC's environmental office.

8. Project future year aircraft operations. In each aircraft category, operations per active aircraft were projected to increase at the same rate as the FAA forecast of hours flown per based aircraft, implicitly assuming that the number of operations per hours flown remain constant. The percentage of touch and go operations in each aircraft category was assumed to remain constant.

Forecasts include based aircraft and operations for each major category: single engine piston, multi-engine piston, turboprop, jets, helicopters, sport aircraft, experimental, and other. It was assumed that the share of each county's registered aircraft in every aircraft category based at all of the airports under study will remain constant.

4. Forecast Results

Table 2 shows the forecast of based aircraft for Crystal. The number of based aircraft at Crystal is projected to decline slightly, from 185 aircraft in 2015 to 171 aircraft in 2035. The dominant aircraft in the fleet, piston engine aircraft, are projected to decline, consistent with the FAA Aerospace Forecast Fiscal Years 2015-2035. Helicopters and experimental aircraft are expected to increase but not fast enough to offset the decline in the piston category.

Table 3 shows the forecast of aircraft operations at MIC. Total aircraft operations at Crystal are forecast to decrease from 41,838 in 2015 to 39,904 in 2035, an average annual rate of -0.2 percent. Increases are projected in all categories except single-engine and multi-engine piston aircraft, for which the anticipated decrease in the based aircraft offsets slightly higher utilization forecasted by FAA. Jet and helicopter operations are expected to increase the fastest.

The percentage of operations occurring in August, the peak month at Crystal Airport, was estimated from FAA air traffic control tower records. Average Day Peak Month (ADPM) operations were estimated by dividing by 31 days. Peak hour operations were obtained from the FAA Distributed Operations Network (OPSNET). The peak hour percentage in the peak month over the past four years has averaged 18.4 percent. As shown in **Table 4**, peak hour operations are projected to fluctuate between 27 and 29 operations.

Table 2: Summary of Based Aircraft Forecast (Crystal Base Case Condition)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other	Total
2015	154	14	0	0	2	0	15	0	185
2020	148	14	0	0	2	0	16	0	180
2025	143	14	0	0	3	0	17	0	177
2030	138	12	0	0	3	0	18	0	171
2035	136	12	0	0	3	0	20	0	171
Average Annual Growth Rate									
	-0.6%	-0.8%	0.0%	0.0%	2.0%	0.0%	1.4%	0.0%	-0.4%

Source: Table 10 in Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report, 2016.

Table 3: Summary of Operations Forecast (Crystal Base Case Condition)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other	Total
2014	35,324	2,382	86	2	829	-	3,440	-	42,063
2015	35,039	2,460	89	8	829	-	3,413	-	41,838
2020	32,046	2,398	90	10	1,002	-	3,949	-	39,495
2025	30,993	2,398	96	12	1,142	-	4,384	-	39,025
2030	30,283	2,116	109	14	1,282	-	4,774	-	38,578
2035	30,633	2,235	126	16	1,440	-	5,454	-	39,904
				Average Annual Growth Rate					
	-0.7%	-0.5%	1.8%	3.5%	2.8%	0.0%	2.4%	0.0%	-0.2%

Source: Table 15 in Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report, 2016.

Table 4: Peak Activity Forecast (Crystal Base Case Condition)

Year	Annual Operations (a)	Peak Month Operations (b)	ADPM Operations (c)	Peak Hour Operations (d)
2014	42,063	4,922	159	29
2015	41,838	4,865	157	29
2020	39,495	4,592	148	27
2025	39,025	4,538	146	27
2030	38,578	4,486	145	27
2035	39,904	4,640	150	28

(a) Table 3.
(b) Value for 2014 is actual. Forecast years estimated using average peak month percentage from 2011-2014.
(c) Peak month operations divided by 31 days.
(d) Estimated at 18.4 percent of ADPM operations based on MAC aircraft operation counts.

Sources: As noted and HNTB analysis

5 Original Forecast Scenarios

General aviation activity has historically been difficult to forecast, since the relationships with economic growth and pricing factors are more tenuous than in other aviation sectors, such as commercial aviation. This uncertainty is likely to carry over into the near future, given the volatility of fuel prices and the continued shift in GA from personal and recreational use to business use. To address these uncertainties, and to identify the potential upper and lower bounds of future activity at the study airports, detailed high and low scenarios are presented. These scenarios use the same forecast approach that was used in the base case, but alter the assumptions to reflect either a more aggressive or more conservative outlook.

The high forecast scenario is based on the assumption that income would grow 0.5 percent per year faster than in the base case. All other assumptions are the same as in the base case. The low forecast scenario is based on the assumption that income would grow 0.5 percent more slowly each year than under the base case.

Table 5 compares the total number of based aircraft and operations under different scenarios for MIC. The MIC base case and high scenario LTCP forecasts are consistent the FAA 2015 Terminal Area Forecast (TAF) as they differ by less than 10% in the 5-year forecast period and 15% in the 10-year forecast period.

Figure 1 provides a graphic comparison of the base, high, and low, and scenario operations forecasts, along with the FAA's 2015 Terminal Area Forecast (TAF) for the airport.

Table 5: Forecast Comparison (Original Forecast Scenarios)

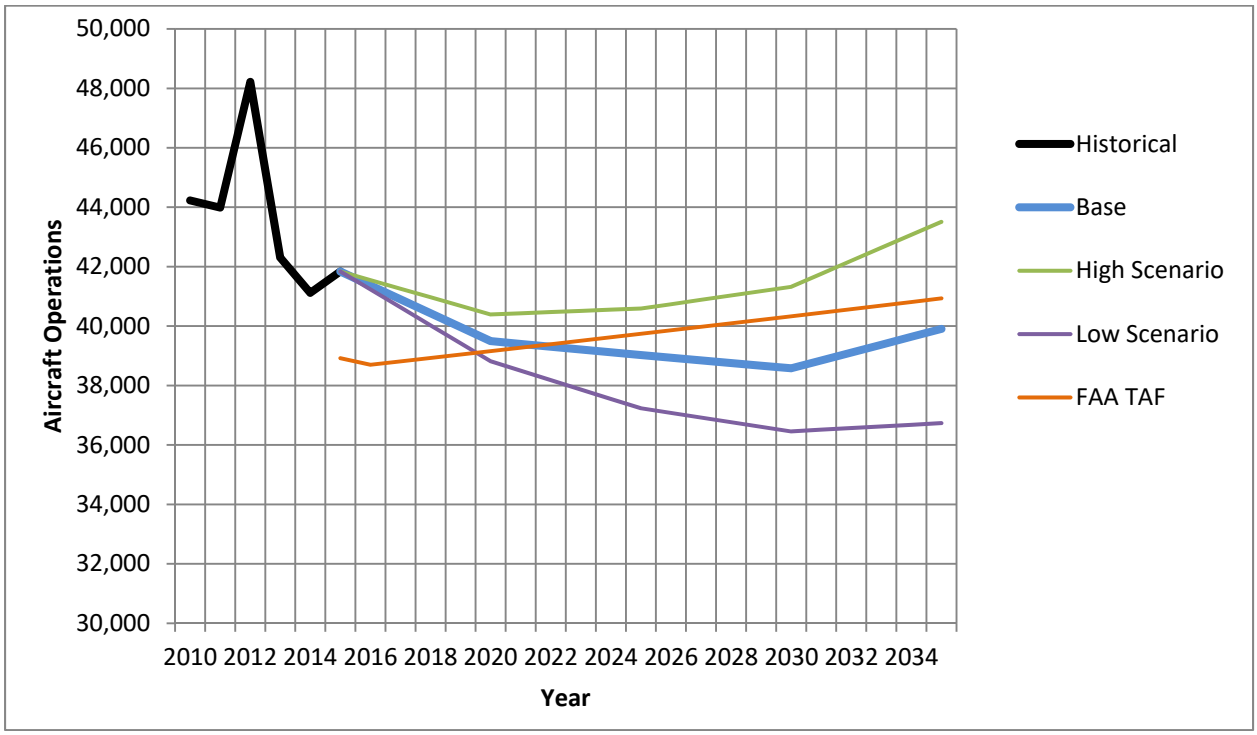
Year	Total Based Aircraft			Total Number of Operations				Variance from TAF (Operations)	
	Base Case	High Range	Low Range	Base Case	High Range	Low Range	2015 TAF	Base Case	High Range
2015	185	185	185	41,838	41,838	41,838	38,917	8%	8%
2020	180	184	177	39,495	40,389	38,818	39,158	1%	3%
2025	177	184	169	39,025	40,589	37,232	39,739	-2%	2%
2030	171	183	162	38,578	41,322	36,455	40,330	-4%	2%
2035	171	187	158	39,904	43,507	36,732	40,931	-3%	6%
Average Annual Growth Rate									
	-0.4%	0.1%	-0.8%	-0.2%	0.2%	-0.6%	0.3%		

Notes:

TAF - 2015 Terminal Area Forecast published by FAA

Sources: HNTB analysis

Figure 1: MIC Forecast Comparison (Original Scenario Operations)



6 Additional Forecast Scenarios

Subsequent to the preparation of the high and low forecast scenarios, two additional scenarios were developed to evaluate the potential impact associated with the following alternative airfield development concepts:

1. Stopway Scenario: Designating the existing blast pad pavement beyond each end of Runway 14L-32R as stopway. Pavement designated as stopway can be considered as useable length for decelerating an aircraft during an aborted takeoff. Stopway pavement can be used for accelerate-stop distance calculations, but not for other takeoff or landing distance calculations. Stopways do not change the published runway length, nor are they intended to attract aircraft types different than those operating at the airport today. However, the availability of stopways may result in a small increase in aircraft operations from some users who find the existing runway length to be limiting based on accelerate-stop distance criteria. In the stopway scenario, the number of additional aircraft operations above the base case is approximately 230 annually by 2035, translating to just over four additional takeoffs and landings per week. Of the additional operations, the majority are expected to be turboprops (approximately three-quarters), with the remaining increase coming from light business jet aircraft. All other forecast assumptions are the same as in the base case. **Table 6** shows the forecast of aircraft operations at MIC under the Stopway Scenario. The number of based aircraft is not expected to change from the base case scenario.
2. Extended Runway Scenario: Converting portions of the existing paved blast pads on each end of Runway 14L-32R to useable runway to provide a published runway length of 3,750 feet. Due to the constrained nature of the airport, however, this will require the

implementation of declared distances, meaning that not all of the published pavement would be available for landing and takeoff movements in each direction. With the increase in published runway length (from 3,267 feet to 3,750 feet), the number of additional aircraft operations above the base case is estimated to be approximately 314 annually by 2035, translating to approximately six additional takeoffs and landings per week. As with the stopway scenario, the majority of additional operations are expected to be from turboprop aircraft. **Table 7** shows the forecast of aircraft operations at MIC under the Extended Runway Scenario. The number of based aircraft is not expected to change from the base case scenario.

Table 8 incorporates aircraft operations under the additional forecast scenarios for MIC. The MIC stopway and extended runway LTCP forecasts remain consistent the FAA 2015 Terminal Area Forecast (TAF) as they differ by less than 10% in the 5-year forecast period and 15% in the 10-year forecast period.

Figure 2 provides a graphic comparison of the base, high, and low, and scenario operations forecasts, along with the FAA's 2015 Terminal Area Forecast (TAF) for the airport.

Figure 2: MIC Forecast Comparison (Additional Scenario Operations)

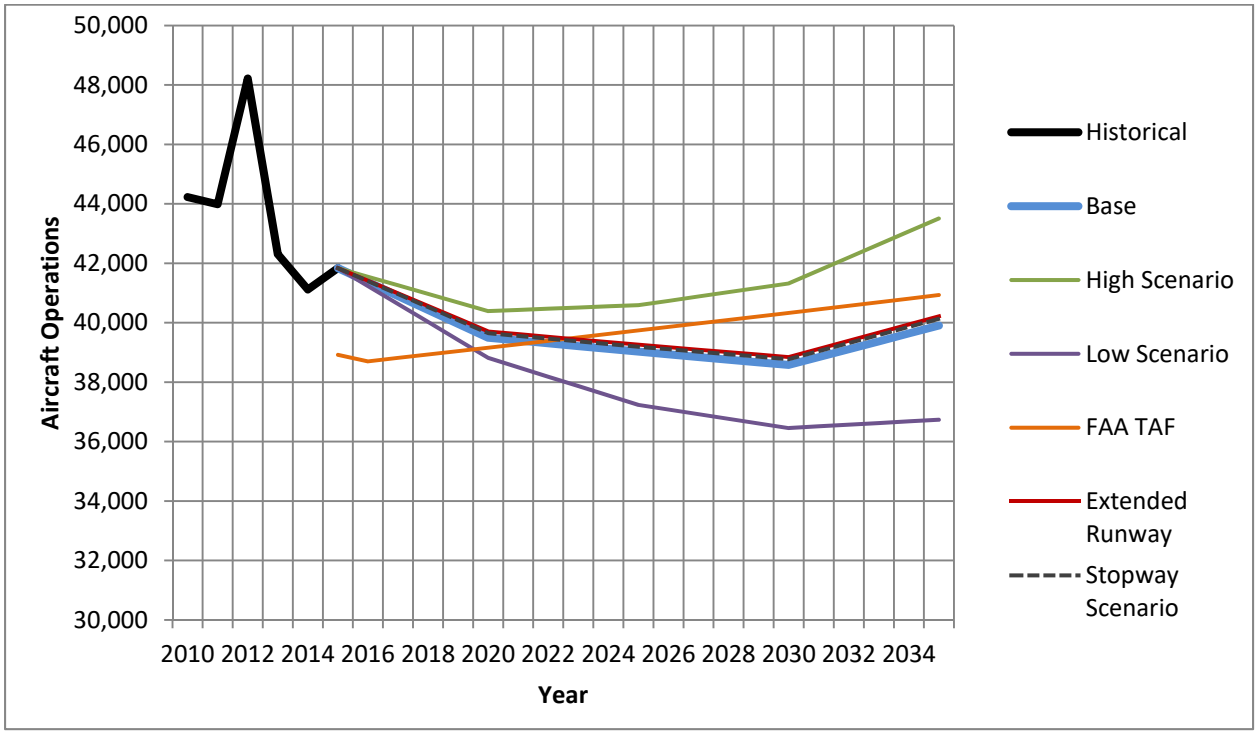


Table 6: Summary of Operations Forecast (Stopway Scenario)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other (a)	Total
2014	35,324	2,382	86	2	829	-	3,440	-	42,063
2015	35,039	2,460	89	8	829	-	3,413	-	41,838
2020	32,046	2,398	210	47	1,002	-	3,949	-	39,652
2025	30,993	2,398	223	56	1,142	-	4,384	-	39,196
2030	30,283	2,116	253	66	1,282	-	4,774	-	38,774
2035	30,633	2,235	294	79	1,440	-	5,454	-	40,135
Average Annual Growth Rate									
	-0.7%	-0.5%	6.2%	12.1%	2.8%		2.4%		-0.2%

Source: HNTB and MAC analysis

Table 7: Summary of Operations Forecast (Extended Runway Scenario)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other (a)	Total
2014	35,324	2,382	86	2	829	-	3,440	-	42,063
2015	35,039	2,460	89	8	829	-	3,413	-	41,838
	-	-			-		-		
2020	32,046	2,398	246	66	1,002	-	3,949	-	39,707
	-	-			-		-		
2025	30,993	2,398	262	79	1,142	-	4,384	-	39,258
	-	-			-		-		
2030	30,283	2,116	297	93	1,282	-	4,774	-	38,845
	-	-			-		-		
2035	30,633	2,235	345	111	1,440	-	5,454	-	40,218
							-		
				Average Annual Growth Rate					
	-0.7%	-0.5%	7.0%	14.1%	2.8%		2.4%		-0.2%

Source: HNTB and MAC analysis

Table 8: Forecast Comparison (Additional Forecast Scenarios)

Year	Total Based Aircraft			Total Number of Operations						Variance from TAF (Operations)	
	Base Case	High Range	Low Range	Base Case	High Range	Low Range	Stopway Scenario	Extended Runway	2015 TAF	Stopway Scenario	Extended Runway
2015	185	185	185	41,838	41,838	41,838	41,838	41,838	38,917	8%	8%
2020	180	184	177	39,495	40,389	38,818	39,652	39,707	39,158	1%	1%
2025	177	184	169	39,025	40,589	37,232	39,196	39,258	39,739	-1%	-1%
2030	171	183	162	38,578	41,322	36,455	38,774	38,845	40,330	-4%	-4%
2035	171	187	158	39,904	43,507	36,732	40,135	40,218	40,931	-2%	-2%
Average Annual Growth Rate											
	-0.4%	0.1%	-0.8%	-0.2%	0.2%	-0.6%	-0.2%	-0.2%	0.3%		

Notes:

TAF - 2015 Terminal Area Forecast published by FAA

Sources: HNTB and MAC analysis

Appendix 4: Runway Length Calculation Details

Note: Assumptions used to assess runway length requirements include the following:

- Takeoff Weight: Based on 90% of Useful Load
- Temperature: 83.4°F, 28.5°C
- Pressure Altitude: 869 feet AMSL
- Wind: 5-knot headwind
- Flap Setting: Typical

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Figure 2-1. Small Airplanes with Fewer than 10 Passenger Seats
(Excludes Pilot and Co-pilot)

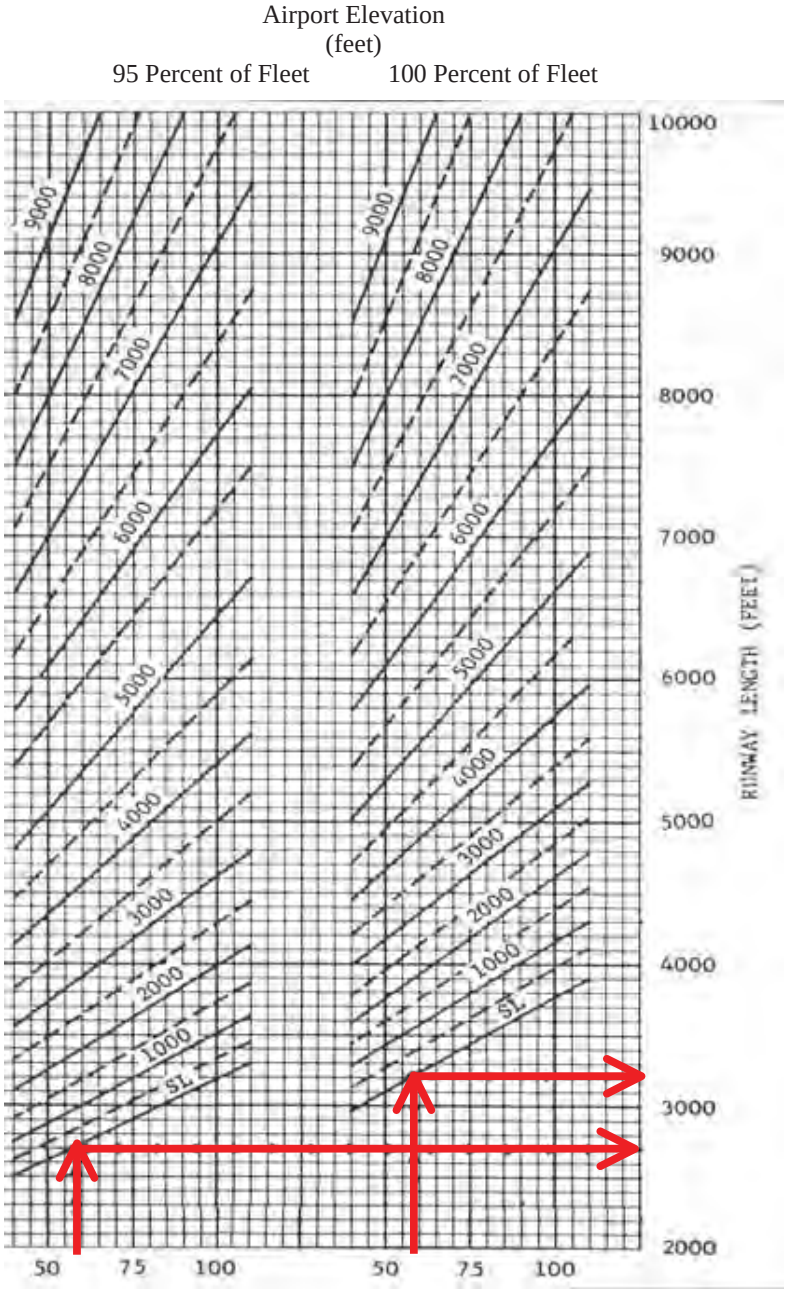
Example:

Temperature (mean day max hot month): 59° F (15° C)
Airport Elevation: Mean Sea Level

Note: Dashed lines shown in the table are mid values of adjacent solid lines.

Recommended Runway Length:

For 95% = 2,700 feet (823 m)
For 100% = 3,200 feet (975 m)



ACCELERATE - STOP - FLAPS UP

ASSOCIATED CONDITIONS:

POWER . . . . . 1. TAKE-OFF POWER SET BEFORE BRAKE RELEASE
2. BOTH ENGINES IDLE AT V_1 SPEED AND REVERSE OPERATING ENGINE
FLAPS . . . . . UP
AUTOFEATHER . ARMED
BRAKING . . . . MAXIMUM
RUNWAY . . . . PAVED, LEVEL, DRY SURFACE

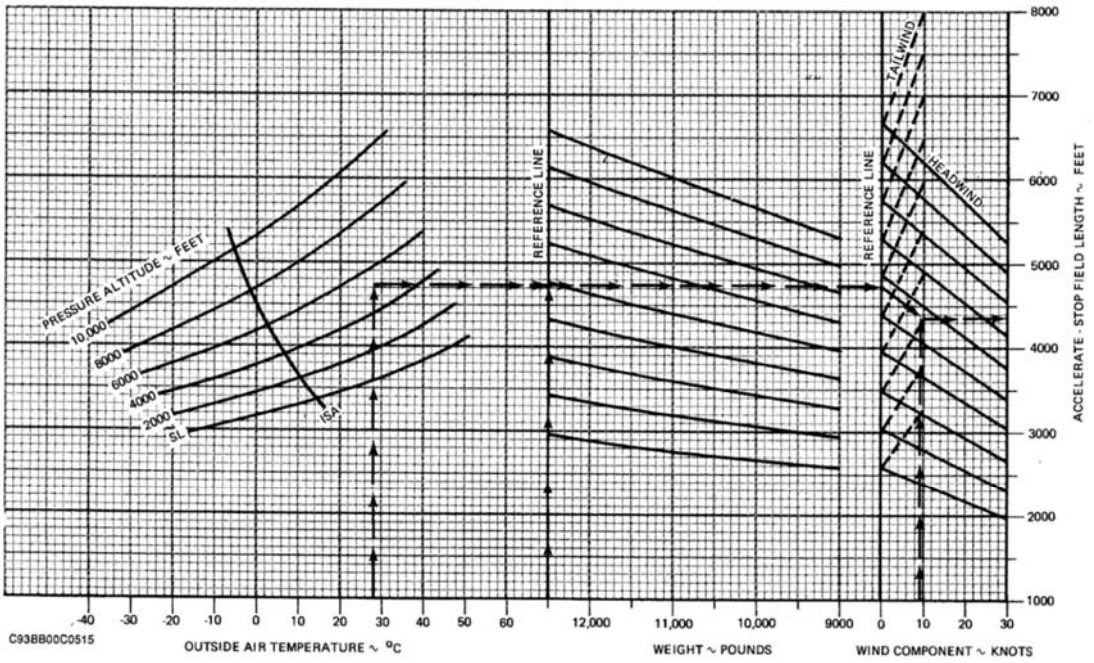
WEIGHT ~ POUNDS	V_1 ~ KNOTS
12,500	95
12,000	95
11,000	95
10,000	95
9000	95

NOTE: FOR OPERATION WITH ICE VANES EXTENDED, PERFORMANCE IS NOT AFFECTED.

EXAMPLE:

OAT . . . . . 28°C
PRESSURE ALTITUDE . . . . . 5430 FT
WEIGHT . . . . . 12,500 LBS
HEADWIND COMPONENT . . . . . 9.5 KTS

FIELD LENGTH . . . . . 4375 FT
V_1 . . . . . 95 KTS



Ralston, Neil

From: Ralston, Neil
Sent: Wednesday, August 20, 2014 2:59 PM
To: Ralston, Neil
Subject: Flight Planning 1458 08/20/14

PC-12 Digital AFM - Flight Planning

Date: 08/20/14
Registration No: 1458
PC-12 Model: PC-12/41
Interior Code: EX-6S-2

Weight & Balance

BEW (lb): 0
BEM (lb-in): 0
Useful Load (lb): 0
Takeoff Total Weight (lb): 0
Landing Total Weight (lb): 0

Fuel Use

Fuel Flow (lb/h): 0
Fuel Use (lb): 0
Remaining Fuel (lb): 0
Max Fuel Load (lb): 0

Takeoff Distance

Weight (lb): 10100
OAT (Â°C): 29
Altitude (ft): 1000
Headwind (kts): 5
Slope (%): 0
Takeoff Ground Roll (ft): 1853
Takeoff Total Distance (ft): 3124
Accelerate-Stop Distance (ft): 3677
Flaps (Â°): 15
Vr (KIAS): 79

Climb Performance

Weight (lb): 0
ISA Deviation (Â°C): 0

ACCELERATE STOP DISTANCE

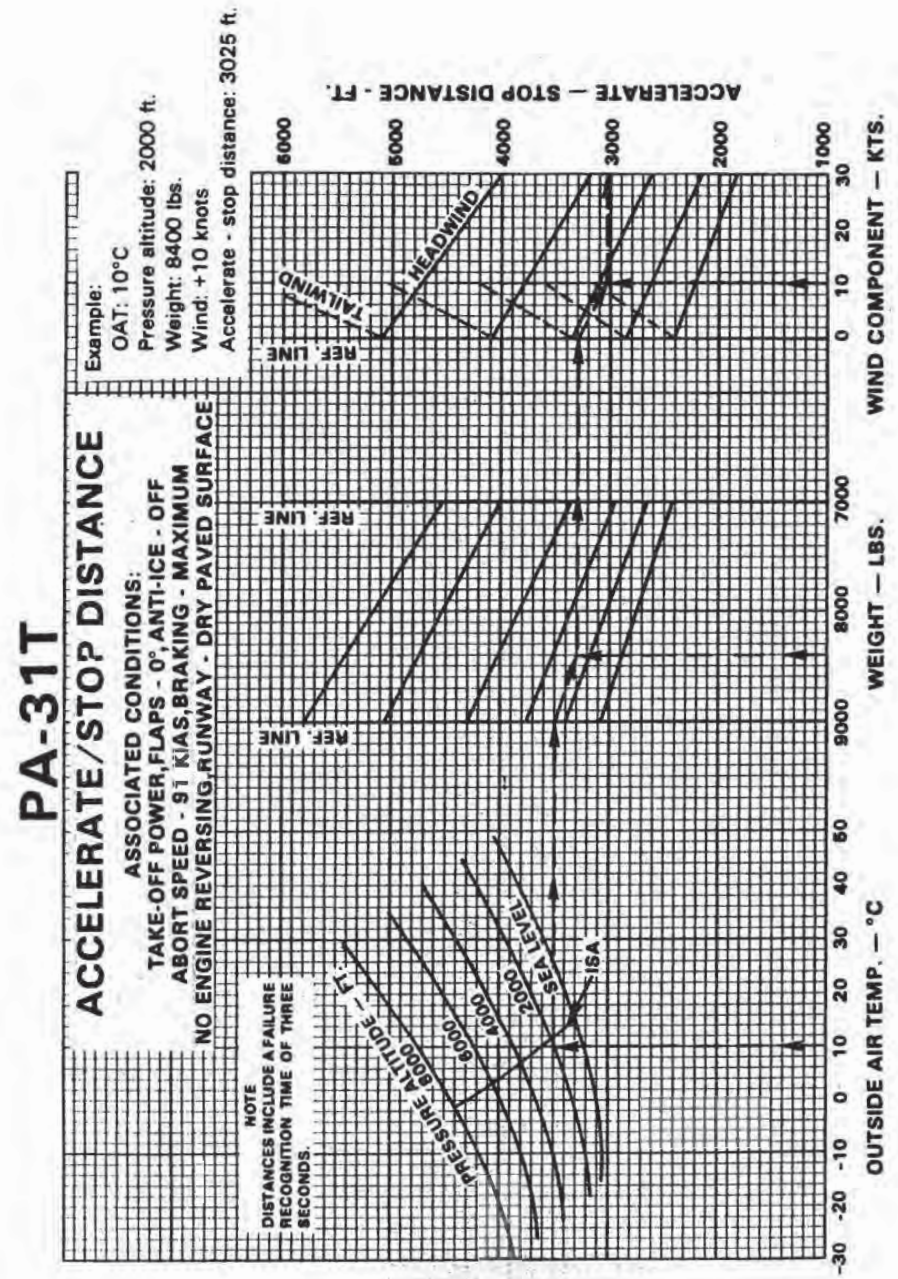
CONDITIONS:
1. Maximum Takeoff Power Before Brake Release.
2. Wing Flaps - T.O.
3. Level, Hard Surface, Dry Runway.
4. Engine Failure - 98 KIAS.
5. Ground Idle Power and Maximum Effective Braking After Engine Failure.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease all distances 2% for each 4 knots headwind.
3. Increase distances 9% for each 2 knots tailwind.
4. ---- Indicates deceleration rates are unpredictable due to possible brake fading.
5. Distances in shaded areas are applicable only with headwind components of 10 knots or greater. At lower headwind components, deceleration rates are unpredictable due to possible brake fading. The distance correction factor of note (2) can be applied for all headwind components.

PRESSURE ALTITUDE - FEET	WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	TOTAL DISTANCE - FEET							WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	TOTAL DISTANCE - FEET						
			-20°C	-10°C	0°C	+10°C	+20°C	+30°C	+40°C	+50°C			-20°C	-10°C	0°C	+10°C	+20°C	+30°C	+40°C	+50°C
Sea Level	9850	98	3100	3360	3620	3880	3750	3930	4180	4390	9800	98	2760	2890	3020	3160	3310	3460	3620	3810
1000			3280	3410	3580	3760	3940	4130	4360	4660			2880	3020	3160	3310	3470	3630	3870	4070
2000			3460	3640	3810	3940	4140	4340	4620	----			3010	3160	3310	3470	3640	3820	4040	----
3000			3650	3750	3940	4140	4350	4570	4910	----			3150	3310	3470	3640	3820	4020	4290	----
4000			3740	3940	4150	4360	4580	4850	5210	----			3300	3470	3640	3820	4010	4240	4560	----
5000			3940	4140	4360	4590	4830	5160	5610	----			3460	3640	3830	4020	4220	4500	4860	----
6000			4140	4360	4590	4830	5120	5510	----	----			3640	3830	4030	4230	4470	4780	5180	----
7000			4360	4610	4860	5110	5460	----	----	----			3830	4030	4240	4460	4720	5110	----	----
8000			4600	4860	5110	5460	----	----	----	----			4030	4240	4470	4720	5010	5470	----	----
9000			4860	5120	5460	----	----	----	----	----			4240	4470	4730	5030	5410	5860	----	----
10,000			5120	5460	----	----	----	----	----	----			4470	4720	5030	5370	5790	----	----	----
11,000			5460	----	----	----	----	----	----	----			4720	5030	5370	5744	6210	----	----	----
12,000			----	----	----	----	----	----	----	----			5030	5370	5744	6180	6680	----	----	----
13,000			----	----	----	----	----	----	----	----			5370	5744	6170	6641	----	----	----	----
14,000			----	----	----	----	----	----	----	----			5744	6170	6641	----	----	----	----	----
Sea Level	8800	98	2940	3070	3220	3371	3510	3690	3860	4120	8800	98	2690	2760	2820	2950	3090	3230	3370	3580
1000			3060	3210	3360	3530	3700	3870	4080	4360			2820	2950	2950	3090	3240	3380	3560	3790
2000			3200	3360	3430	3700	3910	4070	4320	----			2950	3090	3240	3311	3390	3540	3760	----
3000			3360	3530	3700	3891	4111	4260	4590	----			3090	3240	3400	3561	3730	3930	3980	----
4000			3530	3700	3890	4091	4290	4630	4890	----			3240	3400	3570	3740	3920	4170	4209	----
5000			3690	3890	4090	4301	4510	4820	5230	----			3390	3570	3760	3930	4150	4431	4760	----
6000			3880	4091	4300	4530	4711	5141	5670	----			3560	3760	3940	4140	4410	4730	----	----
7000			4090	4311	4530	4780	5111	5600	----	----			3760	3940	4150	4380	4690	5050	----	----
8000			4311	4540	4780	5041	5440	5890	----	----			3940	4150	4390	4660	5000	5400	----	----
9000			4540	4780	5041	5310	5690	----	----	----			4150	4390	4660	4980	5340	5780	----	----
10,000			4780	5041	5310	5590	----	----	----	----			4390	4660	4980	5320	5720	6190	----	----
11,000			5041	5310	5590	----	----	----	----	----			4660	4980	5310	5690	6130	----	----	----
12,000			5310	5590	----	----	----	----	----	----			4980	5310	5690	6100	6580	----	----	----
13,000			5590	5770	----	----	----	----	----	----			5310	5690	6100	6550	7110	----	----	----
14,000			5770	----	----	----	----	----	----	----			5690	6100	6550	----	----	----	----	----

Figure 5-11

Table 5-11 from Cessna 441 Conquest II Pilot's Operating Handbook



ACCELERATE/STOP DISTANCE
Figure 5-19

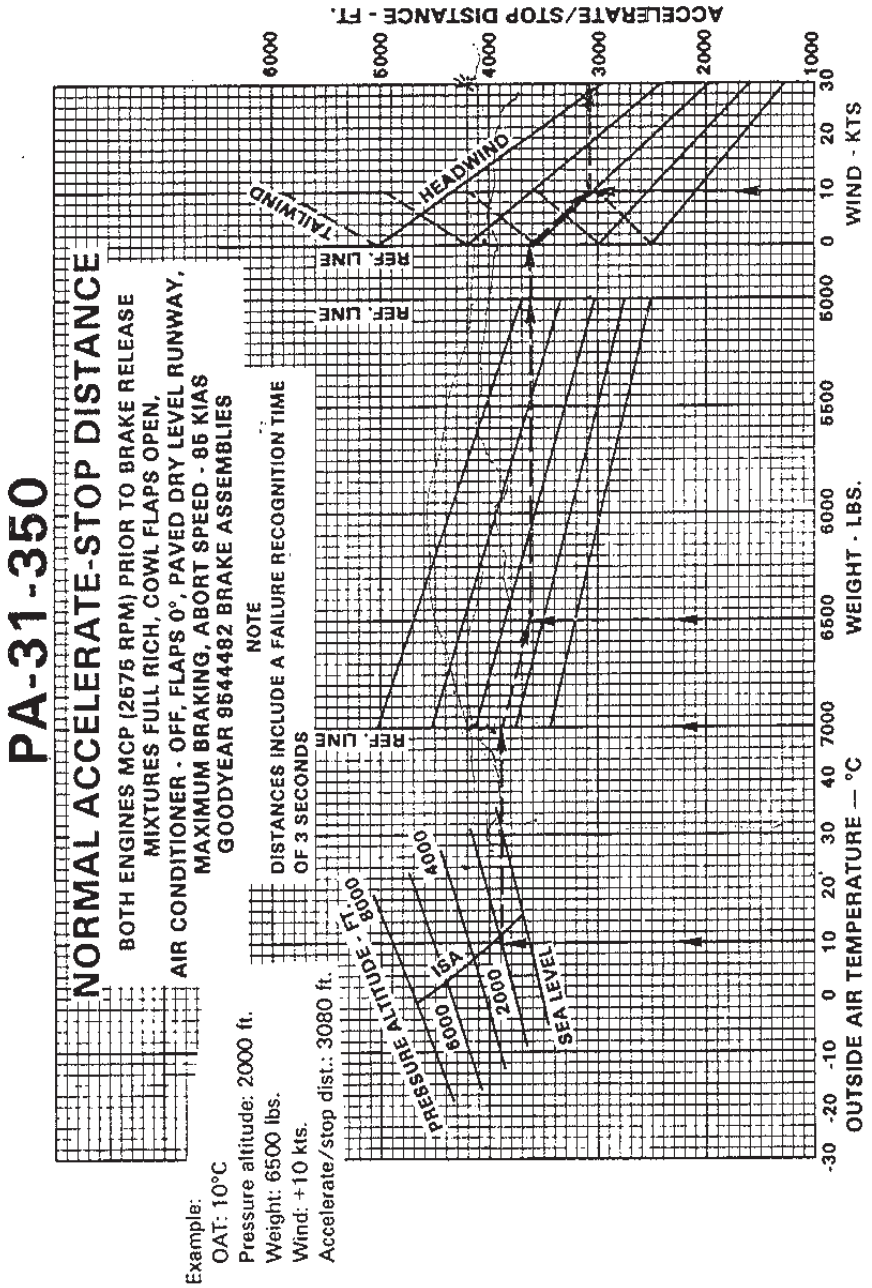
ACCELERATE STOP DISTANCE

CONDITIONS:
1. 2235 RPM and 39.0 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Level, Hard Surface, Dry Runway.
5. Engine Failure at Engine Failure Speed.
6. Idle Power and Maximum Effective Braking After Engine Failure.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease distance 3% for each 4 knots headwind.
3. Increase distance 5% for each 2 knots tailwind.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE - FEET						
			-20°C -4°F	-10°C +14°F	0°C 32°F	+10°C +50°F	+20°C +68°F	+30°C +86°F	+40°C +104°F
7450	100	Sea Level	2900	3090	3290	3510	3750	4010	4300
		1000	3030	3240	3450	3680	3940	4210	4520
		2000	3180	3390	3620	3870	4140	4430	4760
		3000	3340	3560	3800	4060	4350	4670	5020
		4000	3500	3740	4000	4270	4580	4910	5290
		5000	3680	3930	4200	4500	4820	5180	5580
		6000	3860	4130	4420	4740	5080	5470	5900
		7000	4060	4350	4660	4990	5360	5770	6240
		8000	4280	4580	4910	5260	5660	6100	6600
		9000	4510	4830	5180	5560	5980	6450	6990
		10,000	4750	5090	5460	5870	6320	6830	7410
6800	96	Sea Level	2330	2480	2640	2850	3040	3240	3470
		1000	2440	2600	2800	2990	3190	3400	3650
		2000	2560	2760	2940	3130	3350	3580	3840
		3000	2710	2890	3080	3290	3520	3760	4040
		4000	2850	3040	3240	3460	3700	3960	4260
		5000	2990	3190	3400	3640	3890	4170	4490
		6000	3140	3350	3580	3830	4100	4400	4730
		7000	3300	3530	3770	4030	4320	4640	5000
		8000	3470	3710	3970	4250	4560	4900	5290
		9000	3650	3910	4180	4480	4810	5180	5590
		10,000	3850	4120	4420	4730	5090	5480	5920
6200	91	Sea Level	1890	2010	2140	2280	2430	2590	2790
		1000	1980	2110	2240	2390	2570	2750	2950
		2000	2080	2210	2350	2510	2700	2880	3090
		3000	2180	2320	2500	2660	2840	3030	3250
		4000	2280	2460	2620	2800	2990	3190	3420
		5000	2420	2580	2750	2940	3140	3360	3600
		6000	2540	2710	2890	3090	3300	3540	3800
		7000	2670	2850	3050	3250	3480	3730	4010
		8000	2810	3000	3210	3430	3670	3930	4230
		9000	2960	3160	3380	3610	3870	4150	4470
		10,000	3120	3330	3560	3810	4090	4390	4730
5600	86	Sea Level	1500	1600	1700	1800	1920	2040	2180
		1000	1570	1670	1780	1890	2010	2140	2290
		2000	1650	1750	1870	1980	2110	2250	2430
		3000	1730	1840	1960	2080	2220	2390	2560
		4000	1810	1930	2060	2190	2360	2520	2690
		5000	1900	2030	2160	2330	2480	2650	2830
		6000	2000	2130	2290	2440	2610	2790	2980
		7000	2100	2260	2410	2570	2750	2940	3150
		8000	2230	2380	2540	2710	2890	3090	3320
		9000	2350	2500	2670	2850	3050	3260	3500
		10,000	2470	2640	2820	3010	3220	3450	3700

Figure 5-11



NORMAL ACCELERATE - STOP DISTANCE
Figure 5-17

REPORT: LK-1208
5-19

ACCELERATE STOP DISTANCE

CONDITIONS:
1. 2700 RPM and 38.0 Inches Hg. Manifold Pressure Before Brake Release.
2. Mixtures - CHECK Fuel Flows In the White Arc.
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.
6. Engine Failure at Engine Failure Speed.
7. Idle Power and Maximum Effective Braking After Engine Failure.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease distance 3% for each 4 knots headwind.
3. Increase distance 5% for each 2 knots tailwind.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE - FEET						
			-20°C -4°F	-10°C +14°F	0°C 32°F	+10°C +50°F	+20°C +68°F	+30°C +86°F	+40°C +104°F
6750	98	Sea Level	3370	3590	3820	4120	4390	4670	4980
		1000	3530	3760	4060	4320	4600	4900	5240
		2000	3700	3990	4250	4530	4830	5150	5500
		3000	3880	4180	4460	4750	5070	5410	5790
		4000	4120	4390	4680	4990	5330	5690	6090
		5000	4320	4610	4920	5250	5610	5990	6420
		6000	4540	4840	5170	5520	5900	6320	6770
		7000	4770	5090	5440	5810	6220	6660	7140
		8000	5010	5360	5730	6130	6560	7030	7550
		9000	5280	5640	6040	6460	6920	7420	7980
		10,000	5560	5950	6370	6820	7310	7850	8450
6200	94	Sea Level	2780	2960	3150	3340	3560	3780	4090
		1000	2910	3100	3300	3510	3730	4030	4290
		2000	3050	3250	3460	3680	3970	4230	4510
		3000	3200	3410	3630	3910	4170	4440	4740
		4000	3360	3580	3850	4110	4380	4670	4990
		5000	3530	3800	4050	4310	4600	4910	5250
		6000	3740	3990	4250	4540	4840	5170	5530
		7000	3930	4190	4470	4770	5100	5450	5840
		8000	4130	4410	4710	5030	5370	5750	6160
		9000	4350	4640	4960	5300	5670	6070	6510
		10,000	4580	4890	5230	5590	5990	6410	6880
5700	90	Sea Level	2300	2450	2600	2760	2930	3120	3310
		1000	2410	2560	2720	2890	3080	3270	3480
		2000	2530	2690	2860	3040	3230	3430	3710
		3000	2650	2820	3000	3190	3390	3650	3890
		4000	2780	2960	3150	3350	3610	3840	4100
		5000	2920	3110	3310	3560	3790	4040	4310
		6000	3060	3260	3510	3740	3980	4250	4540
		7000	3220	3460	3690	3930	4190	4480	4780
		8000	3410	3640	3880	4140	4420	4720	5050
		9000	3590	3830	4090	4360	4660	4980	5330
		10,000	3780	4030	4310	4600	4920	5260	5630
5200	86	Sea Level	1870	1990	2110	2240	2380	2520	2680
		1000	1960	2080	2210	2350	2490	2650	2810
		2000	2050	2180	2320	2460	2610	2780	2950
		3000	2150	2290	2430	2580	2750	2920	3110
		4000	2260	2400	2550	2710	2890	3070	3270
		5000	2370	2520	2680	2850	3030	3230	3480
		6000	2490	2650	2820	3000	3190	3430	3660
		7000	2620	2790	2970	3190	3390	3620	3860
		8000	2750	2930	3150	3350	3570	3810	4070
		9000	2900	3110	3310	3530	3760	4020	4290
		10,000	3070	3270	3490	3720	3970	4240	4530

Figure 5-11

ACCELERATE STOP DISTANCE

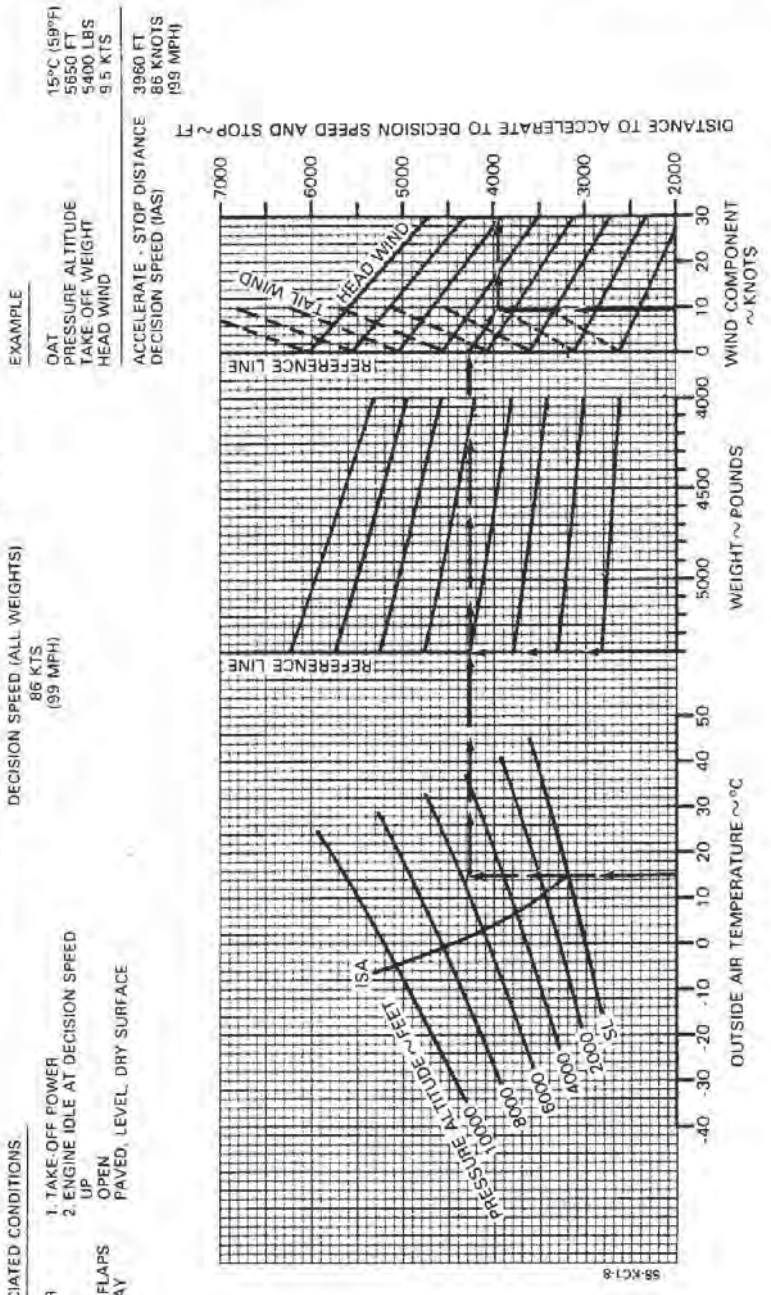
CONDITIONS:
1. Power - FULL THROTTLE and 2700 RPM Before Brake Release.
2. Mixtures - LEAN for field elevation (See Figure 5-27).
3. Wing Flaps - UP.
4. Cowl Flaps - OPEN.
5. Level, Hard Surface, Dry Runway.
6. Engine Failure at Engine Failure Speed.
7. Idle Power and Heavy Braking After Engine Failure.

NOTE:
1. If full power is applied without brakes set, distances apply from point where full power is applied.
2. Decrease distance 3% for each 4 knots headwind.
3. Increase distance 5% for each 2 knots tailwind.

WEIGHT - POUNDS	ENGINE FAILURE SPEED - KIAS	PRESSURE ALTITUDE - FEET	TOTAL DISTANCE - FEET						
			-20°C -4°F	-10°C +14°F	0°C 32°F	+10°C +50°F	+20°C +68°F	+30°C +86°F	+40°C +104°F
5500	92	Sea Level	3020	3190	3370	3550	3740	3930	4120
		1000	3220	3400	3590	3790	3990	4210	4490
		2000	3430	3630	3830	4050	4340	4570	4820
		3000	3660	3880	4100	4400	4650	4910	5180
		4000	3920	4160	4480	4730	5000	5290	5590
		5000	4200	4530	4810	5090	5390	5700	6030
		6000	4590	4880	5180	5490	5820	6170	6530
		7000	4950	5270	5600	5940	6310	6700	7110
		8000	5360	5710	6070	6460	6870	7310	7780
		9000	5830	6210	6630	7060	7530	8020	8560
		10,000	6330	6770	7230	7720	8250	8810	9420
5100	88	Sea Level	2540	2680	2830	2980	3140	3300	3470
		1000	2710	2860	3020	3180	3350	3530	3710
		2000	2880	3050	3220	3390	3580	3770	3970
		3000	3070	3250	3440	3630	3830	4040	4330
		4000	3290	3480	3680	3900	4190	4420	4660
		5000	3520	3730	3950	4250	4500	4750	5020
		6000	3770	4010	4320	4580	4850	5130	5430
		7000	4060	4390	4660	4950	5240	5560	5890
		8000	4470	4750	5050	5360	5690	6050	6420
		9000	4840	5160	5490	5840	6220	6610	7030
		10,000	5250	5600	5970	6370	6790	7230	7710
4700	85	Sea Level	2110	2230	2350	2470	2600	2740	2870
		1000	2250	2370	2500	2640	2770	2920	3070
		2000	2390	2520	2660	2810	2960	3120	3280
		3000	2540	2690	2840	3000	3160	3340	3510
		4000	2720	2880	3040	3210	3390	3580	3780
		5000	2900	3080	3260	3440	3640	3840	4130
		6000	3110	3300	3500	3700	3910	4210	4450
		7000	3340	3550	3760	3990	4300	4550	4820
		8000	3600	3830	4070	4390	4660	4940	5230
		9000	3900	4230	4490	4770	5070	5380	5710
		10,000	4300	4580	4870	5180	5510	5860	6240
4300	81	Sea Level	1730	1820	1920	2020	2120	2230	2340
		1000	1830	1940	2040	2150	2260	2380	2500
		2000	1950	2060	2170	2290	2410	2530	2660
		3000	2070	2190	2310	2440	2570	2710	2850
		4000	2210	2340	2470	2610	2750	2900	3060
		5000	2360	2500	2640	2790	2950	3110	3280
		6000	2520	2680	2830	2990	3160	3340	3530
		7000	2710	2870	3040	3220	3410	3600	3880
		8000	2910	3090	3280	3470	3680	3970	4200
		9000	3140	3340	3550	3760	4070	4310	4570
		10,000	3390	3610	3830	4150	4410	4680	4970

Figure 5-12

ACCELERATE - STOP DISTANCE



ACCELERATE - STOP DISTANCE

(Normally Aspirated Model Equipped With Tip Tanks -- 3725 Lbs Gross Weight)

WING FLAPS RETRACTED
FULL THROTTLE AND MAX RPM
BOTH THROTTLES CLOSED AT DECISION SPEED

RUNWAY SURFACE: PAVED, LEVEL, DRY
ACCELERATE TO 90 MPH IAS
MAXIMUM BRAKING EFFORT

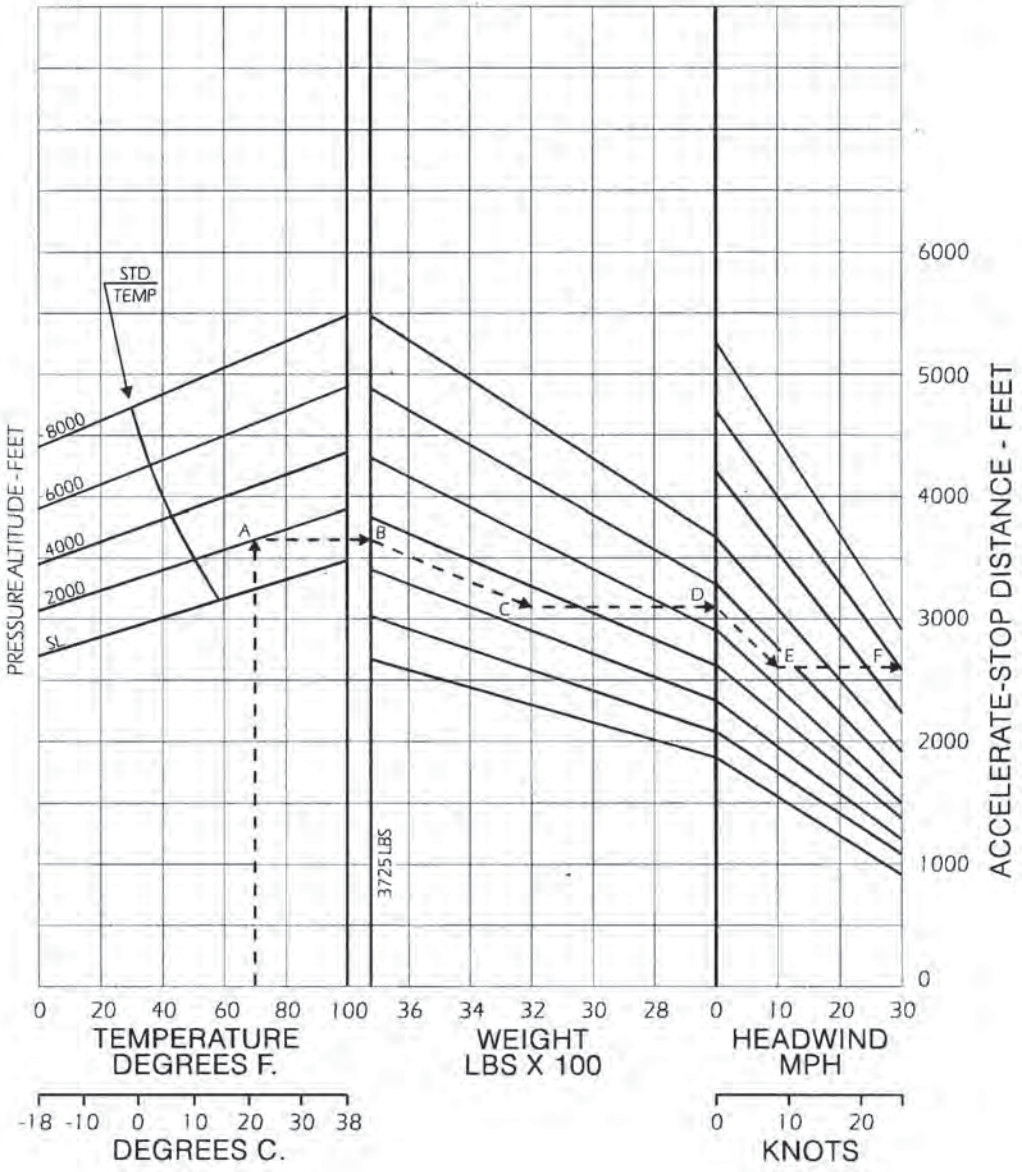


FIGURE 5-08

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Appendix 5: Cost Estimates

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Crystal Airport (MIC)
2016 CIP Update - Runway 14R/32L & Taixways

Engineer's Estimate
July 20, 2016

Remove Runway 14R/32L & Taxiway Improvements

Item	Concept Element	Est. Cost
1	Remove Runway and Construct Parallel Taxiway (includes Taxiway lighting	$1,800,000
2	Other Taxiway Improvements	$300,000
	Runway & Taxiways Total:	*$2,100,000*

Crystal Airport
2016 CIP Update - Runway 14R/32L & Taxiways
Engineer's Estimate

July 20, 2016

Remove Runway & Constuct Parallel Taxiway

Line No.	Item No.	Item Description	Unit	Estimated Unit Price	Estimated Quantity	Estimated Total Amount
1	1012.200	Traffic Provisions / Airport Security & Devices / Phasing	LS	LUMP SUM	***	$ 55,000.00
2	2021.501	Mobilization	LS	LUMP SUM	***	$ 110,000.00
3	2051.501	Maintenance & Restoration of Haul Roads	LS	LUMP SUM	***	$ 7,500.00
4	2104.505	Remove Bituminous Pavement (Full Depth)	SY	$ 4.00	30,000	$ 120,000.00
5	2104.513	Sawing Bituminous Pavement (Full Depth)	LF	$ 2.50	2,500	$ 6,250.00
6	2105.501	Common Excavation (EV)	CY	$ 15.00	3,500	$ 52,500.00
7	2105.507	Subgrade Excavation (EV)	CY	$ 20.00	1,000	$ 20,000.00
8	2105.526	Select Topsoil Borrow (CV)	CY	$ 20.00	2,500	$ 50,000.00
9	2112.501	Subgrade Preparation	SY	$ 1.50	16,000	$ 24,000.00
10	2573.503	Silt Fence, Type Preassembled (Incl. Mtce.)	LF	$ 3.00	1,000	$ 3,000.00
11	2573.540	Filter Log, Type Wood Fiber Bioroll	LF	$ 3.50	1,000	$ 3,500.00
12	2575.605	Turf Est. (Brillion) Incl. Seed, Fertilizer, Mulch, Water	ACRE	$ 3,500.00	5	$ 17,500.00
13	P-209-5.1	Aggregate Base Course (CV)	CY	$ 25.00	4,000	$ 100,000.00
14	P-401-5.1	Bituminous Surface Course PG 58-28	TON	$ 71.00	2500	$ 177,500.00
15	P-401-5.2	Bituminous Base Course PG 58-28	TON	$ 69.00	2500	$ 172,500.00
16	P-603-5.1	Bituminous Tack Coat	GAL	$ 3.50	1,000	$ 3,500.00
17	P-605-5.1	Bituminous Joint (Saw, Route, Seal)	LF	$ 4.00	4,000	$ 16,000.00
18	P-620-5.1	Taxiway Painting	SF	$ 1.00	15,000	$ 15,000.00
19	L	Taxiway Lighting				$ 400,000.00

Estimated Construction Total	**$**	**1,353,750.00**
5% Contingency	$	90,250.00
20% Engineering and Administration	$	361,000.00
Estimated Total Project Cost	$	1,805,000.00

Remove & Construct Connector Taxiways

20	1012.200	Traffic Provisions / Airport Security & Devices / Phasing	LS	LUMP SUM	***	$ 5,000.00
21	2021.501	Mobilization	LS	LUMP SUM	***	$ 20,000.00
22	2051.501	Maintenance & Restoration of Haul Roads	LS	LUMP SUM	***	$ 500.00
23	2104.505	Remove Bituminous Pavement (Full Depth)	SY	$ 4.00	10,000	$ 40,000.00
24	2104.513	Sawing Bituminous Pavement (Full Depth)	LF	$ 2.50	1,000	$ 2,500.00
25	2105.501	Common Excavation (EV)	CY	$ 15.00	2,500	$ 37,500.00
26	2105.507	Subgrade Excavation (EV)	CY	$ 20.00	500	$ 10,000.00
27	2105.526	Select Topsoil Borrow (CV)	CY	$ 20.00	2,000	$ 40,000.00
28	2112.501	Subgrade Preparation	SY	$ 1.50	2,000	$ 3,000.00
29	2573.503	Silt Fence, Type Preassembled (Incl. Mtce.)	LF	$ 3.00	0	$ -
30	2573.540	Filter Log, Type Wood Fiber Bioroll	LF	$ 3.50	0	$ -
31	2575.605	Turf Est. (Brillion) Incl. Seed, Fertilizer, Mulch, Water	ACRE	$ 3,500.00	4	$ 14,000.00
32	P-209-5.1	Aggregate Base Course (CV)	CY	$ 25.00	500	$ 12,500.00
33	P-401-5.1	Bituminous Surface Course PG 58-28	TON	$ 71.00	250	$ 17,750.00
34	P-401-5.2	Bituminous Base Course PG 58-28	TON	$ 69.00	250	$ 17,250.00
35	P-603-5.1	Bituminous Tack Coat	GAL	$ 3.50	100	$ 350.00
36	P-605-5.1	Bituminous Joint (Saw, Route, Seal)	LF	$ 4.00	500	$ 2,000.00
37	P-620-5.1	Taxiway Painting	SF	$ 1.00	500	$ 500.00
38	L	Taxiway Lighting			0	

Estimated Construction Total	**$**	**222,850.00**
5% Contingency	$	14,856.67
20% Engineering and Administration	$	59,426.67
Estimated Total Project Cost	$	297,133.33

TOTAL Runway & Taxiways: $ 2,102,133.33

Crystal Airport (MIC)
2035 Long Term Comprehensive Plan Estimates

May 15, 2017

Convert Portions of Existing Runway Runway 14L-32R Paved Blast Pads to Runway (Refined Concept)		
Item	**Concept Element**	**Est. Cost**
1	Runway Improvements - Grading/Painting	$80,000
2	Runway Improvements - Electrical	$270,000
3	Taxiway Improvements - Grading/Paving	$1,900,000
4	Taxiway Improvements - Electrical	$300,000
	Total:	*$2,550,000*

8.0 Crystal Airport Facility

Asset Funding Needs Report
By Number

Client: Metropolitan Airports Commission (MAC)

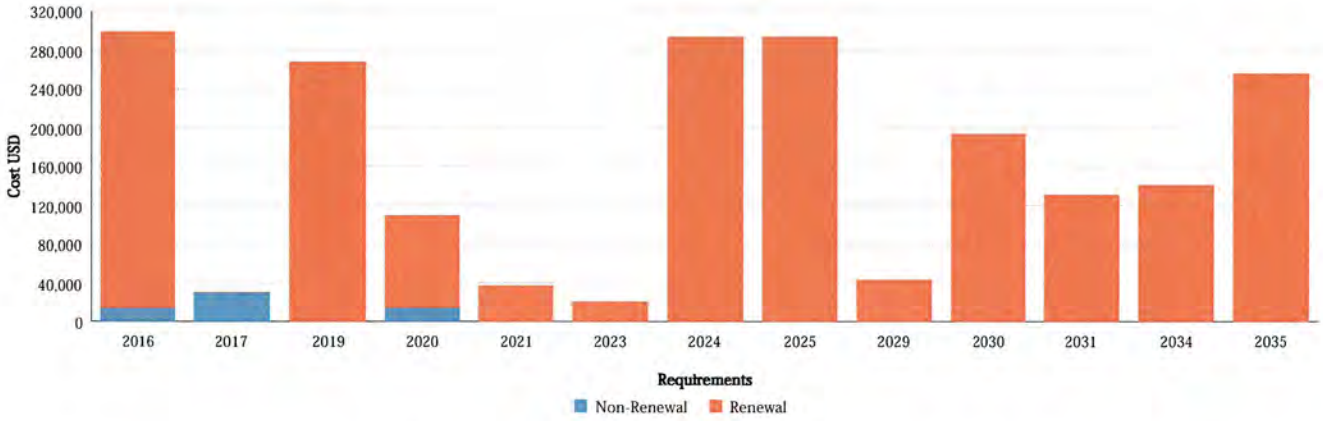
Project_Number: Crystal Airport

Asset: All

Currency: USD **Period:** 20 years **Inflation:** 3%

The current year is always the Period start date. If "Include past due Action Dates/Renewals" is selected, the cost of those past due Requirements is included in the current year cost.

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	285,203	14,110	299,313
2017	0	30,573	30,573
2019	268,115	0	268,115
2020	95,301	14,494	109,795
2021	37,341	0	37,341
2023	21,014	0	21,014
2024	294,173	0	294,173
2025	294,581	0	294,581
2029	43,851	0	43,851
2030	194,417	0	194,417
2031	131,139	0	131,139
2034	141,470	0	141,470
2035	256,505	0	256,505
Total	**2,063,111**	**59,178**	**2,122,288**

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Asset Funding Needs Report
By Number

Client: Metropolitan Airports Commission (MAC)
Project_Number: Crystal Airport

Asset: East Maintenance Building
Asset Number: 1

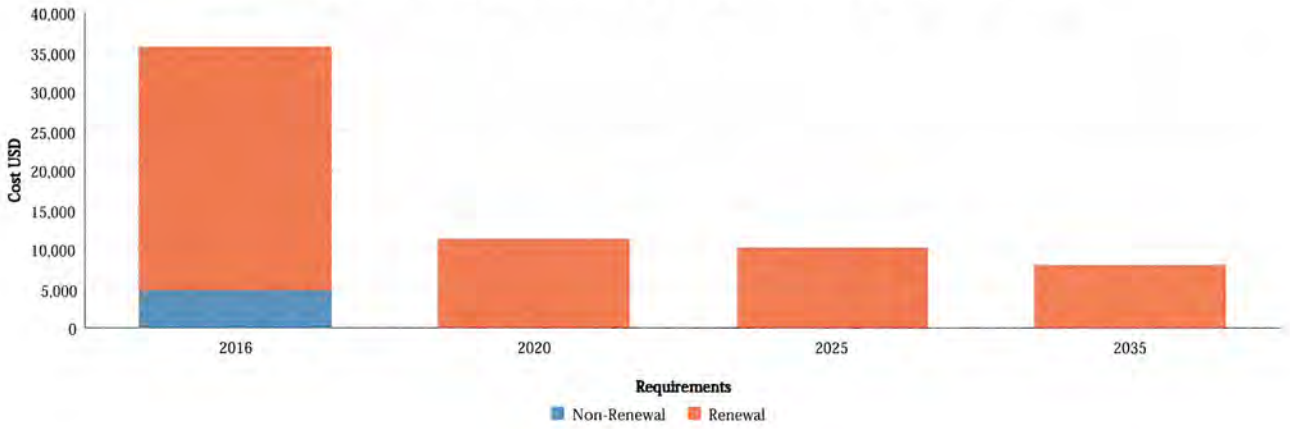
Report is grouped by **Year**

Currency: USD

Address 1	-	Address 2	-
City	Crystal	State/Province/Region	Minnesota
Country	UNITED STATES OF AMERICA	ZIP	-

Current Replacement Value	166,696	Size	1,768 SF

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	30,947	4,797	35,744
2020	11,304	0	11,304
2025	10,207	0	10,207
2035	8,014	0	8,014
Total	**60,472**	**4,797**	**65,269**

Detail of Funding Needed by Year

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	D5021 - Branch Wiring Devices	Exterior Outlet	0	266	266
	B2030 - Exterior Doors	Overhead Sectional Doors - Electric Operation Renewal	17,403	0	17,403
	D5022 - Lighting Equipment	Lighting Fixtures - Light Density Renewal	4,106	0	4,106
	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	1,368	0	1,368
	D5012 - Low Tension Service and Dist.	Main Electrical Service 01 - 60A 240Y/120V + Distribution Renewal	6,122	0	6,122
	B2010 - Exterior Walls	Paint Building Exterior	0	4,531	4,531
	D5021 - Branch Wiring Devices	Branch Wiring - Equipment & Devices - Light Density Renewal	1,948	0	1,948

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Year	System	Requirement Name	Renewal	Non-Renewal	Total
		Subtotal for 2016	**30,947**	**4,797**	**35,744**
2020	D5022 - Lighting Equipment	Lighting Fixtures - Light Density Renewal	4,621	0	4,621
	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	1,539	0	1,539
	C3010 - Wall Finishes	Paint Masonry Interior Finish - Economy Renewal	5,144	0	5,144
		Subtotal for 2020	**11,304**	**0**	**11,304**
2025	D3050 - Terminal and Package Units	Unit Heaters - Gas Fired	3,285	0	3,285
	D2090 - Other Plumbing Systems	Natural Gas Supply for Bldg - 1" Feed (SF)	3,453	0	3,453
	B2030 - Exterior Doors	Door Assembly - 3 x 7 HM	3,469	0	3,469
		Subtotal for 2025	**10,207**	**0**	**10,207**
2035	C3010 - Wall Finishes	Paint Masonry Interior Finish - Economy Renewal	8,014	0	8,014
		Subtotal for 2035	**8,014**	**0**	**8,014**
		Total	**60,472**	**4,797**	**65,269**

Asset Funding Needs Report
By Number

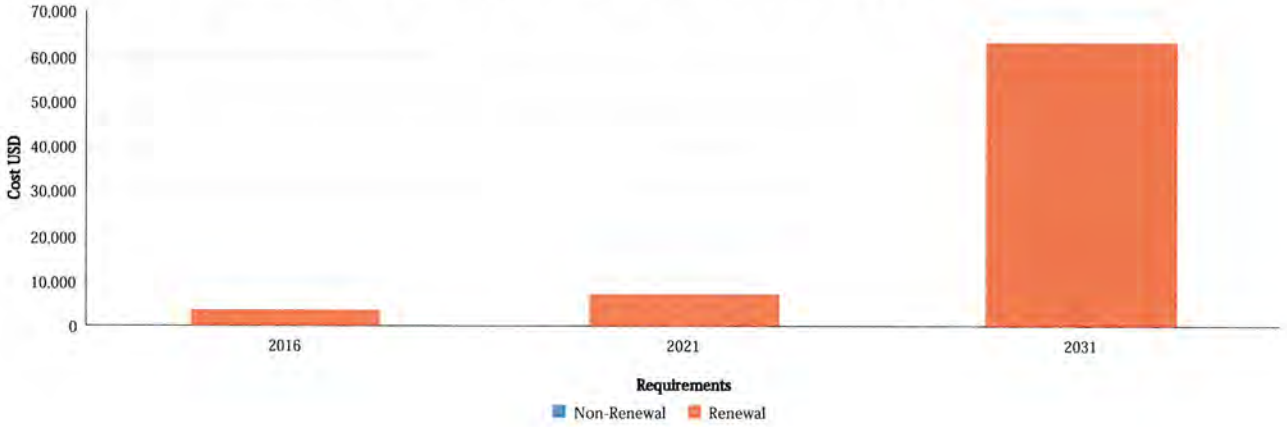
Client: Metropolitan Airports Commission (MAC)
Asset: East Restroom Building
Project_Number: Crystal Airport
Asset Number: 2

Report is grouped by Year
Currency: USD

Address 1	-	Address 2	-
City	Crystal	State/Province/Region	Minnesota
Country	UNITED STATES OF AMERICA	ZIP	-

Current Replacement Value	79,020	Size	235 SF

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	3,537	0	3,537
2021	7,118	0	7,118
2031	63,105	0	63,105
Total	**73,760**	**0**	**73,760**

Detail of Funding Needed by Year

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 6 Gal Renewal	2,282	0	2,282
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	450	0	450
	D3050 - Terminal and Package Units	Unit Heaters - Electric (Each) Renewal	805	0	805
		Subtotal for 2016	**3,537**	**0**	**3,537**
2021	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	145	0	145
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 6 Gal Renewal	2,646	0	2,646
	B30 - Roofing	Asphalt Shingled Roofing Renewal	1,707	0	1,707
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	522	0	522

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Year	System	Requirement Name	Renewal	Non-Renewal	Total
2021	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	793	0	793
	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	1,307	0	1,307
		Subtotal for 2021	**7,118**	**0**	**7,118**
2031	B2030 - Exterior Doors	Door Assembly - 3 x 7 HM	4,732	0	4,732
	C3030 - Ceiling Finishes	GWB Ceiling Taped	1,268	0	1,268
	D2010 - Plumbing Fixtures	Custodial/Utility Sinks - Each	6,726	0	6,726
	D3050 - Terminal and Package Units	Unit Heaters - Electric (Each) Renewal	1,254	0	1,254
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	701	0	701
	D5012 - Low Tension Service and Dist.	Main Electrical Service 02 - 100A 240Y/120V + Distribution	19,639	0	19,639
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 6 Gal Renewal	3,556	0	3,556
	D5021 - Branch Wiring Devices	Branch Wiring - Equipment & Devices - Average Density	1,209	0	1,209
	C10 - Interior Construction	Restroom - Complete - Single	10,289	0	10,289
	D40 - Fire Protection	Fire Extinguishers - Dry Chem w/Cabinet (Each)	624	0	624
	B3014 - Flashings and Trim	Metal Fascia and Soffit	8,034	0	8,034
	D2020 - Domestic Water Distribution	Water Dist Complete - Average	5,071	0	5,071
		Subtotal for 2031	**63,105**	**0**	**63,105**
		Total	**73,760**	**0**	**73,760**

Asset Funding Needs Report
By Number

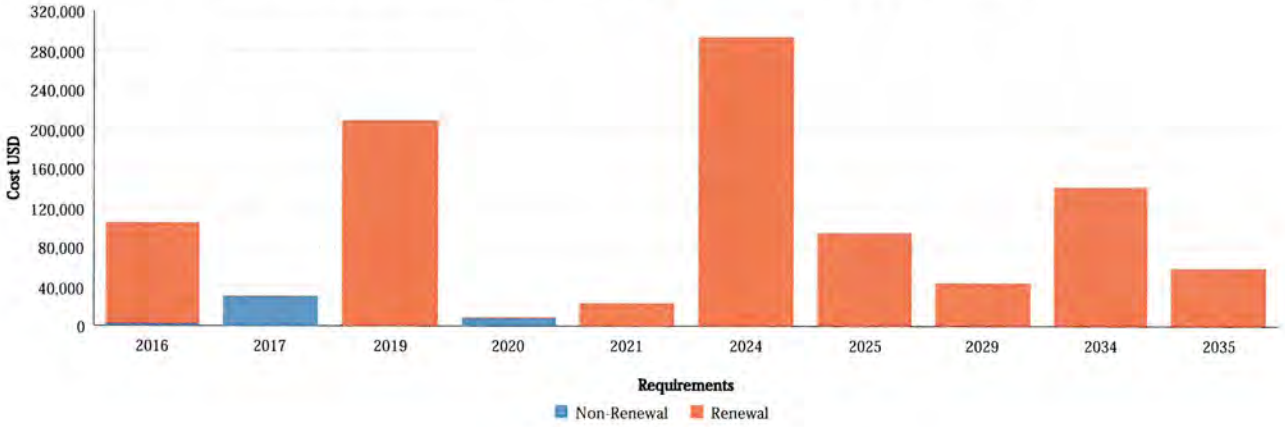
Client: Metropolitan Airports Commission (MAC)
Asset: North Maintenance Building
Project_Number: Crystal Airport
Asset Number: 3

Report is grouped by Year
Currency: USD

Address 1	-	Address 2	-
City	Crystal	State/Province/Region	Minnesota
Country	-	ZIP	-

Current Replacement Value	1,073,571	Size	5,376 SF

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	102,417	2,547	104,964
2017	0	30,573	30,573
2019	209,316	0	209,316
2020	0	8,660	8,660
2021	23,104	0	23,104
2024	294,173	0	294,173
2025	94,674	0	94,674
2029	43,851	0	43,851
2034	141,470	0	141,470
2035	58,781	0	58,781
Total	**967,787**	**41,780**	**1,009,567**

Detail of Funding Needed by Year

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	2,735	0	2,735

Jun 8, 2016 11:23:01 AM

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	C3020 - Floor Finishes	VCT - Average Renewal	4,858	0	4,858
	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	2,858	0	2,858
	D2020 - Domestic Water Distribution	Water Heater - Gas - Residential - 50 Gal Renewal	4,960	0	4,960
	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	40,479	0	40,479
	B30 - Roofing	Roof Edge Saftey Railing	0	2,547	2,547
	D3060 - Controls and Instrumentation	Parking Garage CO Monitor System Renewal	4,162	0	4,162
	C3030 - Ceiling Finishes	ACT System - Standard Renewal	7,949	0	7,949
	D3040 - Distribution Systems	Exhaust System - Dedicated High Velocity Renewal	19,708	0	19,708
	D5092 - Emergency Light and Power Systems	Emergency Battery Pack Lights Renewal	5,413	0	5,413
	D3050 - Terminal and Package Units	Unit Heaters - Gas Fired Renewal	9,295	0	9,295
		Subtotal for 2016	**102,417**	**2,547**	**104,964**
2017	B2010 - Exterior Walls	Aged Precast Panel Joints	0	30,573	30,573
		Subtotal for 2017	**0**	**30,573**	**30,573**
2019	B30 - Roofing	Single-Ply Membrane - Ballasted Renewal	120,996	0	120,996
	D3040 - Distribution Systems	Exhaust System - Fume Hood - Ductwork/Fan (Each) Renewal	66,205	0	66,205
	B30 - Roofing	Downspouts - Aluminum Renewal	499	0	499
	D3050 - Terminal and Package Units	Furnace with AC - Gas Fired Residential Type Renewal	9,710	0	9,710
	D3040 - Distribution Systems	Exhaust System - Garage Renewal	11,905	0	11,905
		Subtotal for 2019	**209,316**	**0**	**209,316**
2020	B2030 - Exterior Doors	Damaged Overhead Garage Door	0	8,660	8,660
		Subtotal for 2020	**0**	**8,660**	**8,660**
2021	D3050 - Terminal and Package Units	Unit Heaters - Gas Fired Renewal	10,776	0	10,776
	B2030 - Exterior Doors	Door Assembly - 3 x 7 HM Renewal	12,329	0	12,329
		Subtotal for 2021	**23,104**	**0**	**23,104**
2024	C10 - Interior Construction	Restroom - Shower - Add	9,202	0	9,202
	B2020 - Exterior Windows	Aluminum Windows	18,684	0	18,684
	D1093 - Hoists and Cranes	Hoist Crane	69,219	0	69,219
	D2010 - Plumbing Fixtures	Emergency Shower Units (Each)	4,113	0	4,113
	D2010 - Plumbing Fixtures	Emergency Eyewash (Each)	2,910	0	2,910
	D5021 - Branch Wiring Devices	Branch Wiring - Equipment & Devices - Average Density	22,567	0	22,567
	D2020 - Domestic Water Distribution	Water Heater - Gas - Residential - 50 Gal Renewal	6,283	0	6,283
	D3040 - Distribution Systems	Perimeter Heat - Electric Baseboard - 2500 SF	5,230	0	5,230
	B2030 - Exterior Doors	Overhead Sectional Doors - Electric Operation	69,334	0	69,334
	D3040 - Distribution Systems	Exhaust System - Dedicated High Velocity Renewal	24,965	0	24,965
	C3020 - Floor Finishes	VCT - Average Renewal	6,153	0	6,153
	D3060 - Controls and Instrumentation	Parking Garage CO Monitor System Renewal	5,272	0	5,272
	D5012 - Low Tension Service and Dist.	Main Electrical Service 04 - 400A 208Y/120V	25,396	0	25,396
	D2010 - Plumbing Fixtures	Custodial/Utility Sinks - Each	5,469	0	5,469
	D5092 - Emergency Light and Power Systems	Emergency Battery Pack Lights Renewal	6,857	0	6,857
	B2020 - Exterior Windows	Aluminum Windows	4,152	0	4,152
	C10 - Interior Construction	Restroom - Complete - Single	8,366	0	8,366
		Subtotal for 2024	**294,173**	**0**	**294,173**
2025	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	6,164	0	6,164
	D5038 - Security and Detection Systems	Security System - Light Density	8,332	0	8,332
	D2010 - Plumbing Fixtures	Kitchenette - Cabinet, Counter and Sink	894	0	894

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2025	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	777	0	777
	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	9,319	0	9,319
	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	33,782	0	33,782
	D5033 - Telephone Systems	Telephone System - Light Density	10,428	0	10,428
	D5037 - Fire Alarm Systems	Fire Alarm System - Light Density	24,978	0	24,978
		Subtotal for 2025	**94,674**	**0**	**94,674**
2029	D40 - Fire Protection	Wet Sprinkler System - Ordinary Hazard wo/Pump	43,851	0	43,851
		Subtotal for 2029	**43,851**	**0**	**43,851**
2034	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	4,865	0	4,865
	C3030 - Ceiling Finishes	ACT System - Standard Renewal	13,532	0	13,532
	C3020 - Floor Finishes	VCT - Average Renewal	8,270	0	8,270
	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	4,656	0	4,656
	D5092 - Emergency Light and Power Systems	Emergency Battery Pack Lights Renewal	9,216	0	9,216
	B3022 - Roof Hatches	Roof Hatch	2,790	0	2,790
	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	68,914	0	68,914
	D3060 - Controls and Instrumentation	Parking Garage CO Monitor System Renewal	7,085	0	7,085
	D2090 - Other Plumbing Systems	Natural Gas Supply for Bldg - 1" Feed (SF)	13,699	0	13,699
	D2020 - Domestic Water Distribution	Water Heater - Gas - Residential - 50 Gal Renewal	8,444	0	8,444
		Subtotal for 2034	**141,470**	**0**	**141,470**
2035	D5038 - Security and Detection Systems	Security System - Light Density	11,198	0	11,198
	D5033 - Telephone Systems	Telephone System - Light Density	14,014	0	14,014
	D5037 - Fire Alarm Systems	Fire Alarm System - Light Density	33,569	0	33,569
		Subtotal for 2035	**58,781**	**0**	**58,781**
		Total	**967,787**	**41,780**	**1,009,567**

Asset Funding Needs Report
By Number

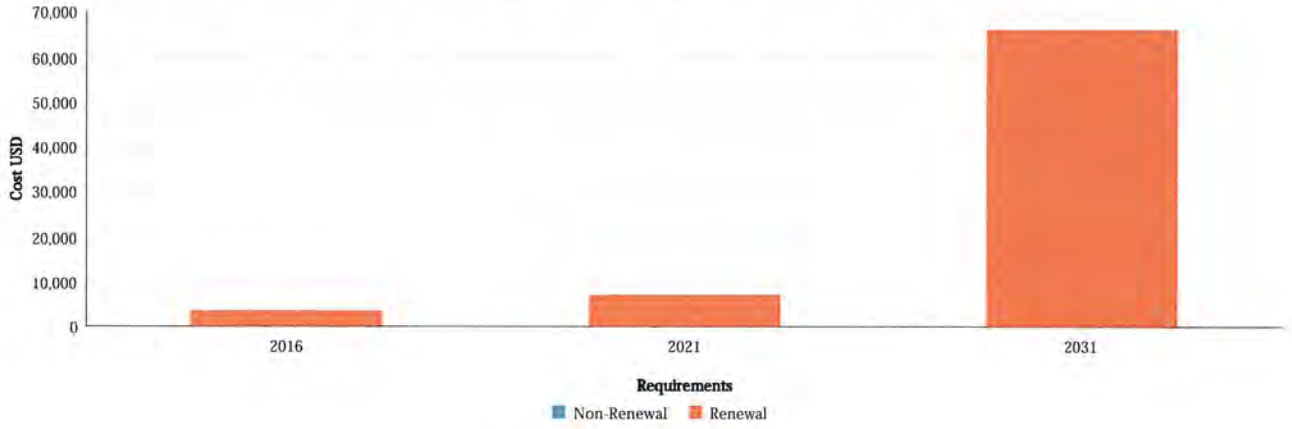
Client: Metropolitan Airports Commission (MAC)
Asset: North Restroom Building
Project_Number: Crystal Airport
Asset Number: 4

Report is grouped by **Year**
Currency: USD

Address 1	-	**Address 2**	-
City	Crystal	**State/Province/Region**	Minnesota
Country	UNITED STATES OF AMERICA	**ZIP**	-

Current Replacement Value	80,589	**Size**	235 SF

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	3,537	0	3,537
2021	7,118	0	7,118
2031	66,162	0	66,162
Total	**76,817**	**0**	**76,817**

Detail of Funding Needed by Year

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 10 Gal Renewal	2,282	0	2,282
	D3050 - Terminal and Package Units	Unit Heaters - Electric (Each) Renewal	805	0	805
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	450	0	450
		Subtotal for 2016	**3,537**	**0**	**3,537**
2021	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	1,307	0	1,307
	B30 - Roofing	Asphalt Shingled Roofing Renewal	1,707	0	1,707
	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	145	0	145
	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs Renewal	793	0	793

Jun 8, 2016 11:23:01 AM

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2021	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	522	0	522
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 10 Gal Renewal	2,646	0	2,646
		Subtotal for 2021	**7,118**	**0**	**7,118**
2031	C10 - Interior Construction	Restroom - Complete - Single	10,289	0	10,289
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish) Renewal	701	0	701
	B2030 - Exterior Doors	Door Assembly - 3 x 7 HM	4,732	0	4,732
	D3050 - Terminal and Package Units	Unit Heaters - Electric (Each) Renewal	1,254	0	1,254
	B3014 - Flashings and Trim	Metal Fascia and Soffit	8,034	0	8,034
	D5021 - Branch Wiring Devices	Branch Wiring - Equipment & Devices - Average Density	1,209	0	1,209
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 10 Gal Renewal	3,556	0	3,556
	D2020 - Domestic Water Distribution	Water Dist Complete - Average	5,071	0	5,071
	D5012 - Low Tension Service and Dist.	Main Electrical Service 02 - 100A 240Y/120V + Distribution	22,696	0	22,696
	D40 - Fire Protection	Fire Extinguishers - Dry Chem w/Cabinet (Each)	624	0	624
	D2010 - Plumbing Fixtures	Custodial/Utility Sinks - Each	6,726	0	6,726
	C3030 - Ceiling Finishes	GWB Ceiling Taped	1,268	0	1,268
		Subtotal for 2031	**66,162**	**0**	**66,162**
		Total	**76,817**	**0**	**76,817**

Asset Funding Needs Report
By Number

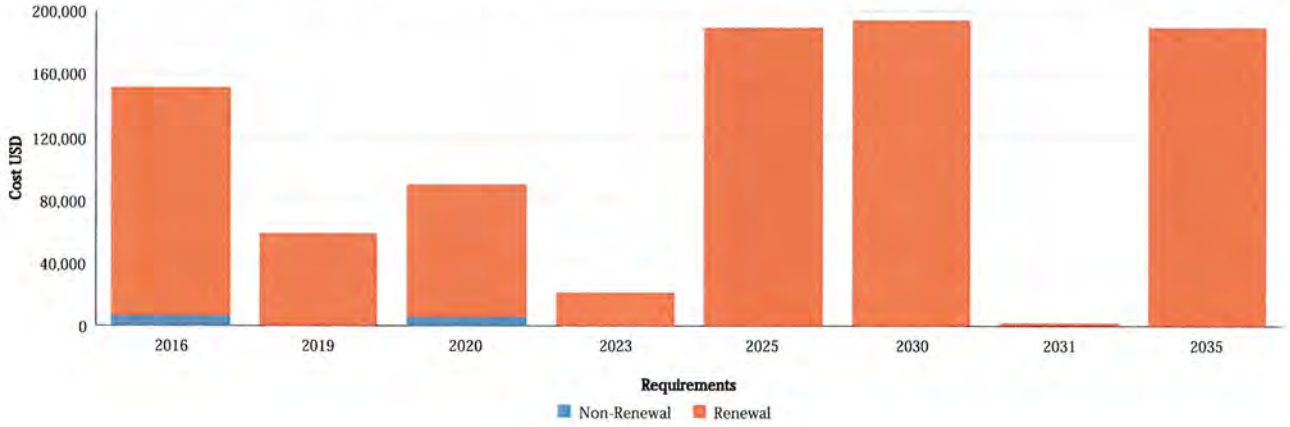
Client: Metropolitan Airports Commission (MAC)
Asset: Administration Building
Project_Number: Crystal Airport
Asset Number: 5

Report is grouped by **Year**
Currency: USD

Address 1	-	Address 2	-
City	Crystal	State/Province/Region	Minnesota
Country	UNITED STATES OF AMERICA	ZIP	-

Current Replacement Value	608,576	Size	4,625 SF

Summary of Funding Needed by Requirement Type and Year



Year	Renewal Requirements	Non-Renewal Requirements	Total
2016	144,765	6,766	151,531
2019	58,799	0	58,799
2020	83,997	5,835	89,832
2023	21,014	0	21,014
2025	189,700	0	189,700
2030	194,417	0	194,417
2031	1,872	0	1,872
2035	189,710	0	189,710
Total	**884,275**	**12,601**	**896,876**

Detail of Funding Needed by Year

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	C3020 - Floor Finishes	Concrete - Painted Renewal	3,177	0	3,177
	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	2,459	0	2,459
	C10 - Interior Construction	Restroom - Complete - Double Renewal	36,200	0	36,200

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Year	System	Requirement Name	Renewal	Non-Renewal	Total
2016	D3050 - Terminal and Package Units	Thru-Wall Units - Cooling w/Electric Heat Renewal	11,549	0	11,549
	B30 - Roofing	Modified Bitumen Renewal	30,023	0	30,023
	D5022 - Lighting Equipment	Emergency Lights and Exit Signs	0	6,766	6,766
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 52 Gal Renewal	3,911	0	3,911
	D5037 - Fire Alarm Systems	Fire Alarm System - Light Density Renewal	7,656	0	7,656
	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	39,597	0	39,597
	C3030 - Ceiling Finishes	ACT System - Economy Renewal	6,996	0	6,996
	C3020 - Floor Finishes	VCT - Average Renewal	3,197	0	3,197
		Subtotal for 2016	**144,765**	**6,766**	**151,531**
2019	B30 - Roofing	Single-Ply Membrane - Ballasted Renewal	58,799	0	58,799
		Subtotal for 2019	**58,799**	**0**	**58,799**
2020	C3020 - Floor Finishes	Concrete - Painted Renewal	3,576	0	3,576
	D3050 - Terminal and Package Units	Thru-Wall Units - Cooling w/Electric Heat Renewal	12,998	0	12,998
	C3030 - Ceiling Finishes	ACT System - Economy Renewal	7,874	0	7,874
	B2010 - Exterior Walls	Cracked Masonry	0	5,835	5,835
	D3040 - Distribution Systems	Exhaust System - Restroom w/Roof Fan Renewal	2,767	0	2,767
	C3020 - Floor Finishes	VCT - Average Renewal	3,599	0	3,599
	D5037 - Fire Alarm Systems	Fire Alarm System - Light Density Renewal	8,617	0	8,617
	D5022 - Lighting Equipment	Lighting Fixtures - Average Density Renewal	44,567	0	44,567
		Subtotal for 2020	**83,997**	**5,835**	**89,832**
2023	D3050 - Terminal and Package Units	Unit Heaters - Gas Fired	21,014	0	21,014
		Subtotal for 2023	**21,014**	**0**	**21,014**
2025	D2090 - Other Plumbing Systems	Natural Gas Supply for Bldg - 2" Feed (SF)	13,577	0	13,577
	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 52 Gal Renewal	5,104	0	5,104
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish)	2,536	0	2,536
	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	2,718	0	2,718
	C3010 - Wall Finishes	Paint Masonry/Epoxy Finish - Economy	8,834	0	8,834
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish)	5,167	0	5,167
	C3030 - Ceiling Finishes	GWB Taped and Finished	8,358	0	8,358
	D3050 - Terminal and Package Units	Furnace with AC - Gas Fired Residential Type	11,323	0	11,323
	B2030 - Exterior Doors	Door Assembly - 3 x 7 HM	13,876	0	13,876
	C3020 - Floor Finishes	Concrete - Painted Renewal	4,146	0	4,146
	C3030 - Ceiling Finishes	Paint Masonry/Epoxy Finish - Economy	12,938	0	12,938
	D5021 - Branch Wiring Devices	Branch Wiring - Equipment & Devices - Average Density	19,997	0	19,997
	D2010 - Plumbing Fixtures	Custodial/Utility Sinks - Each	5,633	0	5,633
	D5020 - Lighting and Branch Wiring	Lighting - Exterior - HID Wall Packs	5,353	0	5,353
	C3020 - Floor Finishes	Carpeting - Tile	15,667	0	15,667
	D3050 - Terminal and Package Units	Thru-Wall Units - Cooling w/Electric Heat	15,068	0	15,068
	D5033 - Telephone Systems	Telephone System - Light Density	5,981	0	5,981
	D5012 - Low Tension Service and Dist.	Main Electrical Service Subpanels - 125A 208Y/120V + Distribution	12,529	0	12,529
	D2020 - Domestic Water Distribution	Water Dist Complete - Average	20,897	0	20,897
		Subtotal for 2025	**189,700**	**0**	**189,700**
2030	D2030 - Sanitary Waste	Sanitary Waste - Gravity Disch - Average	14,847	0	14,847
	C1020 - Interior Doors	Swinging Doors - 3 x 7 Wd - NR	20,131	0	20,131
	C3020 - Floor Finishes	VCT - Average Renewal	4,836	0	4,836

Year	System	Requirement Name	Renewal	Non-Renewal	Total
2030	D3050 - Terminal and Package Units	Thru-Wall Units - Cooling w/Electric Heat Renewal	17,468	0	17,468
	C1020 - Interior Doors	Swinging Doors - 3 x 7 - Half Glass	5,225	0	5,225
	C10 - Interior Construction	Restroom - Shower - Add	10,987	0	10,987
	B2020 - Exterior Windows	Aluminum Windows	12,394	0	12,394
	B2020 - Exterior Windows	Aluminum Windows	24,788	0	24,788
	C1020 - Interior Doors	Swinging Doors - 3 x 7 HM - NR	19,484	0	19,484
	C10 - Interior Construction	Restroom - Complete - Single	12,056	0	12,056
	C3020 - Floor Finishes	Concrete - Painted Renewal	4,806	0	4,806
	D5012 - Low Tension Service and Dist.	Main Electrical Service 03 - 400A 208Y/120V + Distribution	31,260	0	31,260
	C1010 - Partitions	CMU Block Walls - Plain	4,554	0	4,554
	D5037 - Fire Alarm Systems	Fire Alarm System - Light Density Renewal	11,580	0	11,580
		Subtotal for 2030	**194,417**	**0**	**194,417**
2031	D40 - Fire Protection	Fire Extinguishers - Dry Chem w/Cabinet (Each)	1,872	0	1,872
		Subtotal for 2031	**1,872**	**0**	**1,872**
2035	D2020 - Domestic Water Distribution	Water Heater - Elec - Residential - 52 Gal Renewal	6,859	0	6,859
	D3050 - Terminal and Package Units	Thru-Wall Units - Cooling w/Electric Heat	20,250	0	20,250
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish)	6,944	0	6,944
	B2030 - Exterior Doors	Overhead Sectional Doors - Electric Operation	16,953	0	16,953
	B30 - Roofing	Modified Bitumen Renewal	52,645	0	52,645
	C3020 - Floor Finishes	Concrete - Painted Renewal	5,571	0	5,571
	C3010 - Wall Finishes	Painted Finish - Average (1 Coat Prime - 2 Coats Finish)	3,409	0	3,409
	C3020 - Floor Finishes	Carpeting - Tile	21,055	0	21,055
	D5033 - Telephone Systems	Telephone System - Light Density	8,038	0	8,038
	B2030 - Exterior Doors	Overhead Sectional Doors - Electric Operation	47,987	0	47,987
		Subtotal for 2035	**189,710**	**0**	**189,710**
		Total	**884,275**	**12,601**	**896,876**

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Appendix 6: Noise Contour Input Details

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Table A6-1

Baseline Condition Average Daily Flight Operations

Aircraft Type	Aircraft ID	Arrivals			Departures			Touch and Gos			Total Operations		
		Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Helicopter		*0.85*	*0.19*	*1.04*	*0.82*	*0.22*	*1.04*	*0.10*	-	*0.10*	*1.76*	*0.41*	*2.17*
Robinson R22	R22	0.03	-	0.03	0.03	-	0.03	-	-	-	0.06	-	0.06
Agusta 109	A109	0.82	0.19	1.01	0.79	0.22	1.01	0.10	-	0.10	1.70	0.41	2.11
Multi-Engine Piston		*2.35*	*0.04*	*2.39*	*2.26*	*0.12*	*2.39*	*0.98*	-	*0.98*	*5.59*	*0.16*	*5.76*
Beechcraft Baron BE-55	BEC55	0.12	-	0.12	0.12	-	0.12	-	-	-	0.24	-	0.24
Beechcraft Baron BE-58	BEC58	0.08	-	0.08	0.08	-	0.08	-	-	-	0.16	-	0.16
Cessna 310 Twin	CNA310	0.22	-	0.22	0.20	0.02	0.22	0.16	-	0.16	0.59	0.02	0.61
Cessna Super Skymaster 337	CNA337	0.08	-	0.08	0.08	-	0.08	-	-	-	0.16	-	0.16
Cessna 340 Twin	CNA340	0.27	-	0.27	0.27	-	0.27	0.16	-	0.16	0.69	-	0.69
Cessna 414 Twin	CNA414	0.06	-	0.06	0.06	-	0.06	-	-	-	0.12	-	0.12
Cessna Golden Eagle 421	CNA421	0.18	-	0.18	0.18	-	0.18	-	-	-	0.37	-	0.37
Piper Aztec Twin	PA23AZ	0.12	-	0.12	0.12	-	0.12	-	-	-	0.24	-	0.24
Piper Twin Comanche	PA30	0.08	-	0.08	0.08	-	0.08	-	-	-	0.16	-	0.16
Piper Navajo Twin	PA31	0.49	0.04	0.53	0.45	0.08	0.53	0.33	-	0.33	1.27	0.12	1.39
Piper Seneca Twin	PA34	0.31	-	0.31	0.29	0.02	0.31	0.16	-	0.16	0.76	0.02	0.78
Piper Seminole Twin	PA44	0.33	-	0.33	0.33	-	0.33	0.16	-	0.16	0.82	-	0.82
Single-Engine Piston		*25.03*	*1.21*	*26.24*	*25.63*	*0.61*	*26.24*	*20.92*	*0.84*	*21.76*	*71.58*	*2.66*	*74.24*
Grumman American Cheetah	AA5A	0.23	-	0.23	0.23	-	0.23	0.42	-	0.42	0.88	-	0.88
Beechcraft Debonair/Bonanza	BEC33	0.43	0.03	0.46	0.44	0.02	0.46	0.42	-	0.42	1.29	0.05	1.34
Beechcraft Bonanza 35	BECM35	0.31	0.03	0.34	0.34	-	0.34	0.42	-	0.42	1.07	0.03	1.11
Beechcraft Bonanza 36	BECM35	1.39	0.03	1.43	1.38	0.05	1.43	1.26	-	1.26	4.03	0.08	4.11
Cessna 152	CNA152	0.02	0.02	0.03	0.03	-	0.03	-	-	-	0.05	0.02	0.07
Cessna 195	CNA170	0.41	-	0.41	0.39	0.02	0.41	0.42	-	0.42	1.22	0.02	1.24
Cessna Skyhawk 172	CNA172	5.47	0.20	5.67	5.55	0.11	5.66	2.09	0.42	2.51	13.11	0.73	13.84
Cessna Cardinal 177	CNA177	0.15	-	0.15	0.15	-	0.15	0.42	-	0.42	0.71	-	0.71
Cessna Skywagon 180	CNA180	0.25	-	0.25	0.25	-	0.25	0.42	-	0.42	0.91	-	0.91
Cessna Skylane 182	CNA182	1.10	0.03	1.13	1.12	0.02	1.13	1.67	-	1.67	3.89	0.05	3.94
Cessna 185	CNA185	0.08	-	0.08	0.08	-	0.08	1.26	-	1.26	1.42	-	1.42
Cessna 206	CNA206	0.15	0.02	0.16	0.16	-	0.16	0.42	-	0.42	0.73	0.02	0.75
Cessna Centurion 210	CNA210	0.15	-	0.15	0.15	-	0.15	0.42	-	0.42	0.71	-	0.71
Aviat Husky A-1	GASEPF	0.03	-	0.03	0.03	-	0.03	-	-	-	0.07	-	0.07
Lancair Columbia 300	GASEPV	0.07	-	0.07	0.07	-	0.07	-	-	-	0.13	-	0.13
Lancair Columbia 400	GASEPV	0.20	-	0.20	0.20	-	0.20	0.42	-	0.42	0.81	-	0.81
Cirrus SR-20	GASEPV	0.45	0.02	0.47	0.44	0.03	0.48	0.42	-	0.42	1.32	0.05	1.37
Mooney M-20P	M20J	2.18	0.08	2.26	2.25	0.02	2.26	0.84	-	0.84	5.27	0.10	5.37
Mooney M-20T	M20J	0.61	0.03	0.64	0.59	0.05	0.64	0.42	-	0.42	1.62	0.08	1.70
Mooney M-20	M20J	1.35	0.07	1.41	1.39	0.02	1.41	0.84	-	0.84	3.58	0.08	3.66
Piper Comanche	PA24	0.38	-	0.38	0.34	0.03	0.38	0.84	-	0.84	1.56	0.03	1.59
Piper Cherokee	PA28	0.10	0.02	0.11	0.10	0.02	0.11	1.67	-	1.67	1.87	0.03	1.90
Piper Arrow	PA28CA	0.20	-	0.20	0.20	-	0.20	0.42	-	0.42	0.81	-	0.81
Piper Warrior	PA28CH	5.33	0.46	5.79	5.73	0.07	5.79	2.51	0.42	2.93	13.57	0.94	14.51
Piper Cherokee Dakota	PA28DK	0.03	-	0.03	0.03	-	0.03	-	-	-	0.07	-	0.07
Piper Lance/Saratoga	PA32SG	0.02	-	0.02	0.02	-	0.02	-	-	-	0.03	-	0.03
Piper Cherokee Six	PA32SG	1.58	0.07	1.64	1.56	0.08	1.64	1.26	-	1.26	4.39	0.15	4.54
Piper Malibu	PA46	0.28	0.02	0.30	0.30	-	0.30	0.42	-	0.42	0.99	0.02	1.01
Rockwell Aero Commander 112	RWCM12	0.03	-	0.03	0.03	-	0.03	-	-	-	0.07	-	0.07
Cirrus SR-22	SR22	2.07	0.10	2.17	2.08	0.08	2.17	1.26	-	1.26	5.41	0.18	5.59
Experimental		*2.30*	*0.26*	*2.56*	*2.17*	*0.38*	*2.56*	*2.12*	*0.00*	*2.12*	*6.59*	*0.64*	*7.23*
Experimental	GASEPV	1.28	0.13	1.41	1.02	0.38	1.41	1.06	-	1.06	3.36	0.51	3.87
Vans RV-7	GASEPV	0.51	-	0.51	0.51	-	0.51	0.53	-	0.53	1.55	-	1.55
Vans RV-8	GASEPV	0.51	0.13	0.64	0.64	-	0.64	0.53	-	0.53	1.68	0.13	1.81
Turboprop		*0.11*	*0.01*	*0.12*	*0.12*	*0.00*	*0.12*	-	-	-	*0.23*	*0.01*	*0.24*
Beechcraft King Air 300	BEC30B	0.01	-	0.01	0.01	-	0.01	-	-	-	0.01	-	0.01
Beechcraft King Air 200	BEC200	0.02	0.00	0.02	0.02	0.00	0.02	-	-	-	0.04	0.00	0.04
Beechcraft King Air 90	BEC90	0.02	-	0.02	0.02	-	0.02	-	-	-	0.03	-	0.03
Cessna 208	CNA208	0.00	-	0.00	0.00	-	0.00	-	-	-	0.01	-	0.01
Cessna Conquest 441	CNA441	0.01	0.00	0.01	0.01	-	0.01	-	-	-	0.02	0.00	0.02
Piper Malibu Meridian	CNA208	0.00	-	0.00	0.00	-	0.00	-	-	-	0.01	-	0.01
Pilatus PC-12	PC12	0.04	0.00	0.04	0.04	-	0.04	-	-	-	0.08	0.00	0.08
Socata TBM 700	STBM7	0.01	-	0.01	0.01	-	0.01	-	-	-	0.02	-	0.02
Socata TBM-850	CNA208	0.01	-	0.01	0.01	-	0.01	-	-	-	0.01	-	0.01
Jets		*0.01*	-	*0.01*	*0.01*	-	*0.01*	-	-	-	*0.02*	-	*0.02*
Cessna Citation Jet 525	CNA525C	0.01	-	0.01	0.01	-	0.01	-	-	-	0.02	-	0.02
Total		**30.65**	**1.71**	**32.35**	**31.02**	**1.34**	**32.35**	**24.12**	**0.84**	**24.96**	**85.79**	**3.88**	**89.67**

Note: Total may not add due to rounding.

Source: MACNOMS Data Analysis, HNTB Activity Forecasts

Table A6-2
2035 Final Preferred Alternative Condition Average Daily Flight Operations

Aircraft Type	Aircraft ID	Arrivals			Departures			Touch and Gos			Total Operations		
		Day	Night	Total	Day	Night	Total	Day	Night	Total	Day	Night	Total
Helicopter		*1.75*	*0.06*	*1.80*	*1.75*	*0.06*	*1.80*	*0.13*	*0.03*	*0.17*	*3.63*	*0.15*	*3.78*
Robinson R22	R22	0.06	-	0.06	0.06	-	0.06	0.03	-	0.03	0.15	-	0.15
Agusta 109	A109	1.51	0.06	1.57	1.51	0.06	1.57	0.07	0.03	0.10	3.09	0.15	3.24
Bell B429 GlobalRanger	B429	0.06	-	0.06	0.06	-	0.06	-	-	-	0.12	-	0.12
Robinson R44	R44	0.12	-	0.12	0.12	-	0.12	0.03	-	0.03	0.27	-	0.27
Multi-Engine Piston		*2.07*	*0.10*	*2.17*	*2.07*	*0.10*	*2.17*	*0.84*	*0.05*	*0.89*	*4.98*	*0.25*	*5.23*
Beechcraft Baron BE-55	BEC55	0.10	-	0.10	0.10	-	0.10	-	-	-	0.19	-	0.19
Beechcraft Baron BE-58	BEC58	0.06	-	0.06	0.06	-	0.06	-	-	-	0.13	-	0.13
Cessna 310 Twin	CNA310	0.18	-	0.18	0.18	-	0.18	0.11	-	0.11	0.46	-	0.46
Cessna Super Skymaster 337	CNA337	0.06	-	0.06	0.06	-	0.06	-	-	-	0.13	-	0.13
Cessna 340 Twin	CNA340	0.21	-	0.21	0.21	-	0.21	0.11	-	0.11	0.53	-	0.53
Cessna 414 Twin	CNA414	0.05	-	0.05	0.05	-	0.05	-	-	-	0.10	-	0.10
Cessna Golden Eagle 421	CNA421	0.15	-	0.15	0.15	-	0.15	-	-	-	0.29	-	0.29
Diamond Twin Star	DA42	0.21	0.06	0.28	0.21	0.06	0.28	0.21	-	0.21	0.63	0.13	0.76
Piper Aztec Twin	PA23AZ	0.10	-	0.10	0.10	-	0.10	-	-	-	0.19	-	0.19
Piper Twin Comanche	PA30	0.06	-	0.06	0.06	-	0.06	-	-	-	0.13	-	0.13
Piper Navajo Twin	PA31	0.39	0.03	0.42	0.39	0.03	0.42	0.21	0.05	0.26	0.99	0.12	1.10
Piper Seneca Twin	PA34	0.24	-	0.24	0.24	-	0.24	0.11	-	0.11	0.59	-	0.59
Piper Seminole Twin	PA44	0.26	-	0.26	0.26	-	0.26	0.11	-	0.11	0.62	-	0.62
Single-Engine Piston		*21.83*	*1.10*	*22.94*	*21.83*	*1.10*	*22.94*	*17.78*	*1.25*	*19.02*	*61.45*	*3.46*	*64.90*
Beechcraft Debonair/Bonanza	BEC33	0.42	0.03	0.45	0.42	0.03	0.45	0.31	-	0.31	1.16	0.06	1.22
Beechcraft Bonanza 35	BECM35	0.31	0.03	0.34	0.31	0.03	0.34	0.31	-	0.31	0.93	0.06	0.99
Beechcraft Bonanza 36	BECM35	1.38	0.03	1.41	1.38	0.03	1.41	0.94	-	0.94	3.70	0.06	3.76
Cessna Skyhawk 172	CNA172	1.79	0.10	1.88	1.79	0.10	1.88	0.94	0.31	1.25	4.51	0.51	5.02
Cessna Cardinal 177	CNA177	0.15	-	0.15	0.15	-	0.15	0.31	-	0.31	0.60	-	0.60
Cessna Skywagon 180	CNA180	0.24	-	0.24	0.24	-	0.24	0.31	-	0.31	0.80	-	0.80
Cessna Skylane 182	CNA182	1.09	0.05	1.14	1.09	0.05	1.14	1.56	-	1.56	3.74	0.10	3.83
Cessna 185	CNA185	0.08	-	0.08	0.08	-	0.08	0.94	-	0.94	1.10	-	1.10
Cessna 206	CNA206	0.15	0.02	0.16	0.15	0.02	0.16	0.31	-	0.31	0.60	0.03	0.64
Cessna Centurion 210	CNA210	0.49	0.10	0.58	0.49	0.10	0.58	0.31	-	0.31	1.29	0.19	1.48
Lancair Columbia 300	GASEPV	0.73	0.08	0.81	0.73	0.08	0.81	0.62	-	0.62	2.09	0.16	2.25
Lancair Columbia 400	GASEPV	0.81	0.08	0.89	0.81	0.08	0.89	0.62	-	0.62	2.25	0.16	2.41
Diamond Star DA-40	GASEPV	0.03	-	0.03	0.03	-	0.03	-	-	-	0.06	-	0.06
Mooney M-20P	M20J	2.27	0.08	2.36	2.27	0.08	2.36	1.87	-	1.87	6.42	0.16	6.58
Mooney M-20T	M20J	0.60	0.03	0.63	0.60	0.03	0.63	0.31	-	0.31	1.51	0.06	1.58
Mooney M-20	M20J	1.33	0.06	1.40	1.33	0.06	1.40	0.62	-	0.62	3.29	0.13	3.42
Piper Cherokee	PA28	0.10	0.02	0.11	0.10	0.02	0.11	1.25	-	1.25	1.44	0.03	1.47
Piper Warrior	PA28CH	2.05	0.10	2.14	2.05	0.10	2.14	1.87	0.31	2.18	5.97	0.51	6.47
Piper Cherokee Dakota	PA28DK	0.03	-	0.03	0.03	-	0.03	-	-	-	0.06	-	0.06
Piper Arrow	PA28CA	0.19	-	0.19	0.19	-	0.19	0.31	-	0.31	0.70	-	0.70
Piper Lance/Saratoga	PA32SG	0.02	-	0.02	0.02	-	0.02	-	-	-	0.03	-	0.03
Piper Cherokee Six	PA32SG	1.56	0.06	1.62	1.56	0.06	1.62	0.94	-	0.94	4.05	0.13	4.18
Piper Malibu	PA46	0.28	0.02	0.29	0.28	0.02	0.29	0.31	-	0.31	0.86	0.03	0.90
Cirrus SR-20	GASEPV	0.45	0.02	0.47	0.45	0.02	0.47	0.31	-	0.31	1.22	0.03	1.25
Cirrus SR-22	SR22	5.28	0.19	5.47	5.28	0.19	5.47	2.49	0.62	3.12	13.05	1.01	14.07
Experimental		*4.08*	*-*	*4.08*	*4.08*	*-*	*4.08*	*3.39*	*-*	*3.39*	*11.56*	*-*	*11.56*
Experimental	GASEPV	1.86	-	1.86	1.86	-	1.86	1.35	-	1.35	5.07	-	5.07
Vans RV-7	GASEPV	0.74	-	0.74	0.74	-	0.74	0.68	-	0.68	2.16	-	2.16
Vans RV-8	GASEPV	0.74	-	0.74	0.74	-	0.74	0.68	-	0.68	2.16	-	2.16
Vans RV-9	GASEPV	0.74	-	0.74	0.74	-	0.74	0.68	-	0.68	2.16	-	2.16
Turboprop		*0.45*	*0.02*	*0.48*	*0.46*	*0.01*	*0.47*	*-*	*-*	*-*	*0.91*	*0.03*	*0.95*
Beechcraft King Air 300	BEC30B	0.03	-	0.03	0.03	-	0.03	-	-	-	0.07	-	0.07
Beechcraft King Air 200	BEC200	0.07	0.01	0.07	0.06	0.01	0.07	-	-	-	0.13	0.02	0.14
Beechcraft King Air 90	BEC90	0.06	-	0.06	0.05	-	0.05	-	-	-	0.11	-	0.11
Cessna 208	CNA208	0.04	-	0.04	0.04	-	0.04	-	-	-	0.08	-	0.08
Cessna Conquest 441	CNA441	0.02	0.01	0.03	0.03	-	0.03	-	-	-	0.06	0.01	0.07
Piper Malibu Meridian	CNA208	0.01	-	0.01	0.01	-	0.01	-	-	-	0.02	-	0.02
Piper Cheyenne II Twin	PA31T	0.01	-	0.01	0.01	-	0.01	-	-	-	0.02	-	0.02
Pilatus PC-12	PC12	0.14	0.01	0.15	0.15	-	0.15	-	-	-	0.29	0.01	0.30
Socata TBM 700	STBM7	0.05	-	0.05	0.05	-	0.05	-	-	-	0.10	-	0.10
Socata TBM-850	CNA208	0.02	-	0.02	0.02	-	0.02	-	-	-	0.05	-	0.05
Jets		*0.15*	*-*	*0.15*	*0.15*	*-*	*0.15*	*-*	*-*	*-*	*0.30*	*-*	*0.30*
Cessna Citation Jet 525	CNA525C	0.08	-	0.08	0.04	-	0.04	-	-	-	0.11	-	0.11
Cessna 560XL Citation Excel	CNA560XL	0.04	-	0.04	0.08	-	0.08	-	-	-	0.11	-	0.11
Cessna Citation Mustang	CNA510	0.04	-	0.04	0.04	-	0.04	-	-	-	0.08	-	0.08
Total		**30.34**	**1.28**	**31.63**	**30.35**	**1.27**	**31.62**	**22.14**	**1.33**	**23.47**	**82.83**	**3.89**	**86.72**

Note: Total may not add due to rounding.

Source: MACNOMS Data Analysis, HNTB Activity Forecasts

Table A6-3

Baseline Condition Average Annual Runway Use

Aircraft Group	Runway	Arrivals			Departures			Touch and Gos		
		Day	Night	Total	Day	Night	Total	Day	Night	Total
Helicopters	6L	10%	21%	12%	10%	14%	11%	11%	0%	11%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	23%	0%	19%	26%	0%	21%	20%	0%	20%
	14R	17%	0%	14%	17%	0%	14%	14%	0%	14%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	32L	11%	35%	16%	15%	0%	12%	14%	0%	14%
	32R	39%	44%	40%	32%	86%	43%	42%	0%	42%
Piston	6L	3%	1%	3%	3%	0%	3%	5%	0%	5%
	6R	1%	0%	0%	1%	0%	1%	0%	0%	0%
	14L	37%	47%	38%	27%	34%	27%	24%	50%	25%
	14R	6%	0%	5%	9%	8%	9%	15%	0%	14%
	24L	1%	0%	0%	1%	0%	1%	0%	0%	0%
	24R	12%	4%	12%	10%	4%	10%	14%	0%	13%
	32L	10%	13%	10%	17%	7%	16%	17%	0%	16%
	32R	31%	35%	31%	33%	47%	33%	26%	50%	27%
Turboprop	6L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	57%	33%	56%	48%	100%	49%	0%	0%	0%
	14R	4%	0%	4%	4%	0%	4%	0%	0%	0%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	4%	0%	4%	0%	0%	0%
	32L	10%	67%	13%	20%	0%	19%	0%	0%	0%
	32R	29%	0%	27%	24%	0%	24%	0%	0%	0%
Jets	6L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	50%	0%	50%	50%	0%	50%	0%	0%	0%
	14R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	32L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	32R	50%	0%	50%	50%	0%	50%	0%	0%	0%

Note: Totals may not add up to 100% due to rounding.

Source: MAC Analysis

Table A6-4

2035 Final Preferred Alternative Condition Average Annual Runway Use

Aircraft Group	Runway	Arrivals			Departures			Touch and Gos		
		Day	Night	Total	Day	Night	Total	Day	Night	Total
Helicopters	6L	10%	21%	10%	10%	14%	10%	11%	11%	11%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	40%	0%	39%	43%	0%	42%	33%	33%	33%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	32R	50%	79%	51%	47%	86%	48%	55%	55%	55%
Pistons	6L	2%	1%	2%	3%	0%	3%	9%	0%	8%
	6R	1%	0%	1%	2%	0%	2%	0%	0%	0%
	14L	42%	43%	42%	37%	55%	37%	38%	44%	39%
	24L	1%	0%	1%	2%	0%	2%	0%	0%	0%
	24R	10%	1%	9%	8%	6%	8%	12%	16%	12%
	32R	44%	55%	44%	49%	39%	49%	41%	40%	41%
Turboprops	6L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	59%	33%	57%	51%	100%	51%	0%	0%	0%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	1%	0%	1%	0%	0%	0%
	32R	41%	67%	43%	48%	0%	47%	0%	0%	0%
Jets	6L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	6R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	14L	50%	0%	50%	50%	0%	50%	0%	0%	0%
	24L	0%	0%	0%	0%	0%	0%	0%	0%	0%
	24R	0%	0%	0%	0%	0%	0%	0%	0%	0%
	32R	50%	0%	50%	50%	0%	50%	0%	0%	0%

Note: Totals may not add up to 100% due to rounding.

Source: MAC Analysis

Table A6-5
Baseline Condition Departure Flight Track Use

Runway	Track	Jets		Helicopters		Piston		Turboprop		Total
		Day	Night	Day	Night	Day	Night	Day	Night	
6L	A	-	-	75%	0%	52%	31%	100%	-	51%
	B	-	-	25%	100%	20%	38%	0%	-	23%
	C	-	-	0%	0%	28%	31%	0%	-	25%
6R	A	-	-	-	-	64%		-	-	64%
	B	-	-	-	-	19%		-	-	19%
	C	-	-	-	-	18%		-	-	18%
14L	A	0%	-	57%	-	12%	0%	0%	0%	12%
	B	0%	-	0%	-	6%	0%	16%	100%	5%
	C	0%	-	0%	-	9%	0%	8%	0%	8%
	D	0%	-	15%	-	23%	28%	54%	0%	23%
	E	100%	-	0%	-	5%	14%	4%	0%	5%
	F	0%	-	9%	-	7%	5%	0%	0%	7%
	G	0%	-	19%	-	39%	54%	17%	0%	39%
14R	A	-	-	43%	-	28%	31%	0%	-	29%
	B	-	-	14%	-	13%	31%	0%	-	13%
	C	-	-	14%	-	34%	38%	100%	-	33%
	D	-	-	29%	-	24%	0%	0%	-	24%
24L	A	-	-	-	-	38%	-	-	-	38%
	B	-	-	-	-	62%	-	-	-	62%
24R	A	-	-	-	-	57%	33%	0%	-	56%
	B	-	-	-	-	9%	0%	0%	-	9%
	C	-	-	-	-	6%	67%	0%	-	7%
	D	-	-	-	-	14%	0%	100%	-	14%
	E	-	-	-	-	15%	0%	0%	-	15%
32L	A	-	-	0%	-	12%	40%	50%	-	12%
	B	-	-	33%	-	12%	20%	30%	-	13%
	C	-	-	17%	-	6%	20%	0%	-	7%
	D	-	-	17%	-	23%	0%	0%	-	22%
	E	-	-	33%	-	47%	20%	20%	-	46%
32R	A	0%	-	0%	0%	6%	4%	0%	-	6%
	B	0%	-	8%	0%	14%	28%	18%	-	14%
	C	0%	-	46%	50%	20%	0%	32%	-	21%
	D	100%	-	46%	17%	41%	31%	18%	-	40%
	E	0%	-	0%	17%	5%	10%	32%	-	5%
	F	0%	-	0%	17%	14%	28%	0%	-	14%

Notes: Each departure track was dispersed to either side of the backbone tracks. Defualt INM Version 7.0d subtrack use percentages were used to assign aircraft to the subtracks created during dispersa. Totals may not add to 100% due to rounding.

Source: MAC Analysis, 2015

Table A6-6
2035 Final Preferred Alternative Condition Departure Flight Track Use

Runway	Track	Jets		Helicopters		Piston		Turboprop		Total
		Day	Night	Day	Night	Day	Night	Day	Night	
6L	A	-	-	75%	0%	50%	-	100%	-	53%
	B	-	-	25%	100%	22%	-	0%	-	23%
	C	-	-	0%	0%	28%	-	0%	-	24%
6R	A	-	-	-	-	64%	-	-	-	64%
	B	-	-	-	-	19%	-	-	-	19%
	C	-	-	-	-	18%	-	-	-	18%
14L	A	0%	-	51%	-	14%	6%	0%	0%	16%
	B	0%	-	6%	-	7%	2%	17%	100%	7%
	C	0%	-	6%	-	14%	9%	15%	0%	13%
	D	0%	-	20%	-	19%	43%	49%	0%	21%
	E	100%	-	0%	-	4%	13%	4%	0%	4%
	F	0%	-	6%	-	5%	6%	0%	0%	5%
	G	0%	-	11%	-	36%	21%	15%	0%	33%
24L	A	-	-	-	-	37%	-	-	-	37%
	B	-	-	-	-	63%	-	-	-	63%
24R	A	-	-	-	-	60%	37%	0%	-	59%
	B	-	-	-	-	15%	0%	0%	-	14%
	C	-	-	-	-	3%	63%	0%	-	4%
	D	-	-	-	-	13%	0%	100%	-	13%
	E	-	-	-	-	10%	0%	0%	-	10%
32R	A	0%	-	0%	0%	7%	14%	21%	-	7%
	B	0%	-	16%	0%	13%	8%	21%	-	13%
	C	0%	-	37%	50%	13%	14%	18%	-	14%
	D	100%	-	37%	17%	38%	42%	14%	-	38%
	E	0%	-	11%	17%	19%	19%	27%	-	19%
	F	0%	-	0%	17%	9%	3%	0%	-	8%

Notes: Each departure track was dispersed to either side of the backbone tracks. Defualt INM Version 7.0d subtrack use percentages were used to assign aircraft to the subtracks created during dispersa. Totals may not add to 100% due to rounding.

Source: MAC Analysis, 2015

Figure A6-1: Baseline Condition INM Flight Tracks

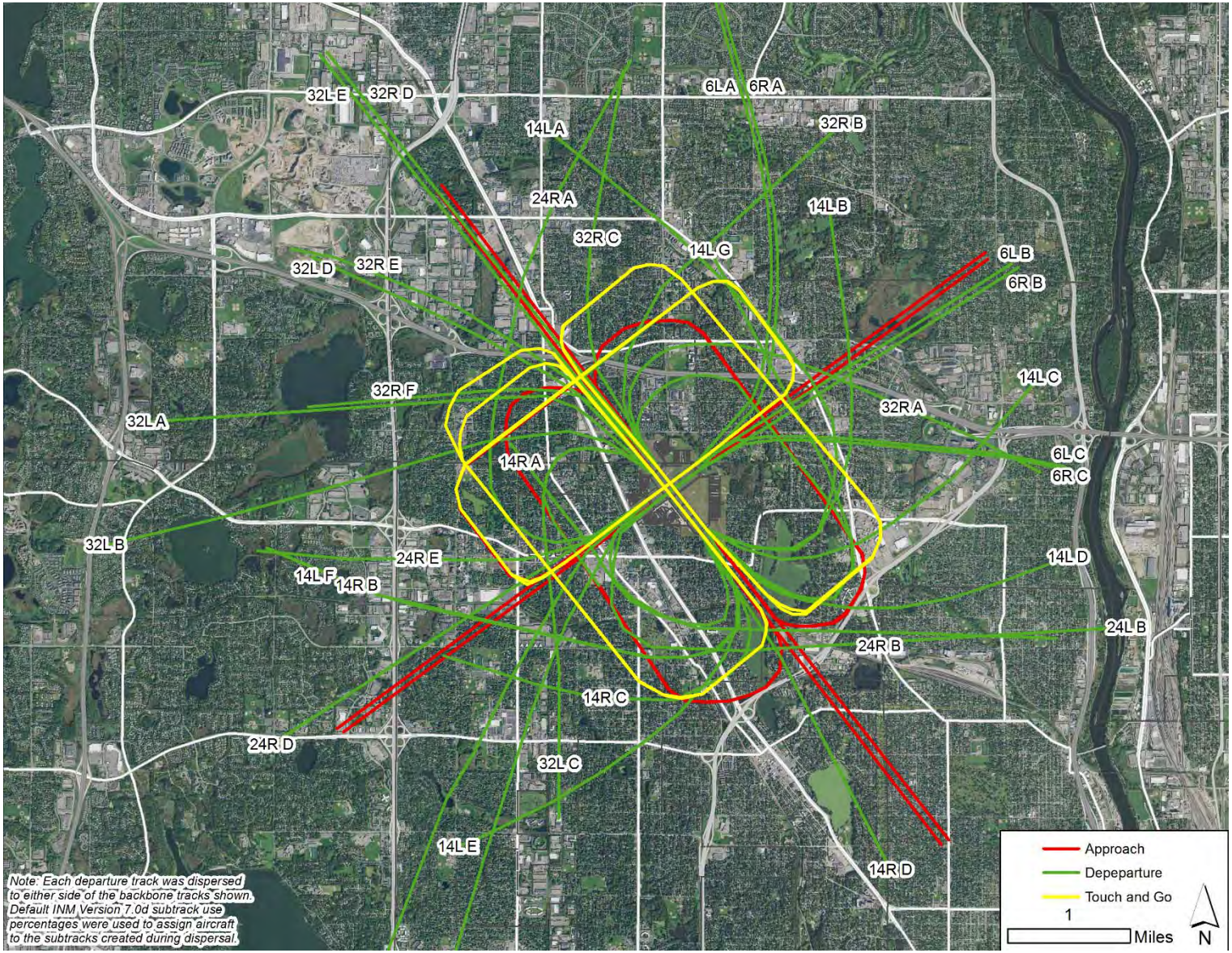
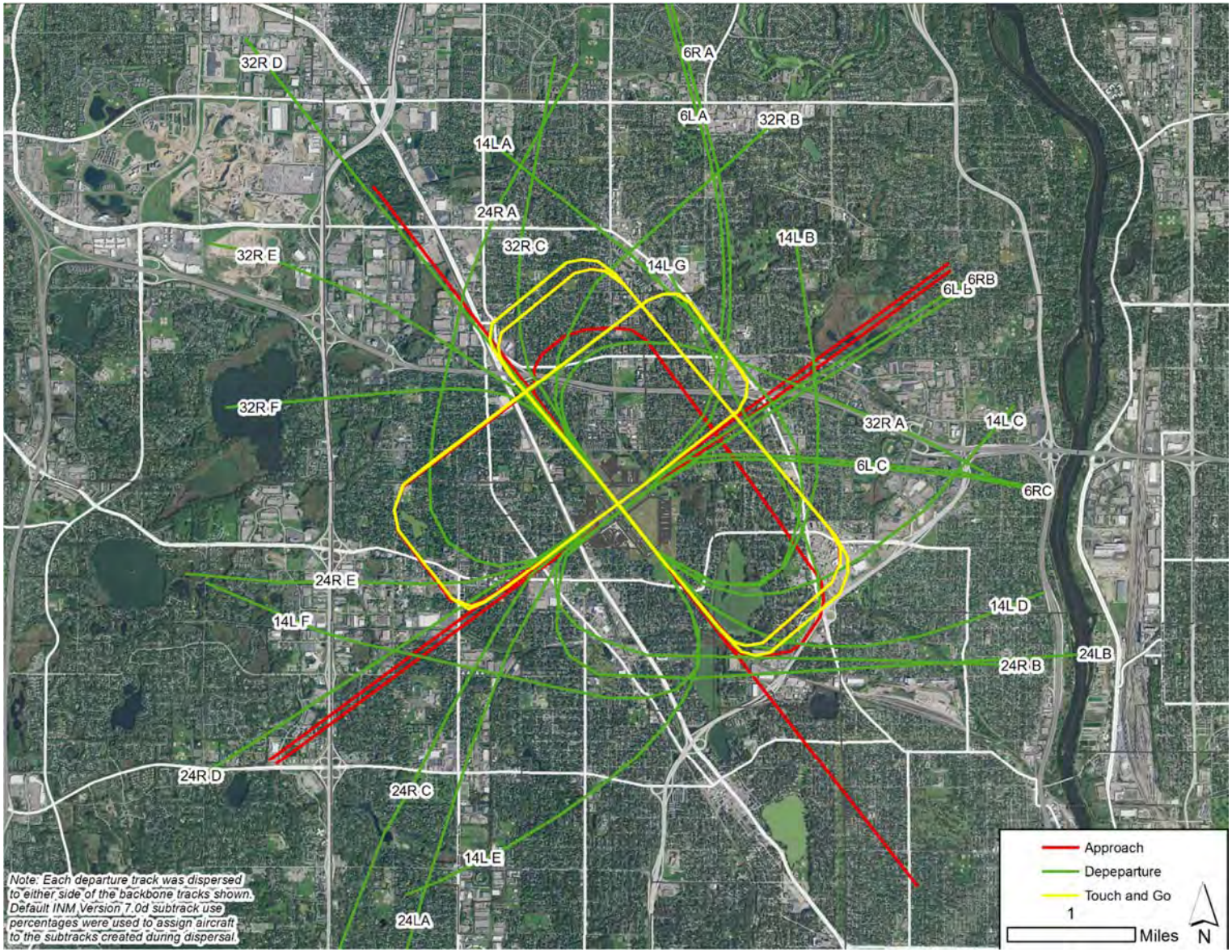


Figure A6-2: 2035 Final Preferred Alternative Condition INM Flight Tracks



Appendix 7: Existing Zoning Ordinances

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ORDINANCE NO. 6

An Ordinance regulating the height of structures and trees and the use of the property in the vicinity of Crystal Airport.

WHEREAS, the Minneapolis-Saint Paul Metropolitan Airports Commission considers it necessary for the purpose of promoting public health, safety, order, convenience and general welfare by protecting the lives and property of users of the Crystal Airport and of owners and occupants of land in its vicinity to adopt the following airport zoning ordinance applicable to Crystal Airport as authorized by Minnesota Laws 1945, Chapter 303 as amended, M.S.A. 360.061-360.074.

The Minneapolis-Saint Paul Metropolitan Airports Commission does ordain:

Section 1. Definitions. As used in this ordinance, unless the context otherwise requires:

(1) "Airport" means the Crystal Airport, a public airport owned and being operated, maintained and developed by the Commission.

(2) "Airport hazard" means any structure of tree or use of land, which obstructs the air space required for the flight of aircraft in landing or taking off at the airport or is otherwise hazardous to such landing or taking off of aircraft.

(3) "Airport hazard area" means the area of land or water or both upon which an airport hazard might exist if not prevented as provided in this ordinance.

(4) "Person" means any individual, firm, partnership, corporation, company, association, joint stock association or body politic, and includes any trustee, receiver, assignee or other similar representative thereof.

(5) "Nonconforming use" means any structure, tree or use of land, which does not conform to a regulation prescribed in this ordinance or any amendment thereto as of the effective date of such regulation or amendment.

(6) "Structure" means any object constructed or installed by man including but without limitation buildings, towers, smoke stacks and overhead transmission lines.

(7) "Tree" means and includes any object of natural growth.

(8) Zoning "map" means the Crystal Airport Zoning Map hereto attached and made a part of this ordinance.

(9) "Master Plan" means the established airport layout as shown by Commission's Plan #2745B, Drawing 2 hereto attached and made a part of this ordinance.

(10) "Airport reference point" means the center point of the airport hazard area, as designated on the zoning map.

(11) "Commission" means Minneapolis-Saint Paul Metropolitan Airports Commission, herein referred to as MAC.

(12) "Committee" means the MAC Airport Zoning Committee.

(13) "Board" means the MAC Airport Zoning Appeal Board.

(14) "Public notice" shall mean notice published at least twice with an interval of at least seven days between publication dates in the official newspaper of the cities of Minneapolis and Saint Paul, and of the county in which the airport is located.

Section 2. Airport Hazard Area, Airport Reference Point And Zones. The airport hazard area is the area surrounding the airport reference point as designated on the zoning map and is divided into zones, as shown on the zoning map, in respect to which zones height limits as hereinafter set forth will apply:

(1) The landing zones are strips within the confines of the airport boundaries, designated in black on the map, and along which landings and take-offs are made and taxiing is done.

(2) The approach zones are trapezoidal areas which extend beyond the ends of all landing zones as indicated on the zoning map.

(3) The horizontal surface zones are areas having radii of 5,000 feet from the airport reference point and are shown on the zoning map.

(4) The conical surface zones are areas lying immediately beyond the horizontal surface zones having to their outer-limits a radius of 8,000 feet from the airport reference point as shown on the zoning map.

(5) The transition zones are irregular areas lying just outside of approach zones as shown on the zoning map.

Section 3. Height Limits. Except as otherwise provided in this ordinance, no structure shall be located, constructed, altered or maintained, and no tree shall be allowed to grow above height limits hereinafter established within any landing zone, approach zones, horizontal surface zones, conical surface zone or transition zones, said heights being measured in feet above established elevations as follows:

(1) Within landing zones - the elevation of the surface of the landing strips except as required and as necessary and incidental to airport operations or as may be recommended by or is in accordance with rules of the Civil Aeronautics Administration.

(2) Within approach zones - the established elevation for the beginning of each approach zone as shown on the Master Plan, plus one foot of height for every 30 feet of horizontal distance measured along the centerline of the approach zone from the end nearest the landing zone to a point on said centerline at right angles to the structure or tree in question.

(3) Within horizontal surface zones - 150 feet above the established elevation of the airport, said established airport elevation being mean sea level elevation 869 feet.

(4) Within conical surface zones - The elevation of the horizontal surface zone at 5,000 feet from the airport reference point plus one foot of height for every 20 feet of horizontal distance to 8,000 feet from the airport reference point.

(5) Within transition zones - The height limit permitted at a point on the centerline of the nearest approach zone at right angles to the structure or tree in question plus one foot in height for every seven feet of horizontal distance from the nearest side boundary of said landing or approach zone to such structure or tree measured along a line at right angles to the centerline of such landing or approach zone.

(6) Where zones overlap, the height limit shall be that of the zone imposing the more stringent height limit.

Section 4. Use Restrictions. Except as provided in Section 8 hereof, from and after the taking effect of this ordinance it shall be unlawful to put any land located within the airport hazard area to any of the following uses:

(1) Any use which would create unreasonable interference with radio communication between aircraft and the airport or communication facilities in the vicinity thereof, or which would unreasonably interfere with other navigational aid or devices used by the airport or by aircraft using said airport, or with electronic navigational aids that may at the time of such interference be established for the vicinity thereof.

(2) Any use which would materially reduce the visibility within the aforementioned airport hazard area or which would make it difficult for flyers in the vicinity of or on the airport to distinguish between airport lights or markers or other navigational lights or markers in the vicinity of the airport or which would result in glare in the eyes of flyers using the airport.

(3) The conduct of any business or occupation, or any use, which business, occupation or use, by its very nature, is inherently dangerous or hazardous as respects likelihood of causing or resulting in injury or damage to aircraft or the occupants thereof flying to and from or in the vicinity of said airport, or persons present at or in the vicinity of said airport or lawfully in the vicinity thereof.

(4) Any other use or uses which would be dangerous or hazardous to the safety of aircraft using the airport or maneuvering in the vicinity thereof or to the health, safety or general welfare of airport personnel and other persons using said airport.

Section 5. Existing Nonconforming Uses. The height limits and use restrictions as provided herein or as may hereafter be provided in any amendment hereto, except as hereinafter provided in Section 6, subdivision 2 and Section 9, subdivision 2, shall in no event be construed to interfere with the continuance of any nonconforming use or to require the removal, lowering or other change or alteration of any existing nonconforming tree, or of any nonconforming structure the construction or alteration of which was begun through the letting of contracts therefor prior to the effective date of this ordinance or amendment thereto and where such construction or alteration is prosecuted with reasonable diligence; provided that the provisions hereof shall not be construed as a limitation upon the rights conferred upon MAC by M.S.A. 360.074.

Section 6. Permits. Application shall be made and permit procured from the MAC Zoning Committee created hereunder in each of the following instances and subject to the following conditions:

(1) Where it is desired to erect or locate structures, to increase the height of existing structures or to plant or transplant trees within the airport hazard area to a height in excess of ten feet below the height limit herein provided with respect thereto.

(2) Where it is desired to replace, substantially alter or repair, rebuild, or relocate any nonconforming structure or tree within the airport hazard area, provided, however, that whenever the Committee determines that a nonconforming structure or tree within the airport hazard area has been abandoned or more than 80% torn down, destroyed, deteriorated or decayed no permit shall be granted.

(3) No permit shall be granted that would allow the establishment or creation of an airport hazard or that would permit a nonconforming structure or tree or nonconforming use to be made or to become higher or to become a greater airport hazard than was the case under the applicable zoning regulations at the time when the application for permit was made.

(4) In granting any permit, the Committee may, if it deems such action advisable to effectuate the purpose of this ordinance and reasonable in the circumstances, so condition such permit as to require the owner of a structure or tree in question to permit the MAC at its own expense to install, operate and maintain thereon such markers and lights as may be necessary to indicate to flyers the presence of an airport hazard.

(5) Whenever any person prior to erection, alteration or relocation of structures or planting or transplanting of trees within the airport hazard area makes a report of the contemplated erection, alteration or relocation of structures or the contemplated planting or transplanting of trees within said airport hazard area, to the committee, the committee shall promptly investigate and determine whether or not there would be a violation of the ordinance; and if a violation be found the committee shall so advise such person, who shall thereupon alter his plans so as to meet the requirements of the ordinance.

Section 7. Variances. Any person desiring to erect or to locate any structure or to increase the height thereof or to permit the growth of any tree or otherwise to use property within the airport hazard area contrary to the provisions of this ordinance may apply to the MAC Airport Zoning Appeal Board created hereunder for variance from the provisions of this ordinance. Such variance shall be allowed where literal application or enforcement of the provisions of this ordinance would result in practical difficulty or unnecessary hardship to the applicant, and where the relief granted would not be contrary to the public interest but would do substantial justice and would be in accordance with the spirit of these provisions. Any variance may be granted, however, subject to such reasonable conditions as the Board may deem necessary to effectuate the purposes of this ordinance, and the granting of such variance may be conditioned upon the owner of a structure or tree granting to the MAC the right at its expense to install, operate and maintain thereon such markers and lights as may be necessary to indicate to flyers the presence of an airport hazard.

(1) Two copies of an application for variance, indicating the facts surrounding such application in sufficient detail to permit a determination of the application on its merits, shall be filed with the MAC Airport Zoning Committee which shall forthwith transmit one copy to the MAC Airport Zoning Appeal Board, the second copy being retained by the Committee for its files.

Section 8. Administration. For the administration and enforcement of the provisions of this ordinance there is hereby created an administrative agency to be known as the MAC Airport Zoning Committee, the same to consist of three members. The said Committee shall include one member of the Commission appointed by the said Commission to represent the City of Minneapolis, a second member of the Commission appointed by the said Commission to represent the City of Saint Paul and a third member who shall be the Executive Director of the said Commission serving ex officio. The members of the Committee, except the ex officio member, shall serve at the pleasure of the Commission. No compensation shall be paid members of the MAC Zoning Committee except reimbursement of actual expense.

(1) The powers and duties of said administrative agency shall be as provided by Laws 1945, c. 303, as amended, M.S.A., sections 360.061-. 074.

(2) Where a nonconforming structure or tree within the airport hazard area has been abandoned or more than 80% torn down, destroyed, deteriorated or decayed, although no application for permit has been made, the Committee may order the owner of such nonconforming structure or tree at the owner's expense to lower, remove, reconstruct or equip the same as may be necessary to conform to this ordinance, in which case the Committee shall give notice thereof to the owner, and if the owner shall neglect or refuse to comply with such order for ten days after notice is given, then the Committee may proceed to have such nonconforming structure or tree lowered, removed reconstructed or equipped and assess the cost and expense thereof against such structure or against the land whereon such structure or tree is or was located. Unless such an assessment is paid within ninety days from the date of service of notice thereof on the owner or upon the person in possession of such structure or tree or of the land upon which the same is or was located, the sum due shall bear interest at the rate of 8% per annum until paid and may be collected either by suit in a court of competent jurisdiction or in the same manner as are general taxes. Notice aforesaid shall be in writing and served in the same manner as a summons in a civil action.

(3) Applications for permits shall be made to the Committee on forms prepared and furnished by it. The forms shall provide for a statement by applicant of the purpose for which the permit is applied, and for statement of applicant of all facts pertinent to the question whether or not the application should be granted. Such applications shall be promptly considered and the permit granted or denied by the Committee, notice in writing of the Committee's decision to be promptly delivered or mailed to the applicant.

(4) All reports made pursuant to Section 6 hereof shall be received by the Committee and shall be reviewed by it promptly to determine whether there is an airport hazard, and if found that there is one, notice in writing of such finding setting forth the reasons therefor shall be promptly delivered or mailed to the person making such report.

(5) All applications for variance shall be received by the Committee, which shall forthwith transmit the copy of such application to the MAC Airport Zoning Appeal Board, retaining a second copy of such application for the Committee's files. The Committee shall be represented at all hearings on applications for variance before the Board unless it shall attach its written approval to the application for variance on transmitting it to the Board.

(6) The Committee shall have its office at the office of the MAC. It shall keep and file in its said office records of all its proceedings, all applications for permits and reports and of action thereon. The Committee shall also keep on file a record of all variances granted by the MAC Airport Zoning Appeal Board. The files of the Committee shall be open to the public.

(7) The majority vote of the members shall control on all matters coming before it.

Section 9. Board of Adjustment. There is hereby created a MAC Airport Zoning Appeal Board consisting of five members. Two members shall be appointed by the Commission from the City of Minneapolis, two members shall be appointed by the Commission from the City of Saint Paul, and the fifth member shall be appointed by a majority vote of the other four members. No member of the MAC Airport Zoning Appeal Board may be a member of the MAC Airport Zoning Committee. Each member shall serve for a term of three years and until his successor is appointed and all members shall be removable by the Commission for cause upon written charges and after notice and opportunity for public hearing before the Commission. The powers and duties of said Board shall be as provided by Laws 1945, c. 303 as amended, M.S.A. Sections 360.061-.074.

Section 10. Appeals.

(1) Any person aggrieved or taxpayer affected by any decision of the MAC Airport Zoning Committee made in its administration of this ordinance, or the Commission or any governing body or administrative agency of a political subdivision, if of the opinion that a decision of said Committee is an improper application of airport zoning regulations of concern of such Commission, governing body or administrative agency, may appeal to the MAC Airport Zoning Appeal Board from the decision of the Committee.

(2) All appeals must be taken within a reasonable time, as provided by the rules of the Board, by filing with the Committee and with the Board a notice of appeal specifying the grounds thereof. The Committee shall forthwith transmit to the Board all papers constituting the record upon which the action appealed from was taken.

(3) An appeal shall stay all proceedings in furtherance of the action appealed from unless the Committee certifies to the Board after notice of appeal has been filed with it that by reason of the facts set forth in the certificate a stay would in its opinion cause imminent peril to life or property. In such case, proceedings shall not be stayed otherwise than by order of the Board on due notice to the Committee and on due cause shown.

(4) The Board shall fix a reasonable time for the hearing of appeals, give public notice and due notice to the parties in interest and decide the same within a reasonable time. Upon the hearing any party may appear in person or by agent or by attorney.

(5) The Board may in conformity with the provisions of this ordinance reverse or affirm wholly or partly or modify the order, requirement, decision or determination appealed from and may make such order, requirement, decision or determination as ought to be made, and to that end the Board shall have all the powers of the MAC Airport Zoning Committee from which the appeal is taken.

Section 11. Judicial Review. Any person aggrieved or taxpayer affected by any decision of the MAC Airport Zoning Appeal Board, or any governing body or administrative agency of a political subdivision which is of the opinion that a decision of the Committee is illegal will have such right of judicial review as is provided in Minnesota Laws 1945, Chapter 303 as amended upon exhausting the administrative remedies herein provided.

(1) In any case in which provision or provisions of this Ordinance are held by a court to interfere with the use or enjoyment of a particular structure or parcel of land to such an extent or to be so onerous in their application to such a structure or parcel of land as to constitute a taking or deprivation of that property in violation of the constitutior of this state or of the United States, such holding shall not affect the application of such provisions as to other structures and parcels of land.

Section 12. Violation and Penalty. Every person who within the airport hazard area shall construct, locate or maintain, substantially change or substantially alter or repair any existing structure or plant, transplant or permit the growth of any tree or make use of property contrary to the terms of this ordinance, or who having been granted a permit or variance as herein provided, shall construct, locate, substantially change or substantially alter or repair any existing growth or structure or permit the growth of any tree except as permitted by such permit or variance, or who otherwise shall violate the terms hereof or regulations, orders or rules promulgated hereunder, shall be guilty of a misdemeanor and shall be punished by a fine of not more than $300 or imprisonment for not more than 90 days or by both such fine and imprisonment. Each day a violation continues to exist shall constitute a separate offense, provided however, that where a report has been made and filed with the MAC Airport Zoning Committee as herein provided, for the purposes of this section there shall be no violation within the meaning of this section until the Committee has given notice that the alteration, erection or location of structures or planing or transplanting of trees, in respect to which such report is made and filed, constitutes an airport hazard in violation of this ordinance, and reasonable opportunity has been given to remove the hazard. (As amended by MAC Ordinance 39 adopted and in effect January 10, 1972)

(1) In addition, the MAC may institute in any court of competent jurisdiction an action to prevent, restrain, correct or abate any violation of this ordinance or of regulations, orders or rulings promulgated hereunder, and the court shall adjudge to the Commission such relief by way of injunction (which may be mandatory) or otherwise as may be proper under all the facts and circumstances of the case in order to fully effectuate the purposes of this ordinance and of regulations, orders and rulings promulgated pursuant thereto.

Section 13. Severability. If any of the provisions of this ordinance or the application thereof to any person or circumstance is held invalid, such invalidity shall not affect other provisions or applications of the ordinance which can be given effect without the invalid provision or application, and to this end the provisions of this ordinance are declared to be severable.

Section 14. Effective Date. This ordinance shall be in full force and effect from and after its adoption.

Passed by the Minneapolis-Saint Paul Metropolitan Airports Commission on the 25th day of August, 1952.

Filed in the office of the Secretary of State on the 2nd day of September, 1952.

Map filed on the 10th day of September, 1952.

Mark Ryan

CRYSTAL AIRPORT JOINT AIRPORT ZONING ORDINANCE

December, 1983

As adopted by the Crystal Airport
Joint Zoning Board

CONTENTS

CRYSTAL AIRPORT

ZONING ORDINANCE

CREATED BY THE

CRYSTAL AIRPORT JOINT ZONING BOARD

AN ORDINANCE REGULATING AND RESTRICTING THE HEIGHT OF STRUCTURES AND OBJECTS OF NATURAL GROWTH, AND OTHERWISE REGULATING THE USE OF PROPERTY, IN THE VICINITY OF THE CRYSTAL AIRPORT BY CREATING THE APPROPRIATE ZONES AND ESTABLISHING THE BOUNDARIES THEREOF; PROVIDING FOR CHANGES IN THE RESTRICTIONS AND BOUNDARIES OF SUCH ZONES; DEFINING CERTAIN TERMS USED HEREIN; REFERRING TO THE CRYSTAL AIRPORT ZONING MAP WHICH IS INCORPORATED IN AND MADE A PART OF THIS ORDINANCE; PROVIDING FOR ENFORCEMENT; ESTABLISHING A BOARD OF ADJUSTMENT; AND IMPOSING PENALTIES.

IT IS HEREBY ORDAINED BY THE CRYSTAL AIRPORT JOINT ZONING BOARD PURSUANT TO THE AUTHORITY CONFERRED BY MINNESOTA STATUTES 360.061 - 360.074, AS FOLLOWS:

SECTION I: PURPOSE AND AUTHORITY

The Crystal Airport Joint Zoning Board, created and established by joint action of the Common Council of the Cities of Brooklyn Center, Brooklyn Park, Crystal, New Hope, Minneapolis, and Robbinsdale and the Metropolitan Airports Commission pursuant to the provisions and authority of Minnesota Statutes 360.063, hereby finds and declares that:

A. An airport hazard endangers the lives and property of users of the Crystal Airport, and property or occupants of land in its vicinity, and also if of the obstructive type, in effect reduces the size of the area available for the landing, takeoff, and maneuvering of aircraft, thus tending to destroy or impair the utility of the Crystal Airport and the public investment therein.

B. The creation or establishment of an airport hazard is a public nuisance and an injury to the region served by the Crystal Airport.

C. For the protection of the public health, safety, order, convenience, prosperity and general welfare, and for the promotion of the most appropriate use of land, it is necessary to prevent the creation or establishment of airport hazards.

D. The prevention of these airport hazards should be accomplished, to the extent legally possible, by the exercise of the police power without compensation.

E. The prevention of the creation or establishment of airport hazards and the elimination, removal, alteration, mitigation, or marking and lighting of existing airport hazards are public purposes for which political

subdivisions may raise and expend public funds.

SECTION II: SHORT TITLE

This ordinance shall be known as "Crystal Airport Joint Zoning Ordinance."

Those sections of land affected by this Ordinance are indicated in "Exhibit A"

which is attached to this Ordinance.

SECTION III: DEFINITIONS

As used in this Ordinance, unless the context otherwise requires:

"AIRPORT" means the Crystal Airport located in Hennepin County, Minnesota.

"AIRPORT ELEVATION" means the established elevation of the highest point on the usable landing area which elevation is established to be 869 feet above mean sea level.

"AIRPORT HAZARD" means any structure or tree or use of land which obstructs the airspace required for, or is otherwise hazardous to, the flight of aircraft in landing or taking off at the airport; and any use of land which is hazardous to persons or property because of its proximity to the airport.

"DWELLING" means any building or portion thereof designed or used as a residence or sleeping place of one or more persons.

"ESTABLISHED RESIDENTIAL NEIGHBORHOOD IN A BUILT-UP URBAN AREA" (ERN-BUUA) means an area, which, if it existed on or before January 1, 1978 (for low density structures and lots) and an area which, if it existed on or before July 2, 1979 (all other land uses), shall be considered a conforming use that shall not be prohibited except as provided below in V B 5 EXEMPTIONS-ESTABLISHED RESIDENTIAL NEIGHBORHOODS. The following criteria shall be applied and considered in determining what constitutes an ERN-BUUA:

(1) Location of the airport;
(2) Nature of the terrain within Safety Zones A and B;
(3) Existing land uses and character of the neighborhood around the airport;
(4) Population of the community;
(5) That the average population density in all areas within one mile of any point on a runway be equal to or greater than one dwelling unit per acre;
(6) Population density near the airport compared with population density in other areas of the community;
(7) The age and the economic, political and social stability of the neighborhood

and the community as a whole;
(8) The proximity of supporting school, commercial, religious, transportation and other facilities and their degree of integration with residential land uses;
(9) Presence or absence of public utilities including, but not limited to, public sanitary sewer system, electric service and gas mains;
(10) Whether or not the factors listed in subparagraphs (8) and (9) above tend to make the community surrounding the airport a self-sufficient unit;
(11) Whether the areas within one mile of the perimeter of the airport property would be considered primarily residential in character; and
(12) Other material factors deemed relevant by the governmental unit in distinguishing the area in question as established, residential, urban and built-up.

"HEIGHT" for the purpose of determining the height limits in all zones set forth in this Ordinance and shown on the zoning map, the datum shall be mean sea level elevation unless otherwise specified.

"LANDING AREA" means the area of the airport used for the landing, taking off or taxiing of aircraft.

"LOW DENSITY RESIDENTIAL STRUCTURE" means a single-family or two-family home.

"LOW DENSITY RESIDENTIAL LOT" means a single lot located in an area which is zoned for single-family or two-family residences and in which the predominant land use is such type of residences.

"NONCONFORMING USE" means any pre-existing structure, tree, natural growth, or use of land which is inconsistent with the provisions of this Ordinance or an amendment hereto.

"NONPRECISION INSTRUMENT RUNWAY" means a runway having an existing or planned straight-in instrument approach procedure utilizing air navigation facilities with only horizontal guidance, and for which no precision approach facilities are planned or indicated on an approved planning document.

"PERSON" means an individual, firm, partnership, corporation, company, association, joint stock association, or body politic, and includes a trustee, receiver, assignee, administrator, executor, guardian, or other representative.

"PLANNED" as used in this Ordinance refers only to those proposed future airport developments that are so indicated on a planning document having the approval of the Federal Aviation Administration, the Department of Transportation, Division of Aeronautics and the Metropolitan Airports Commission.

"PRECISION INSTRUMENT RUNWAY" means a runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), or a precision

Approach Radar (PAR). Also, a runway for which a precision instrument approach system is planned and is so indicated on an approved planning document.

"RUNWAY" means any existing or planned paved surface or turf-covered area of the airport which is specifically designated and used or planned to be used for the landing and/or taking off of aircraft.

"SLOPE" means an incline from the horizontal expressed in an arithmetic ratio of horizontal magnitude to vertical magnitude.

Slope = 3:1 = 3 ft. horizontal to 1 ft. vertical

"STRUCTURE" means an object constructed or installed by man, including, but without limitations, buildings, towers, smokestacks, and overhead transmission lines.

"TRAVERSE WAYS" for the purpose of determining height limits as set forth in this Ordinance shall be increased in height by 17 feet for interstate highways; 15 feet for all other public roadways; 10 feet or the height of the highest mobile object that would normally traverse the road, whichever is greater, for private roads; 23 feet for railroads; and for waterways and all other traverse ways not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it.

"TREE" means any object of natural growth.

"UTILITY RUNWAY" means a runway that is constructed for and intended to be used by propeller-driven aircraft of 12,500 pounds maximum gross weight and less.

"VISUAL RUNWAY" means a runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an approved planning document.

"WATER SURFACES" for the purpose of this Ordinance shall have the same meaning as land for the establishment of protected zones.

"ZONING ADMINISTRATOR" for the purpose of this ordinance is the person in each affected municipality (Brooklyn Park, Brooklyn Center, Crystal, New Hope, Minneapolis, Robbinsdale) whose responsibility it is to issue building permits. (See Section XI B)

SECTION IV: AIRSPACE OBSTRUCTION ZONING

A. AIRSPACE ZONES: In order to carry out the purpose of this Ordinance, as set forth above, the following airspace zones are hereby established: Primary Zone, Horizontal Zone, Conical Zone, Approach Zone, and Transitional Zone and whose locations and dimensions are as follows:

1. PRIMARY ZONE: All that land which lies directly under an imaginary primary surface longitudinally centered on a runway and:

   a. extending 200 feet beyond each end of 13L-31R, 13R-31L, and 200 feet beyond the displaced threshold of 5L-23R and 5R-23L; The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of the primary surface is:

   b. 250 feet for Runways 13L-31R, 13R-31L, 5L-23R, 5R-23L.

2. HORIZONTAL ZONE: All that land which lies directly under an imaginary horizontal surface 150 feet above the established airport elevation, or a height of 1019 feet above mean sea level or 40 feet above existing ground level where such ground is above 979 feet above mean sea level, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc is:

   a. 6,000 feet for Runways 13L-31R, 13R-31L, 5L-23R, 5R-23L.

3. CONICAL ZONE: All that land which lies directly under an imaginary

conical surface extending upward and outward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet as measured radially outward from the periphery of the horizontal surface.

4. APPROACH ZONE: All that land which lies directly under an imaginary approach surface longitudinally centered on the extended centerline at each end of a runway. The inner edge of the approach surface for Runways 13L-31R and 13R-31L is at the same width and elevation as, and coincides with, the end of the primary surface. The inner edge of the approach surface for Runways 5L-23R and 5R-23L is the same width as the primary surface and is at the same elevation as, and coincides with a point 200 feet from the end of each runway. The approach surface inclines upward and outward at a slope of:

   a. 40:1 for Runways 13L-31R, 13R-31L, 5L-23R, 5R-23L.

   The approach surface expands uniformly to a width of:

   b. 2,250 feet for Runways 13L-31R, 13R-31L, 5L-23R, 5R-23L at a distance of 10,000 feet to the periphery of the conical surface.

5. TRANSITIONAL ZONE: All that land which lies directly under an imaginary surface extending upward and outward at right angles to the runway centerline and centerline extended at a slope of 7 to 1 from the sides of the primary surfaces and from the sides of the approach surfaces until they intersect the horizontal surface or the conical surface.

B. HEIGHT RESTRICTIONS: Except as otherwise provided in this Ordinance, and except as necessary and incidental to airport operations, no structure or tree shall be constructed, altered, maintained, or allowed to grow in any airspace zone created in Subsection IV A so as to project above any of the

imaginary airspace surfaces described in said Subsection IV A hereof. Where an area is covered by more than one height limitation, the more restrictive limitations shall prevail.

C. BOUNDARY LIMITATIONS: The airspace obstruction zoning restrictions set forth in this section shall apply for a distance not to exceed one and one-half miles beyond the perimeter of the airport boundary and in that portion of an airport hazard area under the approach zone for a distance not exceeding two miles from the airport boundary.

SECTION V: LAND USE SAFETY ZONING:

A. SAFETY ZONE BOUNDARIES: In order to carry out the purpose of this Ordinance, as set forth above and also, in order to restrict those uses which may be hazardous to the operational safety of aircraft operating to and from the Crystal Airport, and furthermore to limit population and building density in the runway approach areas, thereby creating sufficient open space so as to protect life and property in case of an accident, there are hereby created and established the following land use safety zones:

1. SAFETY ZONE A: All land in that portion of the approach zones of a runway, as defined in Subsection IV A hereof, which extends outward from a point 200 feet from the displaced threshold for Runways 5L-23R and 5R-23L and from the end of the primary surface for a Runways 13L-31R and 13R-31L a distance equal to:

   a. 2,167 feet for runways 13L-31R, 13R-31L.

   b. 1,400 feet for runways 5L-23R, 5R-23L.

2. SAFETY ZONE B: All land in that portion of the approach zones of a runway, as defined in Subsection IV A hereof, which extends outward from

Safety Zone A a distance equal to:

a. 1,083 feet for runways 13L-31R, 13R-31L.

b. 700 feet for runways 5L-23R, 5R-23L.

3. SAFETY ZONE C: All that land which is enclosed within the perimeter of the horizontal zone, as defined in Subsection IV A hereof, and which is not included in Zone A or Zone B.

4. EXCEPTIONS - ESTABLISHED RESIDENTIAL NEIGHBORHOODS: The following described lands are designated as Established Residential Neighborhoods in Built-Up Urban Areas, based upon the state of development of the areas on July 2, 1979. Land uses which were in existence in these areas on July 2, 1979 are exempt from the USE RESTRICTIONS of Sections V B 2 and 3 below, and are subject to the provisions of V B 5 below.

a. Runway 31:

Auditor's Subdivision Number 328, lots 15, 17, 22 - 25, 29
R.L.S. 893
Charles R. Knable Post #494 Addition
Twin Lake Addition, block 11, lots 3 and 4
Bodem's Addition, block 1, lots 1 - 7
Lois First Addition, lot 1
Lois Second Addition, lot 1
Lois Third Addition, lots 1, 2, 3
Erma M. Gallagher Addition, block 2, lot 5
Hillcrest Addition, lots 1, 3
Klink Addition, block 1, lots 1 - 4
Sowers Addition, lot 1
Tred Company Second Addition
Twin Oak Terrace Second Addition, block 1, lots 1 - 4
Twin Oak Terrace, block 1, lots 1 - 8;
block 2, lots 1 - 7
Hoffinger Addition, block 1, lots 1 - 7
Twin Lake Manor, block 1, lots 2 - 10
block 2, lots 1 - 12
Twin Lake Terrace, block 1, lots 1 - 4
block 2, lots 1 - 5
Twin Lake Orchard Addition, lots 1, 2
Cragg and Ziebarth's, block 1, lots 1, 2, 3

Cragg Terrace, block 1, lots 1, 2, 3
Murray Lane Eighth Addition, block 2, lots 13, 14
block 3, lots 1 - 9 and 12 - 17
Hiawatha Manor Second Addition, block 1, lots 1 - 11
block 4, lots 1 - 4 and 5 - 10
Hiawatha Manor First Addition, block 2, lots 1 - 4
Hiawatha Manor, block 3, lots 1 - 3

b. Runway 13
Auditor's Subdivision 328, lots 1 - 8, 11, 13, 15, 16
Larburn Second Addition, block 1, lots 6 - 10
Larburn Addition, block 1, lots 1 - 12
block 2, lots 1 - 12
block 3, lots 1 - 6
block 4, lot 1
Larburn Third Addition, block 1, lot 2 and outlot 2
block 2, lots 1, 2, 3
A. M. Carlson's Addition, block 1, lots 1 - 12
block 2, lots 1 - 11
block 3, lots 1 - 9
block 4, lots 1 - 10
Helmer Sorenson Addition, block 1, lots 1 - 7, outlot 1
Acme Investment First Addition, block 1, lot 1
block 2, lots 1, 2, 3
A. M. Carlson's Second Addition, block 3. lot 7
A. M. Carlson's Third Addition, block 3, lots 9, 10, 11
Edgewood Estates Subdivision, block 1, lots 1, 2, 3
block 2, lot 1
Metes and Bounds Legal Descriptions: parcels 3020, 6679, 1706, 1704, 1708, Section 32, T-119, R-21

c. Runway 23
Auditor's Subdivision 328, lot 1
Bergstrom's Lynside Manor Second Addition, block 1, lots 1 - 22,
block 2, lots 1 - 12
Bergstrom's Lynside Manor Third Addition, block 1, lots 13, 14, 15
block 2, lots 1 - 4, 9 - 15
Waite's Addition, block 2, lots 7 - 10
Waite's Second Addition, block 2, lots 7-11

d. Runway 5
Kensey Manor Second Addition, block 1, lots 11 - 18, 1, 2
block 2, lots 1 - 9, 12 - 19
block 3, lots 11 - 13
block 4, lots 1 - 15
Mork Campion Addition, block 1, lots 16, 17
Kensey Manor, block 3, lots 3 - 7, 17, 18

B. USE RESTRICTIONS:

1. GENERAL: Subject at all times to the height restrictions set forth in Subsection IV B, no use shall be made of any land in any of the safety zones defined in Subsection V A which creates or causes interference with the operations of radio or electronic facilities on the airport or with radio or electronic communications between airport and aircraft, makes it difficult for pilots to distinguish between airport lights and other lights, results in glare in the eyes of pilots using the airport, impairs visibility in the vicinity of the airport, or otherwise endangers the landing, taking off, or maneuvering of aircraft.

2. ZONE A: Subject at all times to the height restrictions set forth in Subsection IV B and to the general restrictions contained in Subsection V B 1 areas designated as Zone A shall contain no buildings, temporary structures, exposed transmission lines, or other similar above-ground land use structural hazards, and shall be restricted to those uses which will not create, attract, or bring together an assembly of persons thereon. Permitted uses may include, but are not limited to, such uses as agriculture (seasonal crops), horticulture, animal husbandry, raising of livestock, wildlife habitat, light outdoor recreation (nonspectator), cemeteries, and auto parking.

3. ZONE B: Subject at all times to the height restrictions set forth in Subsection IV B, and to the general restrictions contained in Subsection V B 1, areas designated as Zone B shall be restricted in use as follows:

   a. Each use shall be on a site whose area shall not be less than three acres.

b. Each use shall not create, attract, or bring together a site population that would exceed 15 times that of the site acreage.

c. Each site shall have no more than one building plot upon which any number of structures may be erected.

d. A building plot shall be a single, uniform and non-contrived area, whose shape is uncomplicated and whose area shall not exceed the following minimum ratios with respect to the total site area:

Site Area at least (Acres)	But Less Than (Acres)	Ratio of Site Area to Bldg. Plot Area	Building Plot Area (sq. ft.)	Max. Site Population (15 persons/A)
3		12:1	10,900	45
	4	12:1		
4		10:1	17,400	60
	6	10:1		
6		8:1	32,700	90
	10	8:1		
10		6:1	72,600	150
	20	6:1		
20	and up	4:1	218,000	300

e. The following uses are specifically prohibited in Zone B: Churches, hospitals, schools, theaters, stadiums, hotels and motels, trailer courts, camp grounds, and other places of frequent public or semi-public assembly.

4. ZONE C: Zone C is subject only to height restrictions set forth in Subsection IV B, and to the general restrictions contained in Subsection V B 1.

5. EXEMPTIONS - ESTABLISHED RESIDENTIAL NEIGHBORHOODS:

a. Land uses which existed as of July 2, 1979 in the Established Residential Neighborhoods set forth in Section V A 4 above, and as

shown on the zoning map are subject to the height restrictions of Section IV B and the general restrictions of Section V B 1. Land uses which came into existence after July 2, 1979 are treated as though they were not in a designated Established Residential Neighborhood and are subject to the Zone A or Zone B restrictions as the case may be.

b. Land uses in Established Residential Neighborhoods which violate any of the following restrictions are prohibited as safety hazards and must be acquired, altered or removed at public expense. Those conditions are as follows:

(1) The following land uses if they exist in Safety Zone A or B and in an "Established Residential Neighborhood in a Built-Up Urban Area" are considered by the Commissioner to constitute airport safety hazards so severe, either to persons on the ground or to the air-traveling public, or both, that they must be prohibited under local airport zoning ordinances;

(a) any structure which a person or persons customarily use as a principal residence and which is located entirely inside Safety Zone A within 1000 feet of the end of the primary zone;

(b) any structure which a person or persons customarily use as a principal residence and which is located entirely within Safety Zones A or B and which penetrates an imaginary approach surface as defined by Section IV A;

(c) any land use in Safety Zone A or B which violates any of the following standards:

(i) the land use must not create or cause interference with the operation of radio or electronic facilities on the airport or with radio or electronic communications between the airport and aircraft;

(ii) the land use must not make it difficult for pilots to distinguish between airport lights and other lights;

(iii) the land use must not result in glare in the eyes of pilots using the airport or impair visibility in the vicinity of the airport.

(d) any isolated residential building lot zoned for single-family or two-family residences on which any structure, if built, would be prohibited by subparagraphs b.(1)(a), (b) or (c) above. An "isolated" residential building lot is one located in an area in which the predominant land use is single-family or two-family residential structures; and

(e) any other land use which presents, in the opinion of the Commissioner, a material danger to the landing, taking off or maneuvering of aircraft or to the safety of persons on the ground. In making such a determination, the Commissioner shall consider the following factors:

(i) possibility that the land use may contribute to or cause a collision of two or more aircraft or an aircraft and some other object;

(ii) possibility that the land use may, in case of an aircraft accident, cause an explosion, fire or the release of harmful or noxious fumes, gases or substances;

(iii) tendency of the land use to increase the number of persons that could be injured in case of an aircraft accident;

(iv) effect of the land use on availability of clear areas for emergency landings; and

(v) flight patterns around the airport, the extent of use of the runway in question, the type of aircraft using the airport, whether the runways are lighted, whether the airport is controlled, and other similar factors.

C. BOUNDARY LIMITATIONS: The land use safety zoning restrictions set forth in this section shall apply for a distance not to exceed one mile beyond the perimeter of the airport boundary and in that portion of an airport hazard area under the approach zone for a distance not exceeding two miles from the airport boundary.

SECTION VI: AIRPORT ZONING MAP:

The several zones herein established are shown on the Crystal Airport Zoning Map consisting of 2 sheets, prepared by Toltz, King, Duvall, Anderson and dated May 1980, attached hereto and made a part hereof, which map, together with such amendments thereto as may from time to time be made, and all notations, references, elevations, data, zone boundaries, and other information thereon, shall be and the same is hereby adopted as part of this Ordinance.

SECTION VII: NONCONFORMING USES:

Regulations not retroactive. The regulations prescribed by this Ordinance shall not be construed to require the removal, lowering, or other changes or alteration of any structure or tree not conforming to the regulations as of the effective date of this Ordinance, or otherwise interfere with the continuance of any nonconforming use. Nothing herein contained shall require any change in the contruction, alteration, or intended use of any structure, the construction or alteration of which was begun prior to the effective date of this Ordinance, and is diligently prosecuted and completed within two years thereof.

SECTION VIII: PERMITS:

A. FUTURE USES: Except as specifically provided in Paragraph 1 and 2 hereunder, no material change shall be made in the use of land and no structure shall be erected, altered, or otherwise established in any zone hereby created unless a permit therefor shall have been applied for and granted by the zoning administrator, hereinafter provided for. Each application for a permit shall Indicate the purpose for which the permit is desired, with sufficient particularity to permit it to conform to the regulations herein prescribed. If such determination is in the affirmative, the permit shall be granted.

1. However, a permit for a tree or structure of less than 75 feet of vertical height above the ground shall not be required in the horizontal and conical zones or in any approach and transitional zones beyond a horizontal distance of 4,200 feet from each end of the runway except when such tree or structure, because of terrain, land contour, or topographic features, would extend the height or land use limit

prescribed for the respective zone.

2. Nothing contained in this foregoing exception shall be construed as permitting or intending to permit any construction, alteration, or growth of any structure or tree in excess of any of the height limitations established by this Ordinance as set forth in Section IV and the land use limitations set forth in Section V.

B. EXISTING USES: Before any existing use or structure may be replaced, substantially altered or repaired, or rebuilt within any zone established herein, a permit must be secured authorizing such replacement, change, or repair. No permit shall be granted that would allow the establishment or creation of an airport hazard or permit a nonconforming use, structure, or tree to become a greater hazard to air navigation than it was on the effective date of this Ordinance or any amendments thereto, or than it is when the application for a permit is made. Except as indicated, all applications for such a permit shall be granted.

C. NONCONFORMING USES ABANDONED OR DETERIORATED: Whenever the zoning administrator determines that a nonconforming structure or tree has been abandoned or more than 80% torn down, deteriorated, or decayed, no permit shall be granted that would allow such structure or tree to exceed the applicable height limit or otherwise deviate from the zoning regulations. Whether application is made for a permit under this paragraph or not, the zoning administrator may order the owner of the nonconforming structure, at his own expense, to lower, remove, reconstruct, or equip the same in the manner necessary to conform to the provisions of this Ordinance. In the event the owner of the nonconforming structure shall neglect or refuse to

comply with such order for ten days after receipt of written notice of such order, the zoning administrator may, by appropriate legal action, proceed to have the nonconforming structure lowered, removed, reconstructed, or equipped and assess the cost and expense thereof against the land on which the structure is or was located. Unless such an assessment is paid within ninety days from the service of notice thereof on the owner of the land, the sum shall bear interest at the rate of eight per cent per annum from the date the cost and expense is incurred until paid, and shall be collected in the same manner as are general taxes.

SECTION IX: VARIANCES:

Any person desiring to erect or increase the height of any structure, or permit the growth of any tree, or use his property not in accordance with the regulations prescribed in this Ordinance may apply to the Board of Adjustment, hereinafter provided for, for a variance from such regulations. If a person submits an application for a variance by certified mail to the zoning administrator who shall forward it to the members of the Board and the Board fails to grant or deny the variance within four months, the variance shall be deemed to be granted by the Board. When the variance is granted by reason of the failure of the Board to act on the variance, the person receiving the variance shall notify the Board and Commissioner of Transportation by certified mail that the variance has been granted. The applicant shall include a copy of the original application for the variance with this notice to the Commissioner. The variance shall be effective 60 days after this notice is received by the Commissioner subject to any action taken by the Commissioner pursuant to Section 360.063, Subdivision 6. Such variances shall be allowed where it is duly found that a literal application or enforcement of the regulations would result in practical difficulty or unnecessary hardship and relief granted would not be

contrary to the public interest but do substantial justice and be in accordance with the spirit of this Ordinance provided any variance so allowed may be subject to any reasonable conditions that the Board of Adjustment or Commissioner may deem necessary to effectuate the purpose of this Ordinance.

SECTION X: HAZARD MARKING AND LIGHTING:

A. NONCONFORMING USES: The owner of any nonconforming structure or tree is hereby required to permit the installation, operation, and maintenance thereon of such markers and lights as shall be deemed necessary by the zoning administrator to indicate to the operators of aircraft in the vicinity of the airport the presence of such airport hazards. Such markers and lights shall be installed, operated, and maintained at the expense of the Metropolitan Airports Commission.

B. PERMITS AND VARIANCES: Any permit or variance granted by the zoning administrator or Board of Adjustment as the case may be, may, if such action is deemed adviseable to effectuate the purpose of this Ordinance and be reasonable in the circumstances, so condition such permit or variance as to require the owner of the structure or tree in question at his own expense, to install, operate, and maintain thereon such markers and lights as may be necessary to indicate to pilots the presence of an airport hazard.

SECTION XI: AIRPORT ZONING ADMINISTRATOR:

A. DUTIES: It shall be the duty of the zoning administrator to administer and enforce the regulations prescribed herein. Applications for permits and variances shall be made to the zoning administrator upon a form furnished by him. Permit applications shall be promptly considered and granted or denied

by him in accordance with the regulations prescribed herein. Variance applications shall be forthwith transmitted by the zoning administrator for action by the Board of Adjustment hereinafter provided for.

B. MUNICIPAL IDENTIFICATION: For the purpose of this Ordinance the Zoning Administrator shall be the following municipal officials: the Brooklyn Center Director of Planning and Inspection for lands located in Brooklyn Brooklyn Center; the Brooklyn Park Zoning Administrator for lands located in Brooklyn Park; the Crystal Building Inspector for lands located in Crystal; the Minneapolis Director of Inspection for lands located in Minneapolis; the New Hope Building Official for lands located in New Hope; and the Robbinsdale Director of Community Development for lands located in Robbinsdale. In the event that one or more of the above-described zoning administrators does not administer this ordinance, and if the municipality does not appoint a successor zoning administrator, the Crystal Airport Joint Zoning Board shall appoint an individual or a permit-issuing agency to administer the ordinance in the municipality or municipalities.

C. LIMITATION OF SCOPE: In the event that a permit application is denied by the zoning administrator because it violates the terms of this airport zoning ordinance and the terms of the municipal zoning ordinance, the applicant must receive variances from both the Board of Adjustment, as provided for in Minnesota Statutes 360.067 Subdivision 2, and the municipality before a permit may be issued.

SECTION XII: BOARD OF ADJUSTMENT:

A. ESTABLISHMENT: The Board of Adjustment shall consist of five members appointed by the Metropolitan Airports Commission and each shall serve for a

term of three years and until his successor is duly appointed and qualified. Of the members first appointed, one shall be appointed for a term of one year, two for a term of two years, and two for a term of three years. Upon their appointment the members shall select a chairman to act at the pleasure of the board. Members shall be removable by the Metropolitan Airports Commission for cause, upon written charges, after a public hearing.

B. POWERS: The Board of Adjustment shall have and exercise the following powers:

1. To hear and decide appeals from any order, requirement, decision, or determination made by the Zoning Administrator in the enforcement of the zoning regulations contained in this ordinance, as provided in Minnesota Statutes 360.068.
2. To hear and decide special exceptions to the terms of zoning regulations contained in this Ordinance upon which such Board of Adjustment under such regulations may be required to pass.
3. To hear and decide specific variances under Minnestoa Statutes 360.067.

C. PROCEDURES:

1. The Board of Adjustment shall adopt rules for its governance and procedure in harmony with the provisions of this Ordinance. Meetings of the Board of Adjustment shall be held at the call of the Chairman and at such other times as the Board of Adjustment may determine. The Chairman, or in his absence the acting chairman, may administer oaths and compel the attendance of witnesses. All hearings of the Board of Adjustment shall be public. The Board of Adjustment shall keep minutes

of its proceedings showing the vote of each member upon each question or, if absent or failing to vote, indicating such fact, and shall keep records of its examinations and other official actions, all of which shall immediately be filed in the office of the Zoning Administrator and shall be a public record.

2. The Board of Adjustment shall make written findings of fact and conclusions of law giving the facts upon which it acted and its legal conclusions from such facts in reversing, affirming, or modifying any order, requirement, decision or determination which comes before it under the provisions of this Ordinance.

3. The concurring vote of a majority of the members of the Board of Adjustment shall be sufficient to reverse any order, requirement, decision or determination of the Zoning Administrator or to decide in favor of the applicant on any matter upon which it is required to pass under this Ordinance or to effect any variation in this Ordinance.

SECTION XIII: APPEALS:

A. Any person aggrieved, or any taxpayer affected by any decision of the Zoning Administrator made in his administration of airport zoning regulations contained in this Ordinance, may appeal to the Board of Adjustment. Such appeals may also be made by any governing body of a municipality, county, or airport zoning board, which is of the opinion that a decision of the zoning administrator is an improper application of this ordinance as it concerns such governing body or board.

B. All appeals hereunder must be commenced within 30 days of the Zoning Administrator's decision by filing with the Zoning Administrator a notice of

appeal specifying the grounds thereof. The Zoning Administrator shall forthwith transmit to the Board of Adjustment all papers constituting the record upon which the action appealed from was taken. In addition, any person aggrieved, or any taxpayer affected by any decisions of the Zoning Administrator made in his administration of airport zoning regulations contained in this ordinance who desires to appeal such decision, shall submit an application for a variance by certified mail to the members of the Board of Adjustment in the manner set forth in Minnesota Statutes 360.068, Subdivision 2.

C. An appeal shall stay all proceedings in furtherance of the action appealed from, unless the Zoning Administrator certifies to the Board of Adjustment, after the notice of appeal has been filed with it, that by reason of the facts stated in the certificate a stay would in his opinion, cause imminent peril to life or property. In such case, proceedings shall not be stayed except by order of the Board of Adjustment on notice to the Zoning Administrator and on due cause shown.

D. The Board of Adjustment shall fix a reasonable time for hearing appeals, give public notice, notice to the municipalities of Brooklyn Center, Brooklyn Park, Crystal, Minneapolis, New Hope, Robbinsdale and the Metropolitan Airports Commission, and due notice to the parties in interest, and decide the same within a reasonable time. Upon the hearing any party may appear in person or by agent or by attorney.

E. The Board of Adjustment may, in conformity with the provisions of this ordinance, reverse or affirm, in whole or in part, or modify the order, requirement, decision or determination appealed from and may make such

order, requirement, decision or determination, as may be appropriate under the circumstances, and to that end shall have all the powers of the Zoning Administrator for the purpose of enforcing this airport zoning Ordinance.

SECTION XIV: JUDICIAL REVIEW:

Any person aggrieved, or any taxpayer affected by any decision of the Board of Adjustment, or any governing body of a municipality, county, or airport zoning board, which is of the opinion that a decision of the Board of Adjustment is illegal may present to the District Court of Hennepin County a verified petition setting forth that the decision or action is illegal, in whole or in part, and specifying the grounds of the illegality. Such petition shall be presented to the court within 30 days after the decision is filed in the office of the Board of Adjustment. The petitioner must exhaust the remedies provided in this Ordinance before availing himself of the right to petition a court as provided by this section.

SECTION XV: PENALTIES:

Every person who shall construct, establish, substantially change, alter or repair any existing structure or use, or permit the growth of any tree without having complied with the provision of this Ordinance or who, having been granted a permit or variance under the provisions of this Ordinance, shall construct, establish, substantially change or substantially alter or repair any existing growth or structure or permit the growth of any tree, except as permitted by such permit or variance, shall be guilty of a misdemeanor and shall be punished by a fine of not more than $500 or imprisonment for not more than 90 days or by both. Each day a violation continues to exist shall constitute a separate offense. The Airport Zoning Administrator may enforce all provisions of this ordinance through such proceedings for injunctive relief and other relief as may be proper under the laws of Minnesota Statutes 360.073 and other applicable law.

SECTION XVI: CONFLICTS:

Where there exists a conflict between any of the regulations or limitations prescribed in this Ordinance and any other regulations applicable to the same area, whether the conflict be with respect to the height of structures or trees, the use of land, or any other matter, the more stringent limitation or regulation shall govern and prevail.

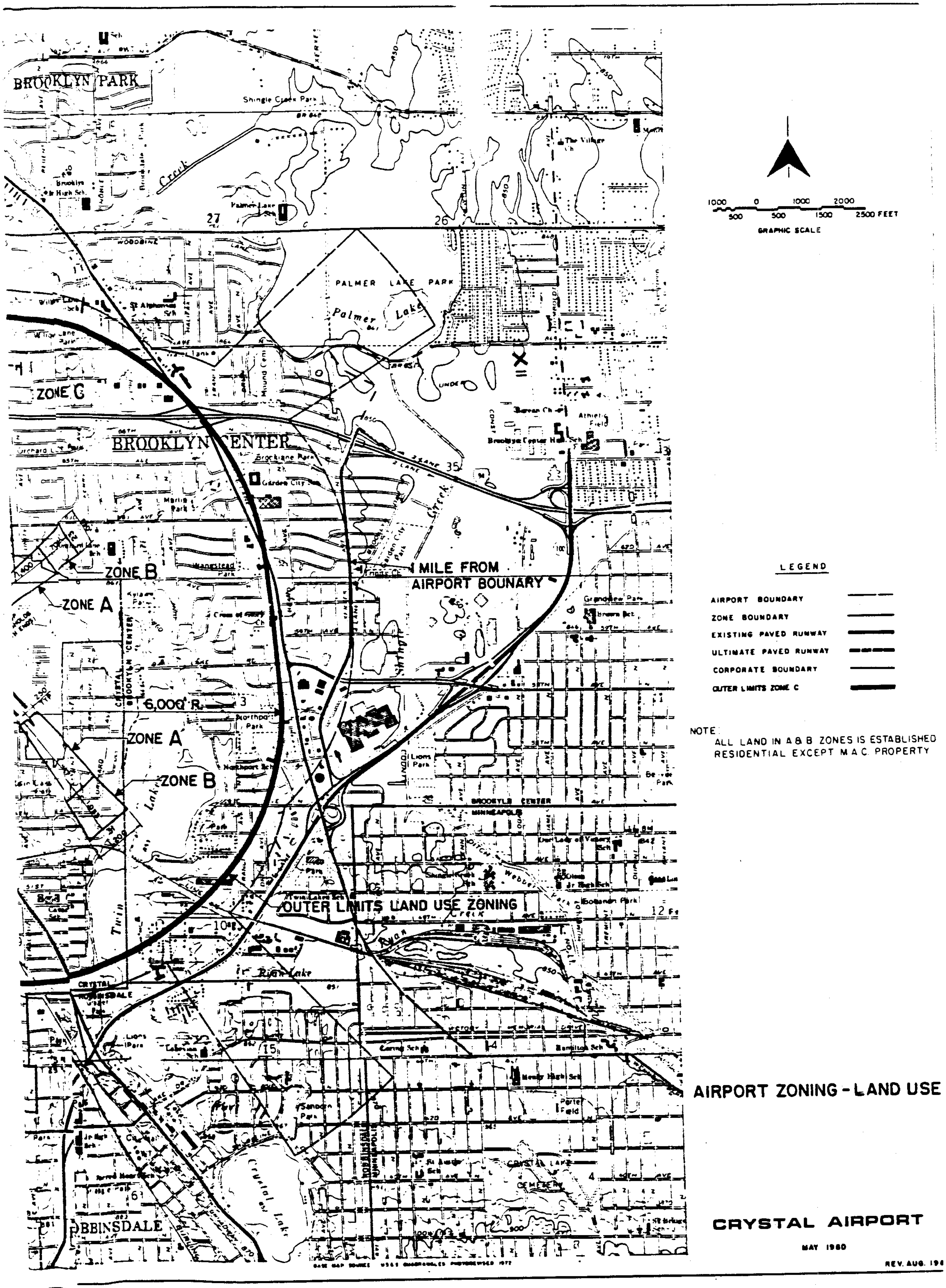
SECTION XVII: SEVERABILITY:

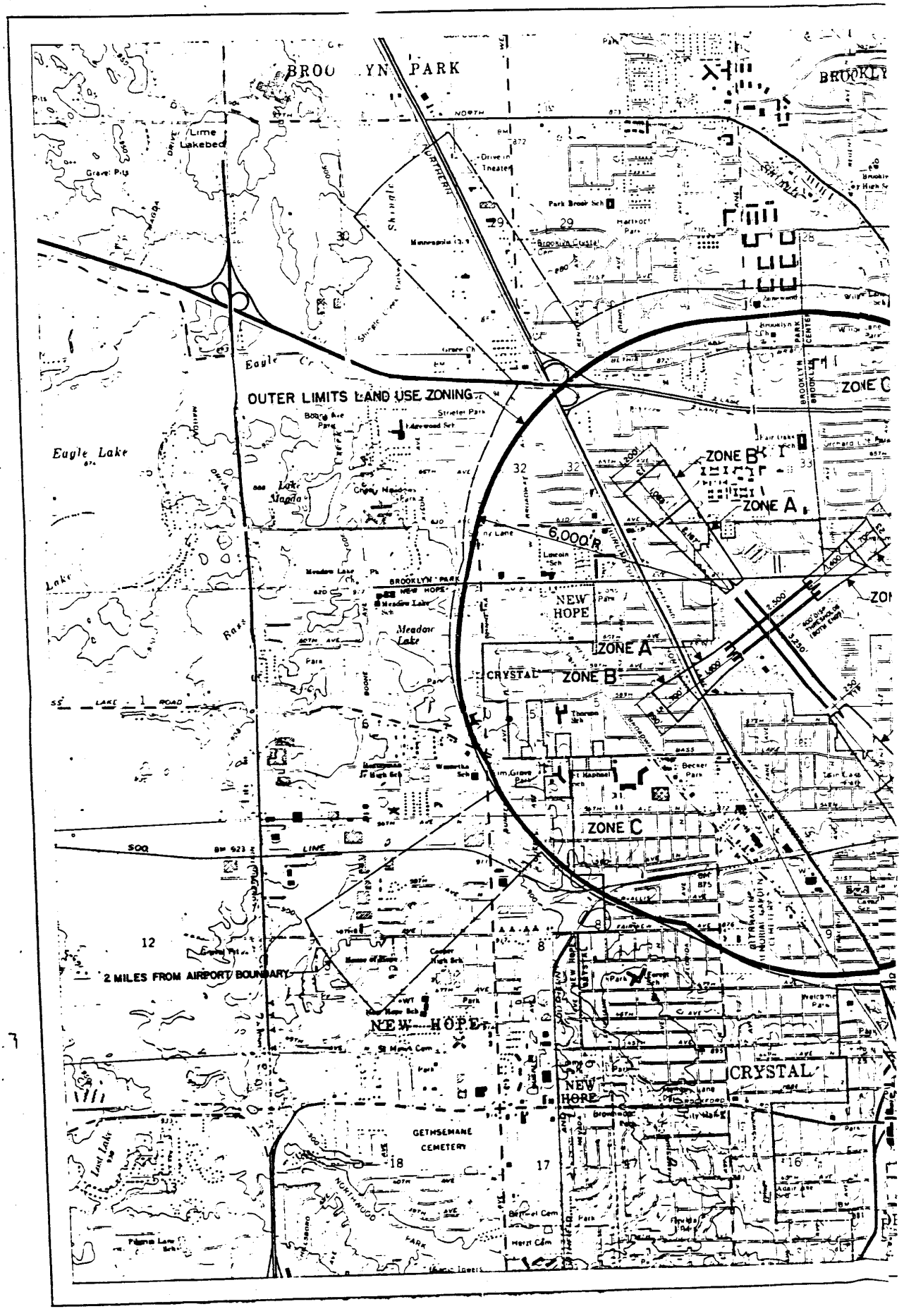
A. In any case in which the provisions of this Ordinance, although generally reasonable, are held by a court to interfere with the use or enjoyment of a particular structure or parcel of land to such an extent, or to be so onerous in their application to such a structure or parcel of land as to constitute a taking or deprivation of that property in violation of the constitution of this state or the constitution of the United States, such holding shall not affect the application of this Ordinance as to other structures and parcels of land, and to this end, the provisions of this Ordinance are declared to be severable.

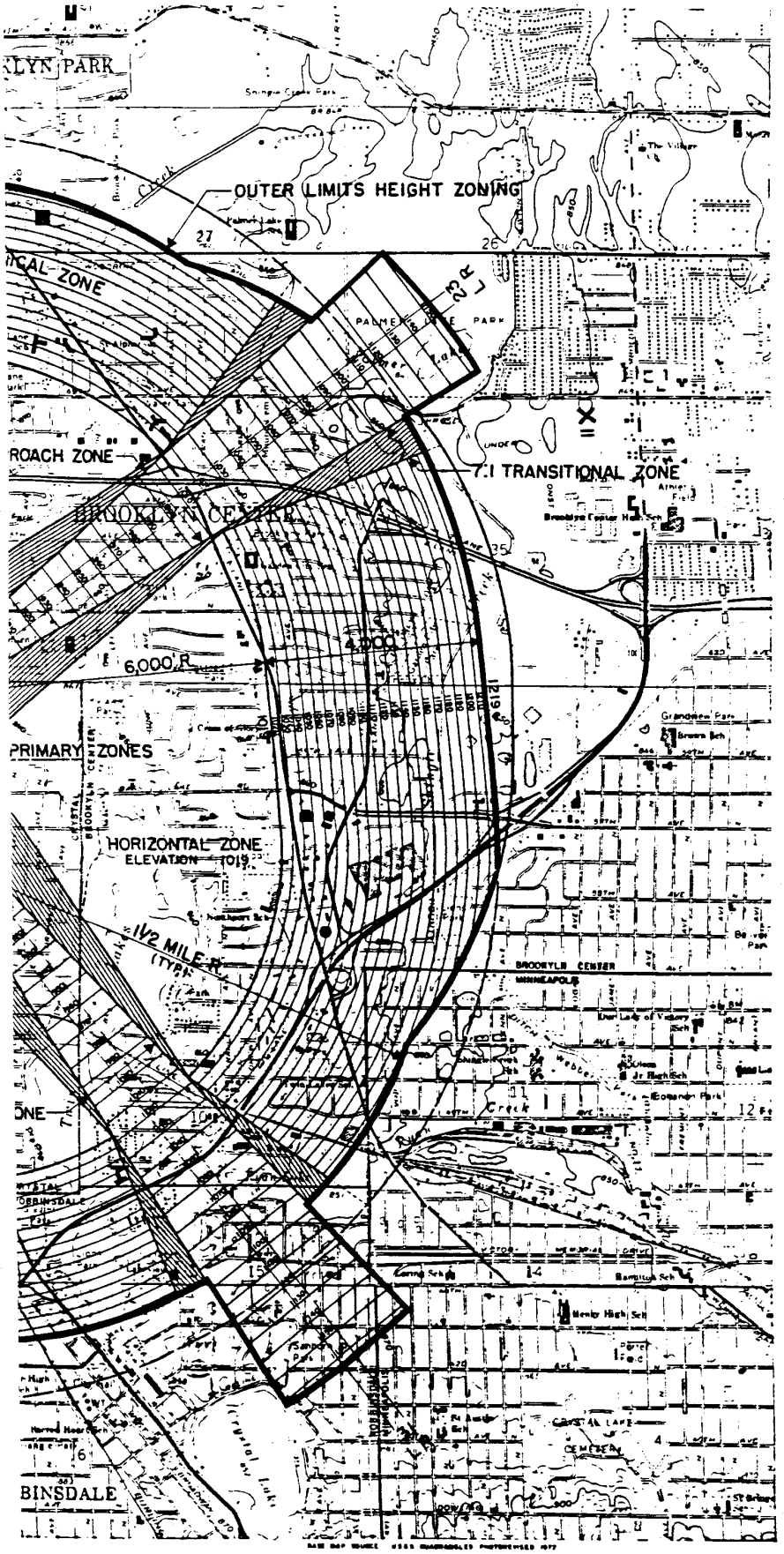
B. Should any section or provision of this Ordinance be declared by the courts to be unconstitutional or invalid, such decision shall not affect the validity of the Ordinance as a whole or any part thereof other than the parts so declared to be unconstitutional or invalid.

SECTION XVIII: EFFECTIVE DATE:

This Ordinance shall take effect on the 9TH day of December, 1983. Copies thereof shall be filed with the Commissioner of Transportation, Division of Aeronautics, State of Minnesota, and the Register of Deeds, Hennepin County, Minnesota.


BROOKLYN PARK
BROOKLYN CENTER
PALMER LAKE PARK
Palmer Lake
ZONE C
ZONE B
ZONE A
1 MILE FROM AIRPORT BOUNARY
6,000' R.
ZONE A
ZONE B
OUTER LIMITS LAND USE ZONING
Ryan Lake
Twin Lake
Crystal Lake
ROBBINSDALE
GRAPHIC SCALE
1000 0 1000 2000
500 500 1500 2500 FEET
LEGEND
AIRPORT BOUNDARY
ZONE BOUNDARY
EXISTING PAVED RUNWAY
ULTIMATE PAVED RUNWAY
CORPORATE BOUNDARY
OUTER LIMITS ZONE C
NOTE:
ALL LAND IN A & B ZONES IS ESTABLISHED RESIDENTIAL EXCEPT M.A.C. PROPERTY
AIRPORT ZONING - LAND USE
CRYSTAL AIRPORT
MAY 1980


OUTER LIMITS LAND USE ZONING
ZONE A
ZONE B
ZONE C
6,000'R
2 MILES FROM AIRPORT BOUNDARY
BROOKLYN PARK
NEW HOPE
CRYSTAL
Eagle Lake
Meadow Lake
GETHSEMANE CEMETERY



LEGEND

- AIRPORT BOUNDARY
- ZONE BOUNDARY
- EXISTING PAVED RUNWAY
- ULTIMATE PAVED RUNWAY
- CORPORATE BOUNDARY
- OUTER LIMITS HEIGHT ZONING
- AERIAL CONTOUR

ALL RUNWAY APPROACH SURFACE DIMENSIONS ARE 250' AT INNER WIDTH & 2,250 AT 10,000'

RUNWAY END ELEVATIONS

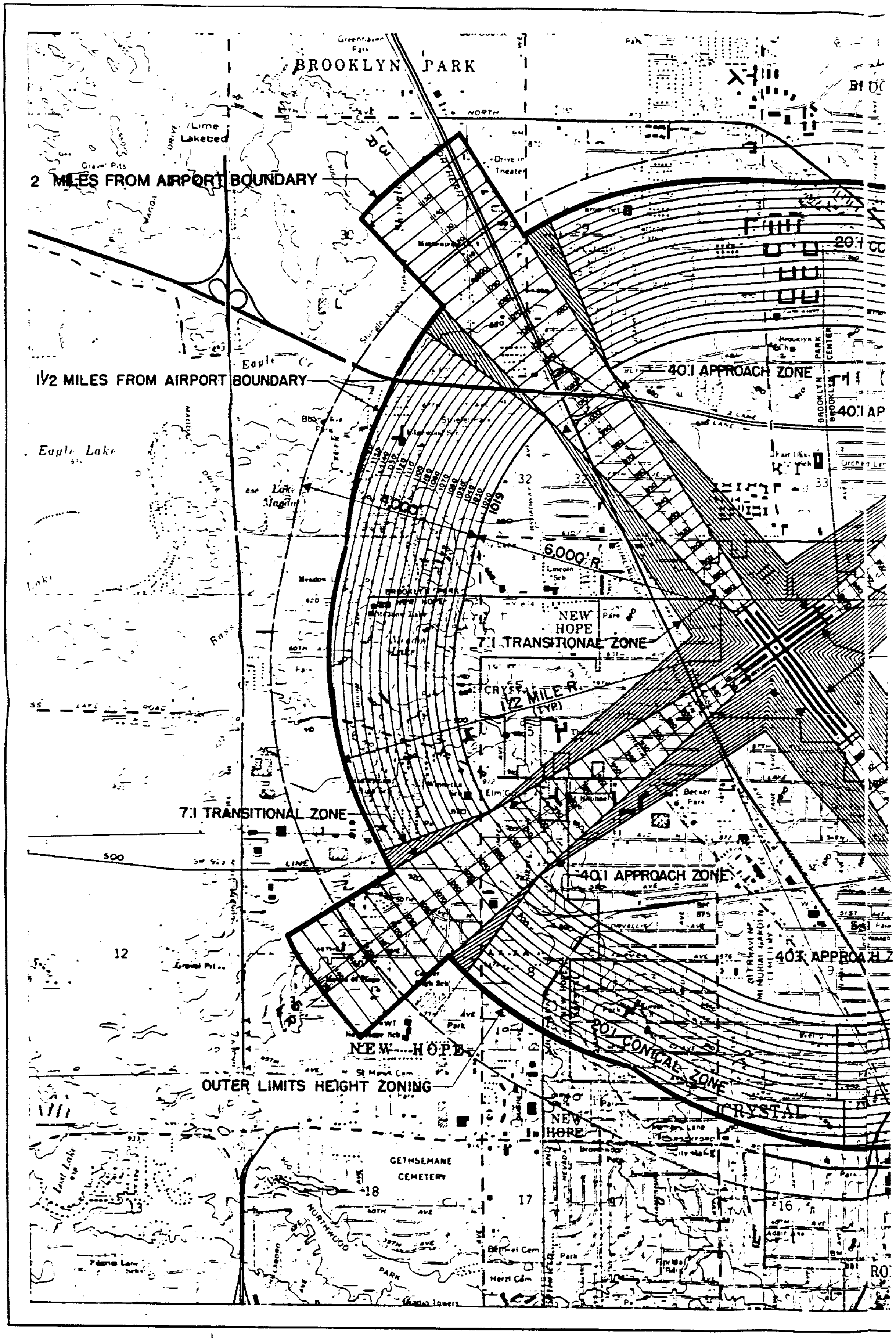
13R & 13L - 868.0
31R & 31L - 867.0
05R & 05L - 869.0
23R & 23L - 867.0

AIRPORT ZONING - HEIGHT

CRYSTAL AIRPORT

MAY 1980

REV. AUG. 1983


BROOKLYN PARK
2 MILES FROM AIRPORT BOUNDARY
1½ MILES FROM AIRPORT BOUNDARY
Eagle Lake
40:1 APPROACH ZONE
20:1 CONICAL ZONE
7:1 TRANSITIONAL ZONE
6,000' R
½ MILE R. (TYP.)
NEW HOPE
40:1 APPROACH ZONE
7:1 TRANSITIONAL ZONE
OUTER LIMITS HEIGHT ZONING
CRYSTAL
GETHSEMANE CEMETERY

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Appendix 8: Stakeholder Engagement Program Documentation

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Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

08 June 2016 – Quarterly Runway Safety/User Meeting

LTCP Overview

Briefing Agenda

- Guiding Principles
- Aviation Activity Forecasts
- Development Concepts
- Stakeholder Engagement
- Next Steps

2

LTCP Guiding Principles


Metropolitan Airports Commission

Crystal Airport
2035 Long-Term Comprehensive Plan (LTCP)

Guiding Principles

Guiding principles establish a foundation for and parameters against which planning-related decisions are evaluated. These principles provide focus and direction in formulating a recommended development plan – in this case for Crystal Airport (MIC). The principles also act as a high-level explanation of the purpose and objectives of the planning process.

By nature, these guiding principles are dynamic and may be adjusted over time.

Airport Role

Operating within a diverse system of metropolitan area airports, Crystal Airport's primary role is to serve personal, recreational, and some business aviation users in the northwest metropolitan area, including the cities of Crystal, Brooklyn Park, and Brooklyn Center. Example business services include flight training, aircraft rentals, charter flights, aircraft and propeller maintenance, sale of aircraft avionics and parts, and medical flight transportation.

The primary role of Crystal airport is not expected to change during the planning period. The Airport's classification will continue to be one of:

- A Commercially Reliever in the Metropolitan Airports Commission (MAC) system
- An Intermediate Airport per Minnesota Department of Transportation/Office of Aeronautics (MnDOT)
- A Minor Airport per the Metropolitan Council Regional Aviation System Plan

The aircraft mainly anticipated to use Crystal Airport – and that which it is designed for – will continue to be a family of small, propeller-driven airplanes with fewer than 10 passenger seats.

The proposed plan does not contemplate upgrading the role of Crystal Airport to accommodate a large aircraft factory or scheduled passenger or cargo flights, nor does the plan contemplate downgrading the role of Crystal Airport or transferring aviation activities to another site.

Airport Infrastructure

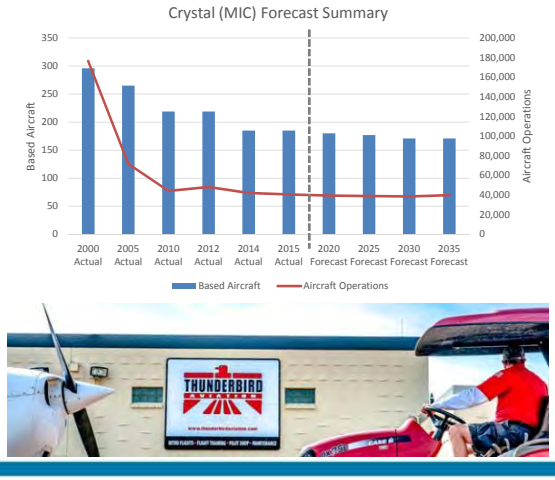
Key airfield improvement objectives for Crystal Airport are to:

1. Improve airfield safety by reducing the risk for runway incursions.
2. Right-size the airfield's size and dimensions to match existing and forecasted aviation activity levels.
3. Preserve and if feasible improve operational capabilities for the family of aircraft expected to use the facility.

- States high-level purpose and objectives for planning
- Provides focus and direction to evaluate planning decisions
  - Airport Role
  - Airport Infrastructure
  - Stakeholder and Community Engagement
  - Land Use Compatibility & Environmental Considerations
  - Financial Viability

3

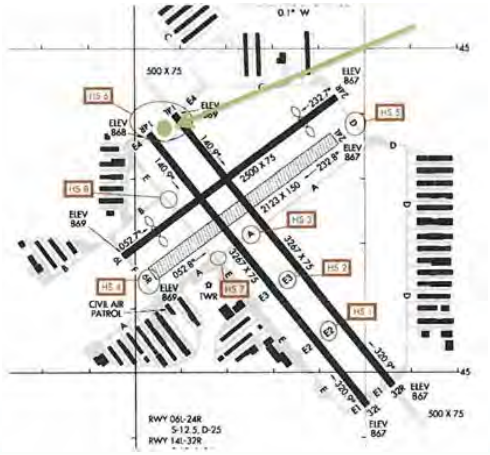
Activity Forecast Summary



- Based Aircraft
  - 296 in 2000
  - 185 in 2015
  - 171 estimated in 2035
- Aircraft Operations
  - ~177,000 in 2000
  - ~41,000 in 2015
  - ~40,000 estimated in 2035
- Trend towards stabilizing activity levels

4

Runway Incursion Mitigation (RIM)



- Airfield geometry identified as a primary contributing factor for Runway Incursions (RIs) at MIC
  - 37 documented RIs since 2007
- MIC is now on FAA's RIM "Hit List"
  - Hot Spot #6 has 13 RIs by itself
  - 9 aircraft, 4 vehicle incursions
- Improving airfield safety by reducing the rate of runway incursions is a high priority in the LTCP

5

Runway Length Requirements

- Design Aircraft Family
  - Small Propeller-Driven Airplanes
  - Fewer Than 10 Passenger Seats
- Primary Runway Length
  - FAA Guidance: Range of 3,300 – 3,900 feet
  - Aircraft-specific analysis: ~3,600 feet appropriate length for long-term future planning
    - Based on Accelerate-Stop Distance (ASDA)
    - Enhances safety and operational capability for the design aircraft family of propeller airplanes
    - Does NOT consider length requirements for jets
  - Existing RWY 14L-32R length is at the bottom end of this range
  - Consider "activating" paved overruns as stopways

6

Previous LTCP Concept

Maintain One Primary and One Crosswind Runway

- Previous LTCP adopted in December 2008
- Recommendation to "right size" the airfield to better align infrastructure with demand
  - Decommission turf (6R-24L) and south parallel (14R-32L) runways
  - Leaves a two-runway system in place
  - Opportunity to eliminate most or all Hot Spots
  - Open up Aeronautical & Non-Aeronautical development opportunities
- Turf Runway Operations

7

LTCP Concept Refinements Being Considered

Activate RWY 14-32 Stopways

- No change to runway ends or thresholds
- Requires Stopway lighting
- Requires additional safety area grading off ends
- Provides for ~3,767 feet Accelerate-Stop Distance
- Safety benefits for all; operational benefits for some

8

LTCP Concept Refinements Being Considered

- Utility Runway Designation
  - Improves RPZ Compliance
- Convert existing RWY 14R-32L to Full Parallel Taxiway
- Remove section of TWY E that crosses RWY 6-24
- Remove direct Apron-to-Runway access
- Additional apron/hangar development areas
- Obstacle (tree) clearing
- Additional LNAV instrument approaches

9

Stakeholder & Public Engagement

- Pre-Publication Stakeholder Engagement
  - Agencies
  - Tenants
  - Municipal Representatives
- MAC Board Approval to Publish Draft LTCP
- Formal Public Review Period
  - 45-day review period (targeting Fall 2016)
  - Public Information Meeting(s)
  - Additional briefings as necessary
- MAC Board Approval to Submit to Met C
- Metropolitan Council Review
- Final MAC Board Adoption
- Tenant/User Engagement During the Public Process is Crucial!

10

Questions, Input & Open Dialogue

11

Metropolitan Airports Commission

Airport Development Department

Memo

DATE: **July 19, 2016**

TO: **Crystal LTCP Working Group Members**

FROM: **Neil Ralston, Airport Planner**

SUBJECT: **Summary of 07/15/16 Crystal Airport 2035 LTCP Municipal Representatives Briefing**

On July 15, 2016, MAC staff met with representatives from several municipalities in the vicinity of the Crystal Airport to update them about the status of the draft 2035 Long-Term Comprehensive Plan (LTCP). Represented municipalities included:

- City of Crystal (Dan Olson, City Planner and John Sutter, Community Development Director)
- Hennepin County (Jason Gottfried, Senior Planning Analyst)
- City of Brooklyn Center (Tim Benetti, City Planner)
- City of Brooklyn Park (Cindy Sherman, Planning Director)

MAC staff in attendance were Dana Nelson, Mike Wilson, Melissa Scovronski, Kelly Gerads, Gary Schmidt, Robert Dockry, and Neil Ralston.

A copy of the briefing agenda, presentation slides, and supplemental handouts are attached.

The briefing started with a review of the Airport's role, current activity trends compared to other airports in the state, and the updated LTCP activity forecasts. Questions that arose from this portion of the briefing included:

- What are some examples of peer "Intermediate" airports in the state? For context, which airports have higher activity levels?
- What is MAC doing to market flight training activities at Crystal Airport?

The next item was a recap of the airfield changes recommended in the previous LTCP, and a description of the refinements to the base concept that we are considering in this planning cycle. The refinements under consideration include:

- Utility runway designations and use of smaller-dimension Runway Protection Zones (RPZs)
- Converting existing RWY 14L-32R paved overruns to stopways
- Converting existing RWY 14L-32R paved overruns to runway *(discarded from further consideration)*
- Ultimate taxiway configuration to simplify airfield layout

Dialogue from this portion of the briefing included the following items:

- Overall, the municipal representatives seemed supportive of the preliminary plan recommendation to convert the existing RWY 14L-32R paved overruns to stopways, likening them to paved shoulders on freeways. However, the Crystal representatives emphasized that we will have to carefully consider how we explain the rationale for the stopway conversion to the public to avoid the perception that this is a "back door" way to expand the airport.
- Concern was expressed about the stopway edge lighting moving closer to residential neighborhoods. MAC will confirm that the stopway lights use unidirectional lenses that are only visible in the direction of the takeoff roll.
- City of Crystal staff questioned the need for the crosswind runway, noting that if it was decommissioned it would open up a lot of valuable real estate along CR 81/Bottineau Boulevard for non-aeronautical development (like the recent medical device facility being constructed in Brooklyn Park). MAC staff explained that the rationale for preserving the crosswind runway are for wind coverage (primary 14-32 alignment does not provide 95% wind coverage in all conditions), and that use of the crosswind disperses noise impacts around the airport.

The final portion of the briefing focused on stakeholder engagement, public input, and the timeline for moving the LTCP forward. In particular, MAC staff solicited input from the group about methods to notify the public about upcoming informational meetings.

- The cities are increasing their use of social media to notify citizens of upcoming meetings. They will assist us through these channels.
- To maximize notification efforts, the cities recommended that we direct mail a postcard to residents in the vicinity of the airport. Crystal staff will put together a suggested list of residents to include in the direct mail.
- They also have had success in using temporary digital signage to announce meeting times and locations. They suggested that we could consider setting up temporary message boards next to the VFW on Bass Lake Road, and perhaps next to the former HFI hangar site.

Our next step is to coordinate further with the municipalities regarding the logistics of the public outreach program after we have MAC Board approval to proceed.

Attachments:
- Meeting agenda
- Briefing slides
- Draft LTCP Guiding Principles
- Crystal Airport LTCP Forecast Summary

Crystal Airport
2035 Long-Term Comprehensive Plan (LTCP)
Progress Briefing

07/15/2016 @ 2:30 PM
Crystal City Hall

----- Agenda Topics -----

- **Introductions**
- **Crystal Airport LTCP Guiding Principles (draft)**
- **Aviation Activity Forecast (2015 – 2035)**
    - Baseline activity levels
    - Base Case forecast
        - Based Aircraft
        - Aircraft Operations
        - Aircraft Fleet Mix
- **Recap of Alternatives Considered in Previous LTCP**
    - Eight (8) concepts evaluated
    - Preferred Alternative = Right-Size Airfield
        - Decommission two runways/retain two runways
    - Preferred Alternative Retained for 2035 LTCP
- **Preferred Alternative Refinements Being Evaluated**
    - Runway Designation
        - “Utility” Runway designation
    - Convert Runway 14L-32R Paved Overruns to Stopways
        - No new pavement; requires edge lights and additional safety area grading
        - Does not change published runway length
        - Safety enhancement
        - Improved but limited operational capabilities for some users
    - Taxiway Configuration Changes
- **Stakeholder Engagement**
    - User Group Outreach
    - First MAC Committee presentation – August 2016
    - Public/Stakeholder Comment Period (45 Days) – Fall 2016
- **Open Discussion/Next Steps**

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

15 July 2016

LTCP Progress Briefing to Municipal Planners

Briefing Agenda

- Introductions
- Airport Role
- Guiding Principles
- Aviation Activity Forecasts
- Development Concepts
- Stakeholder Engagement & Next Steps

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

2

Crystal Airport Role

- Primary Role of Crystal Airport
  - Integral part of the regional Reliever Airport system
  - Accommodates Personal, Recreational, and some Business Aviation users
  - Design Aircraft is and will continue to be small, propeller driven aircraft with < 10 passenger seats
  - Role not expected to change
- Crystal Airport Context
  - Of Peer "Intermediate" Airports (83)
    - 2nd busiest for aircraft operations
    - 3rd highest number of based aircraft
  - Of All Minnesota Airports (135)
    - Top 10 busiest for aircraft operations & top 5 for based aircraft

3

LTCP Guiding Principles

Metropolitan Airports Commission

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

Guiding Principles

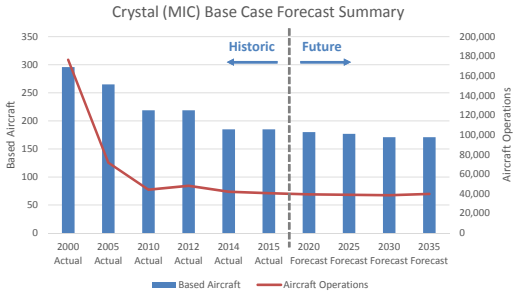
Airport Role

Airport Infrastructure

- States high-level purpose and objectives for planning
- Provides focus and direction to evaluate planning decisions
  - Airport Role
  - Airport Infrastructure
  - Stakeholder and Community Engagement
  - Land Use Compatibility & Environmental Considerations
  - Financial Viability

4

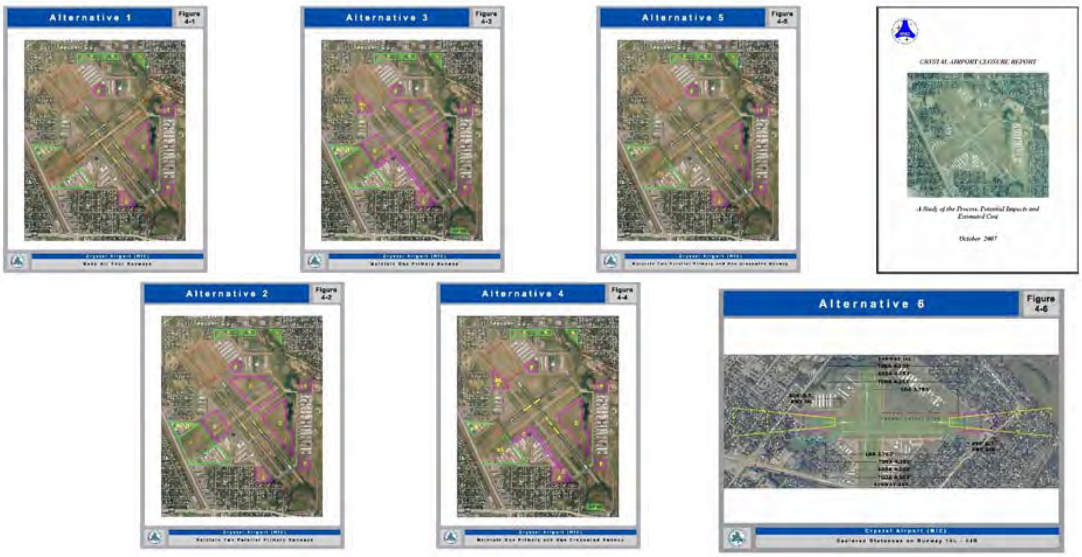
Activity Forecast Summary



- Based Aircraft (MnDOT)
  - 296 in 2000
  - 185 in 2015
  - 171 estimated in 2035
- Aircraft Operations
  - ~177,000 in 2000
  - ~41,000 in 2015
  - ~40,000 estimated in 2035
- Trend towards stabilizing activity levels
- Aircraft Fleet Mix

5

Previous LTCP Alternatives Considered



6

Previous LTCP Preferred Alternative

Maintain One Primary and One Crosswind Runway

- Previous LTCP adopted in December 2008
- Recommendation to "right size" the airfield to better align infrastructure with demand
  - Decommission turf (6R-24L) and south parallel (14R-32L) runways
  - Leaves a two-runway system in place
  - Opportunity to eliminate most or all "Hot Spots"
  - Open up Aeronautical & Non-Aeronautical development opportunities
- Turf Runway Operations

7

LTCP Concept Refinements Being Considered

"Utility" runway designation

- Allows use of smaller Runway Protection Zones (RPZs)
- Reduces number of homes in the RPZ
- Published runway strength = 12,500 pounds

8

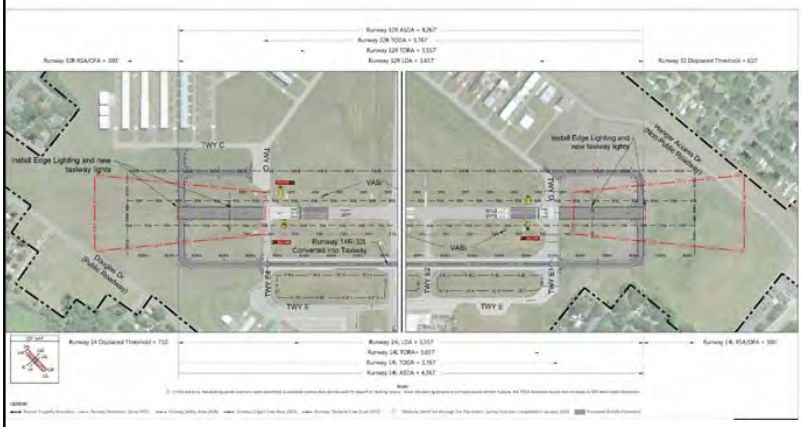
LTCP Concept Refinements Being Considered

Convert RWY 14-32 Overruns to Stopways

- No change to runway ends or thresholds
- Requires Stopway lighting
- Requires additional safety area grading off ends
- Provides for ~3,767 feet Accelerate-Stop Distance
- Safety benefits for all; operational benefits for some

9

LTCP Concept Refinements Being Considered



Convert RWY 14-32 Overruns to Runway

- Changes runway ends
- Requires taxiway extensions
- Provides for ~4,267 feet Accelerate-Stop Distance
- Increases complexity through declared distances
- Increases community noise exposure by moving takeoffs closer to homes

Dismissed from further consideration

10

LTCP Concept Refinements Being Considered

- Convert existing RWY 14R-32L to Full Parallel Taxiway
- Remove section of TWY E that crosses RWY 6-24
- Remove direct Apron-to-Runway access
- Additional apron/hangar development areas
- Obstacle (tree) clearing
- Additional LNAV instrument approaches

11

Stakeholder & Public Engagement

- Pre-Publication Stakeholder Engagement
  - Agencies
  - Tenants
  - Municipal Representatives
- MAC Board Approval to Publish Draft LTCP
- Formal Public Review Period
  - 45-day review period (targeting Fall 2016)
  - Public Information Meeting(s)
  - Additional briefings as necessary
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- Metropolitan Council Review
- Final MAC Board Adoption

12

Questions, Input & Open Dialogue

13

Crystal Airport
2035 Long-Term Comprehensive Plan (LTCP)
Guiding Principles

Guiding principles establish a foundation for and parameters against which planning-related decisions are evaluated. These principles provide focus and direction in formulating a recommended development plan – in this case for Crystal Airport (MIC). The principles also act as a high-level explanation of the purpose and objectives of the planning process.

By nature, these guiding principles are dynamic and may be adjusted over time.

Airport Role

Operating within a diverse system of metropolitan area airports, Crystal Airport's primary role is to serve personal, recreational, and some business aviation users in the northwest metropolitan area, including the cities of Crystal, Brooklyn Park, and Brooklyn Center. Example business services include flight training, aircraft rentals, charter flights, aircraft and propeller maintenance, sale of aircraft avionics and parts, and medical flight transportation.

The primary role of Crystal Airport is not expected to change during the planning period. The Airport's classification will continue to be that of:

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- An Intermediate Airport per Minnesota Department of Transportation/Office of Aeronautics (MnDOT)
- A Minor Airport per the Metropolitan Council Regional Aviation System Plan

The aircraft mainly anticipated to use Crystal Airport – and that which it is designed for – will continue to be a family of small, propeller-driven airplanes with fewer than 10 passenger seats.

The proposed plan does not contemplate upgrading the role of Crystal Airport to accommodate a larger aircraft family or scheduled passenger or cargo flights. Nor does the plan contemplate downgrading the role of Crystal Airport.

Airport Infrastructure

Key airfield improvement objectives for Crystal Airport are to:

1. Right size the airfield to match existing and forecasted activity levels
2. Preserve and, if possible, improve operational capabilities for the current family of aircraft using the facility
3. Enhance safety by simplifying the runway and taxiway layout

The planning process will ensure proposed airfield development conforms to Federal Aviation Administration (FAA) and MnDOT regulations, design standards, and system plans to the extent practical and feasible.

Wherever prudent, development plans will make use of existing facilities through renewal, modernization and/or infill development.

Stakeholder and Community Engagement

The planning process will seek to foster consensus among stakeholders, including tenants and users, the FAA, MnDOT, the Metropolitan Council, the Metropolitan Airports Commission, and local governmental bodies.

Airport development and maintenance plans should consider the objectives of local governmental bodies, including partnering with these bodies to promote regional economic development and local land use compatibility.

The planning process will include a public involvement program to inform and educate interested parties of possible plans for Crystal Airport's future and any associated community impacts, and to consider community feedback received.

Land Use Compatibility & Environmental Considerations

A significant investment has been made in Crystal Airport, warranting the need to protect the facility from new non-compatible off-airport development that could compromise its role. Existing zoning and land use controls should be maintained, unless otherwise modified, to facilitate long-term plan implementation in a manner that acknowledges the urban nature of the neighborhoods surrounding Crystal Airport and encourages compatible development.

In service to all parties, operation and development of Crystal Airport will promote initiatives to incorporate environmental stewardship and infuse sustainable thinking.

Financial Viability

Development at Crystal Airport will continue to be self-funded by users of the airport and aviation system; no local sales or property taxes will be used to fund Airport improvements.

- All facility improvements will be funded through pursuing FAA and MnDOT grants first, with MAC funding as a secondary source.
- Future development at Crystal Airport should promote financial self-sufficiency to the maximum extent practical, including strategies to encourage tenant investments in facility improvements and/or new facilities, and other non-aeronautical revenue generation.

Crystal Airport (MIC)
2035 Long-Term Comprehensive Plan Forecast Summary

1. Introduction

This chapter summarizes the LTCP activity forecast for Crystal Airport (MIC). The base year is represented by the twelve months ending June 2015 and forecasts were prepared for 2020, 2025, 2030, and 2035. The forecasts for the airport are unconstrained, except for runway length, and assume that the necessary facilities will be in place to accommodate demand. The chapter begins with a description of the forecast approach, followed by a discussion of the forecasts for based aircraft and aircraft operations, and then concludes with a set of alternative forecast scenarios.

The assumptions inherent in the following calculations are based on data provided by the MAC, federal and local sources, and professional experience. Forecasting, however, is not an exact science. Departures from forecast levels in the local and national economy and in the aviation industry would have a significant effect on the forecasts presented herein.

2. Historical Trends

Table 1 shows historical based aircraft and aircraft operations at MIC from 1990 through 2015.

Table 1: Historical Aviation Activity at Crystal

Year	Based Aircraft	Operations
1990	324	189,906
1995	327	172,024
2000	296	176,554
2001	280	156,801
2002	278	127,095
2003	288	98,612
2004	263	74,879
2005	265	71,704
2006	261	62,900
2007	251	53,583
2008	238	49,244
2009	219	42,507
2010	219	44,229
2011	199	43,986
2012	219	48,220
2013	189	42,308
2014	185	41,117
2015	185	41,838(a)

(a) Twelve months ending June 2015. Includes estimate of nighttime activity.
Source: MAC and FAA ATADS.

The total number of aircraft based in Crystal airport declined from 1990 to 2015. The total counts stayed above 300 aircraft before 2000 but declined to around 185 recently. Aircraft operations fell more rapidly than based aircraft over the same period, indicating reduced utilization for those aircraft that remained based at MIC. A number of factors have contributed to the decline including the slowing economy, increased fuel prices and other operating costs, and reduced interest in recreational flying by younger people.

3. Forecast Approach

The Minneapolis-St. Paul metropolitan area is served by a system of airports. These airports provide a variety of roles and therefore both complement and compete with each other. Since these airports operate as a system, they were forecast as a system so that the interrelationships between the airports could be properly captured. The forecast focused on five of the airports in the MAC system – Crystal, Airlake (LVN), Anoka County (ANE), Flying Cloud (FCM), and St. Paul Downtown (STP) – but also incorporated the other MAC airports – Minneapolis-St. Paul International (MSP) and Lake Elmo (21D) into the analysis. The details of the forecast approach are provided in the main forecast report, *Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report*, and are summarized below:

1. Identify Catchment Areas – Crystal Airport is located in Hennepin County and most of the based aircraft owners reside in the same county as the airport they use. Nevertheless, there is some overlap between the airport catchment areas. Jet and turboprop aircraft owners that require longer runways and more extensive maintenance and fueling facilities tend to gravitate towards airports such as St. Paul Downtown (STP) and Flying Cloud Airport (FCM). Likewise, operators of small single engine piston aircraft often shy away from larger more commercial airports because of congestion and costs, even though these airports may be closer to their place of residence. Aircraft registration data from the Minnesota Department of Transportation (MnDOT) and the Metropolitan Airports Commission (MAC) was used to identify the percentage of MIC based aircraft owners that resided in each county.
2. Develop Socioeconomic Projections – Population forecasts from the Metropolitan Council (Met Council) and per capita income forecasts from Woods & Poole Economics (W&P) were used to develop hybrid income forecasts for each county in the metropolitan area. The income forecasts were used to estimate the share of based aircraft growth accounted for by each county.
3. Project the number of based aircraft registered in each county by aircraft category based on the county income forecasts and the FAA Aerospace forecast adjusted for Minneapolis-St. Paul trends.
4. Allocate the projected based aircraft to each MAC-airport according to the existing distribution pattern for each aircraft category (piston, turboprop, jet, helicopter, etc.).
5. Estimate the number of aircraft on waiting list that would be added assuming airport capacity is unconstrained. Since MIC has extra capacity, there is no waiting list and the waiting list adjustment was not applied there.
6. Redistribute aircraft from the constrained MAC airports (MSP) to the remaining unconstrained airports based on the existing distribution patterns of the airports. Although MSP has sufficient airfield capacity to accommodate growth, the facilities that can accommodate based general aviation (GA) aircraft are limited.
7. Identify base year aircraft operations. Operations counts for Crystal were initially obtained from the FAA Air Traffic Control Tower. The air traffic control tower at MIC does not operate 24 hours per day; therefore late night operations were estimated based on the MAC's flight tracking system data. To estimate operations by aircraft type, the FAA Traffic

Flow Management System Counts (TFMSC) which provides aircraft information was used and supplemented with flight tracking system data from the MAC's environmental office.

8. Project future year aircraft operations. In each aircraft category, operations per active aircraft were projected to increase at the same rate as the FAA forecast of hours flown per based aircraft, implicitly assuming that the number of operations per hours flown remain constant. The percentage of touch and go operations in each aircraft category was assumed to remain constant.

Forecasts include based aircraft and operations for each major category: single engine piston, multi-engine piston, turboprop, jets, helicopters, sport aircraft, experimental, and other. It was assumed that the share of each county's registered aircraft in every aircraft category based at all of the airports under study will remain constant.

4. Forecast Results

Table 2 shows the forecast of based aircraft for Crystal. The number of based aircraft at Crystal is projected to decline slightly, from 185 aircraft in 2015 to 171 aircraft in 2035. The dominant aircraft in the fleet, piston engine aircraft, are projected to decline, consistent with the FAA Aerospace Forecast Fiscal Years 2015-2035. Helicopters and experimental aircraft are expected to increase but not fast enough to offset the decline in the piston category.

Table 3 shows the forecast of aircraft operations at MIC. Total aircraft operations at Crystal are forecast to decrease from 41,838 in 2015 to 39,904 in 2035, an average annual rate of -0.2 percent. Increases are projected in all categories except single-engine and multi-engine piston aircraft, for which the anticipated decrease in the based aircraft offsets slightly higher utilization forecasted by FAA. Jet and helicopter operations are expected to increase the fastest.

The percentage of operations occurring in August, the peak month at Crystal Airport, was estimated from FAA air traffic control tower records. Average Day Peak Month (ADPM) operations were estimated by dividing by 31 days. Peak hour operations were obtained from the FAA Distributed Operations Network (OPSNET). The peak hour percentage in the peak month over the past four years has averaged 11.6 percent. As shown in **Table 4**, peak hour operations are projected to fluctuate between 27 and 29 operations.

Table 2: Summary of Based Aircraft Forecast (Crystal Base Case Condition)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other	Total
2015	154	14	0	0	2	0	15	0	185
2020	148	14	0	0	2	0	16	0	180
2025	143	14	0	0	3	0	17	0	177
2030	138	12	0	0	3	0	18	0	171
2035	136	12	0	0	3	0	20	0	171
Average Annual Growth Rate									
	-0.6%	-0.8%	0.0%	0.0%	2.0%	0.0%	1.4%	0.0%	-0.4%

Source: Table 10 in Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report, 2016.

Table 3: Summary of Operations Forecast (Crystal Base Case Condition)

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jets	Rotor	Sport	Experimental - Excluding Ultralights	Other	Total
2014	35,324	2,382	86	2	829	-	3,440	-	42,063
2015	35,039	2,460	89	8	829	-	3,413	-	41,838
2020	32,046	2,398	90	10	1,002	-	3,949	-	39,495
2025	30,993	2,398	96	12	1,142	-	4,384	-	39,025
2030	30,283	2,116	109	14	1,282	-	4,774	-	38,578
2035	30,633	2,235	126	16	1,440	-	5,454	-	39,904
Average Annual Growth Rate									
	-0.7%	-0.5%	1.8%	3.5%	2.8%	0.0%	2.4%	0.0%	-0.2%

Source: Table 15 in Minneapolis-St. Paul Reliever Airport: Activity Forecasts – Technical Report, 2016.

Table 4: Peak Activity Forecast (Crystal Base Case Condition)

Year	Annual Operations (a)	Peak Month Operations (b)	ADPM Operations (c)	Peak Hour Operations (d)
2014	42,063	4,922	159	29
2015	41,838	4,865	157	29
2020	39,495	4,592	148	27
2025	39,025	4,538	146	27
2030	38,578	4,486	145	27
2035	39,904	4,640	150	28

(a) Table 3.
(b) Value for 2014 is actual. Forecast years estimated using average peak month percentage from 2011-2014.
(c) Peak month operations divided by 31 days.
(d) Estimated at 18.4 percent of ADPM operations based on MAC aircraft operation counts.

Sources: As noted and HNTB analysis.

5 Scenarios

General aviation activity has historically been difficult to forecast, since the relationships with economic growth and pricing factors are more tenuous than in other aviation sectors, such as commercial aviation. This uncertainty is likely to carry over into the near future, given the volatility of fuel prices and the continued shift in GA from personal and recreational use to business use. To address these uncertainties, and to identify the potential upper and lower bounds of future activity at the study airports, detailed high and low scenarios are presented. These scenarios use the same forecast approach that was used in the base case, but alter the assumptions to reflect either a more aggressive or more conservative outlook.

The high forecast scenario is based on the assumption that income would grow 0.5 percent per year faster than in the base case. All other assumptions are the same as in the base case. The low forecast scenario is based on the assumption that income would grow 0.5 percent more slowly each year than under the base case.

Subsequent to the preparation of the high and low forecast scenarios, an additional scenario was developed to evaluate the potential impact associated with designating the existing overrun pavement beyond each end of Runway 14L-32R as stopway. Pavement designated as stopway can be used for decelerating an aircraft during an aborted takeoff and can be considered for accelerate-stop distance calculations, but cannot be considered for takeoff or landing distance calculations. Designating stopways will allow aircraft to depart at a higher takeoff weight when accelerate-stop distance is a limiting factor, and will promote safety by formally making this pavement available for use in the event of an aborted takeoff attempt. Stopways do not change

the published runway length, nor are they intended to attract aircraft types different than those operating at the airport today. However, the availability of stopways may result in a small increase in aircraft operations from some users who find the existing runway length to be limiting based on accelerate-stop distance criteria. In the stopway scenario, the number of additional aircraft operations above the base case is approximately 230 annually, translating to just over four additional takeoffs and landings per week. Of the additional operations, the majority are expected to be turboprops (approximately three-quarters), with the remaining increase coming from small jets. All other forecast assumptions are the same as in the base case.

Table 5 compares the total number of based aircraft and operations under different scenarios for MIC. The MIC base case, high and stopway scenario LTCP forecasts are consistent the FAA 2015 Terminal Area Forecast (TAF) as they differ by less than 10% in the 5-year forecast period and 15% in the 10-year forecast period.

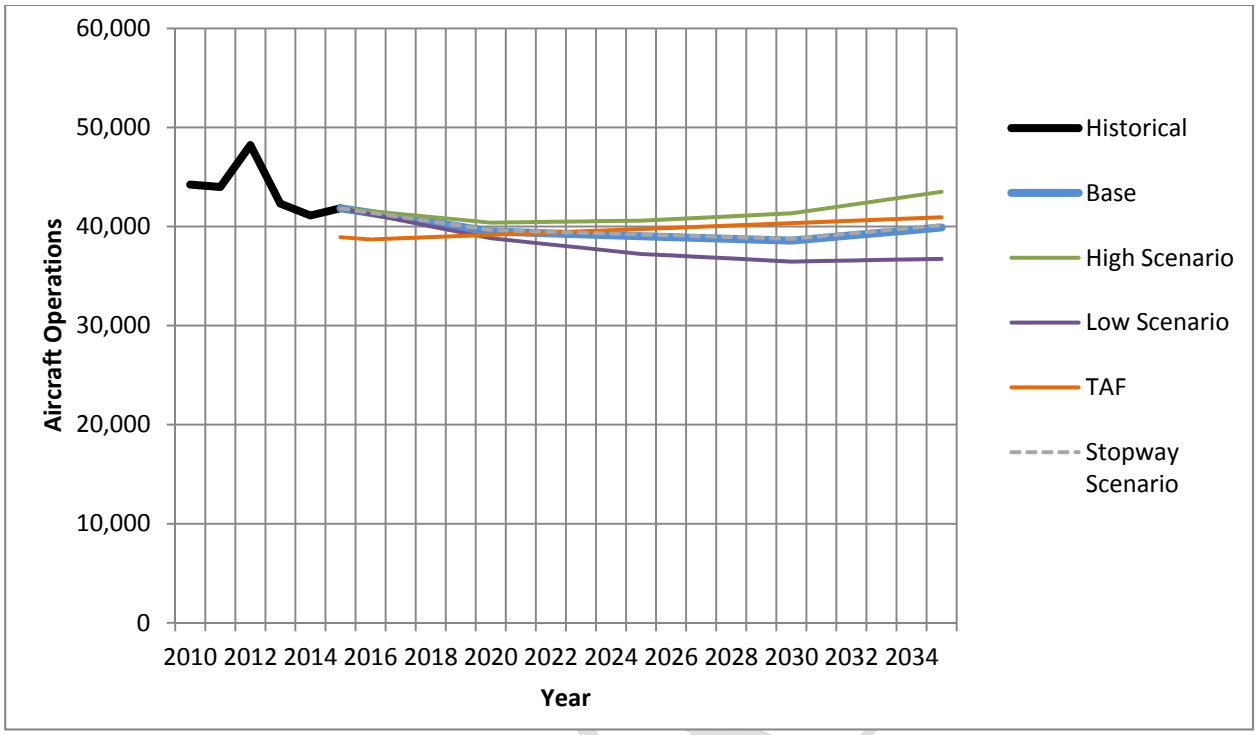
Figure 1 provides a graphic comparison of the base, high and low, and stopway scenario operations forecasts, along with the FAA's 2015 Terminal Area Forecast (TAF) for the airport.

Table 5: Forecast Comparison By Scenario

Year	Total Based Aircraft			Total Number of Operations					Variance from TAF (Operations)		
	Base Case	High Range	Low Range	Base Case	High Range	Low Range	Stopway Scenario	2015 TAF	Base Case	High Range	Stopway Scenario
2015	185	185	185	41,838	41,838	41,838	41,838	38,917	8%	8%	8%
2020	180	184	177	39,495	40,389	38,818	39,652	39,158	1%	3%	1%
2025	177	184	169	39,025	40,589	37,232	39,196	39,739	-2%	2%	-1%
2030	171	183	162	38,578	41,322	36,455	38,774	40,330	-4%	2%	-4%
2035	171	187	158	39,904	43,507	36,732	40,135	40,931	-3%	6%	-2%
Average Annual Growth Rate											
	-0.4%	0.1%	-0.8%	-0.2%	0.2%	-0.6%	-0.2%	0.3%			

Sources: HNTB Analysis.

Figure 1: MIC Forecast Comparison (Operations)



Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

06 September 2016 – Tenant Briefing

Draft LTCP Overview

Briefing Agenda

- Airport Role & Context
- Aviation Activity Forecasts
- Development Concepts
- Stakeholder Engagement & Next Steps

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

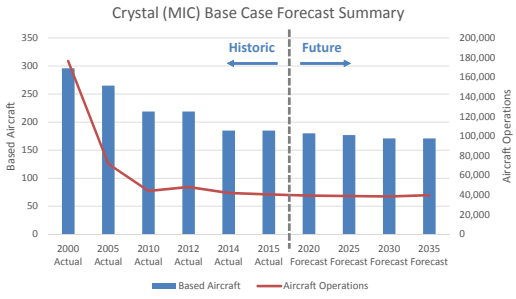
2

Crystal Airport Role

- Primary Role of Crystal Airport
  - Integral part of the regional Reliever Airport system
  - Accommodates Personal, Recreational, and some Business Aviation users
  - Design Aircraft is and will continue to be small, propeller driven aircraft with < 10 passenger seats
  - Role not expected to change
- Crystal Airport Context
  - Of Peer "Intermediate" Airports (83)
    - 2nd busiest for aircraft operations
    - 3rd highest number of based aircraft
  - Of All Minnesota Airports (135)
    - Top 10 busiest for aircraft operations & top 5 for based aircraft

3

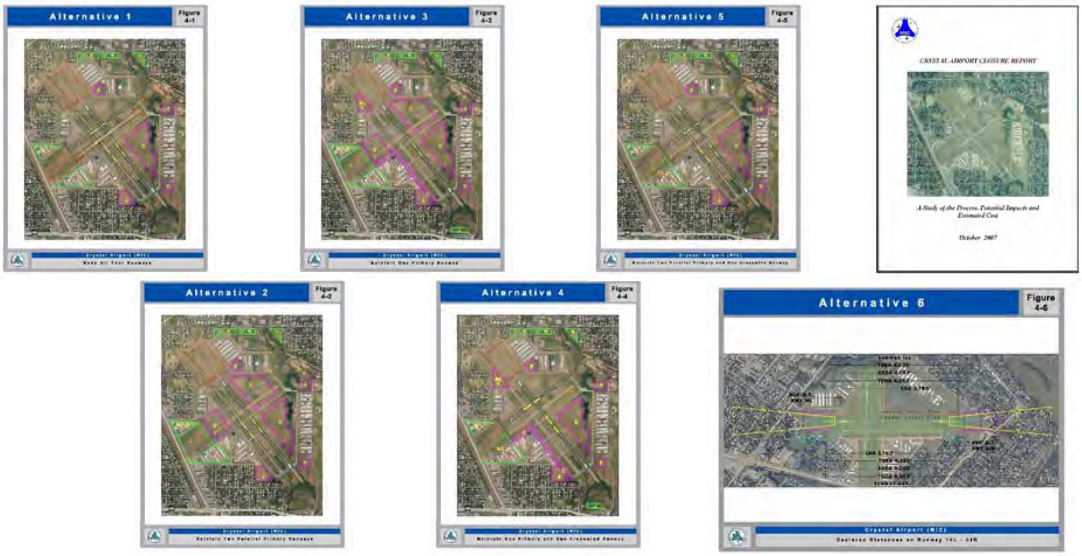
Activity Forecast Summary



- Based Aircraft (MnDOT)
  - 296 in 2000
  - 185 in 2015
  - 171 estimated in 2035
- Aircraft Operations
  - ~177,000 in 2000
  - ~41,000 in 2015
  - ~40,000 estimated in 2035
- Trend towards stabilizing activity levels
- Aircraft Fleet Mix

4

Previous LTCP Alternatives Considered



5

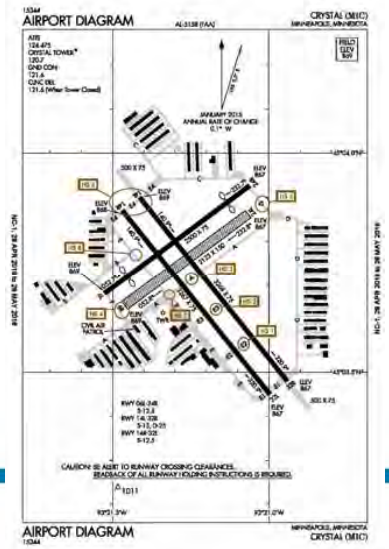
Previous LTCP Preferred Alternative

Maintain One Primary and One Crosswind Runway

- Previous LTCP adopted in December 2008
- Recommendation to "right size" the airfield to better align infrastructure with demand
  - Decommission turf (6R-24L) and south parallel (14R-32L) runways
  - Leaves a two-runway system in place
  - Open up Aeronautical & Non-Aeronautical development opportunities

6

Crystal Airport "Hot Spots"



- "Hot Spots" = Designated airport area where heightened attention by pilots and drivers is necessary due to complex or confusing layouts
- Reducing runways to one primary and one crosswind simplifies the airfield configuration for pilots
- Crystal's 8 existing Hot Spots can be reduced with the proposed plan

7

Runway Length Requirements

- Design Aircraft Family
  - Small Propeller-Driven Airplanes
  - Fewer Than 10 Passenger Seats
- Primary Runway Length
  - FAA Guidance: Range of 3,300 – 3,900 feet
  - Aircraft-specific analysis: ~3,600 feet appropriate length for long-term future planning
    - ***Based on Accelerate-Stop Distance (ASDA)***
    - Enhances safety and operational capability for the design aircraft family of propeller airplanes
    - Does NOT consider length requirements for jets

8

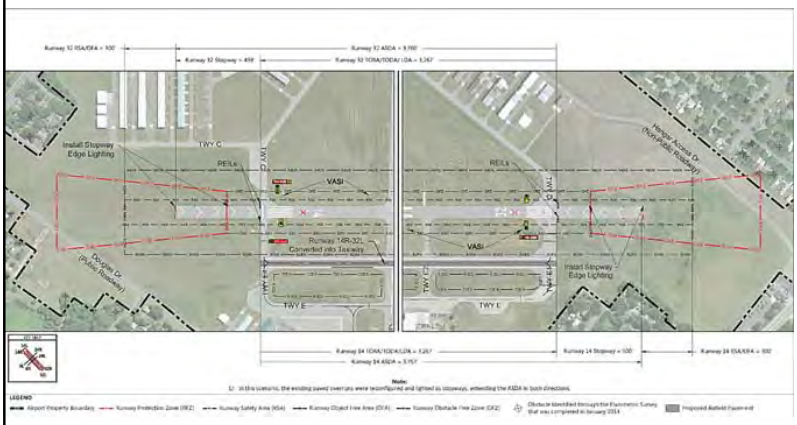
LTCP Concept Refinements Being Considered

Utility runway designation

- Allows use of smaller Runway Protection Zones (RPZs)
- Reduces number of homes in the RPZs
- Published runway strength = 12,500 pounds

9

LTCP Concept Refinements Being Considered

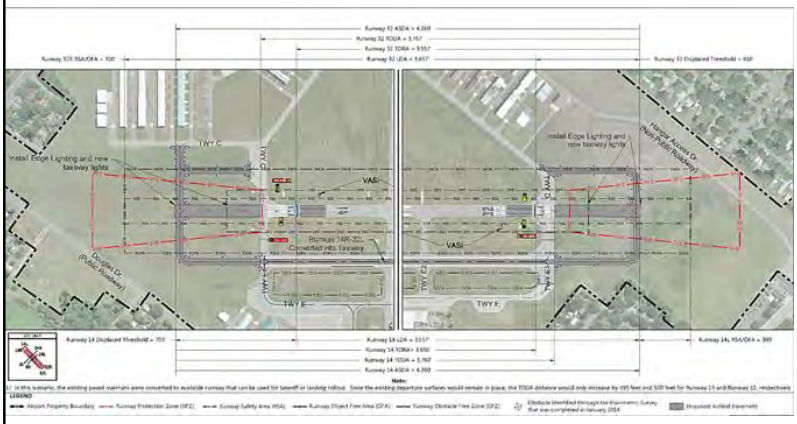


Convert RWY 14-32 Overruns to Stopways

- No change to runway ends or thresholds
- Requires Stopway lighting
- Requires additional safety area grading off ends
- Provides for ~3,800 feet Accelerate-Stop Distance

10

LTCP Concept Refinements Being Considered

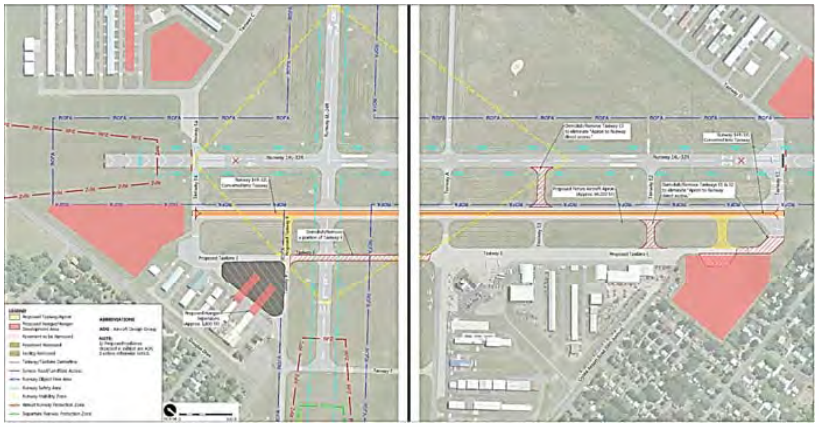


Convert RWY 14-32 Overruns to Runway

- Changes runway ends
- Requires taxiway extensions
- Provides for ~4,300 feet Accelerate-Stop Distance
- Potential to attract larger aircraft
- Increases community noise exposure by moving takeoffs closer to homes

11

LTCP Concept Refinements Being Considered



Taxiway Configuration Changes

- Convert existing RWY 14R-32L to Full Parallel Taxiway with lighting
- Remove section of TWY E that crosses RWY 6-24
- Extend TWY B to new parallel
- Remove direct Apron-to-Runway access @ TWY E2 & E3
- Convert portion of TWY E to Taxilane

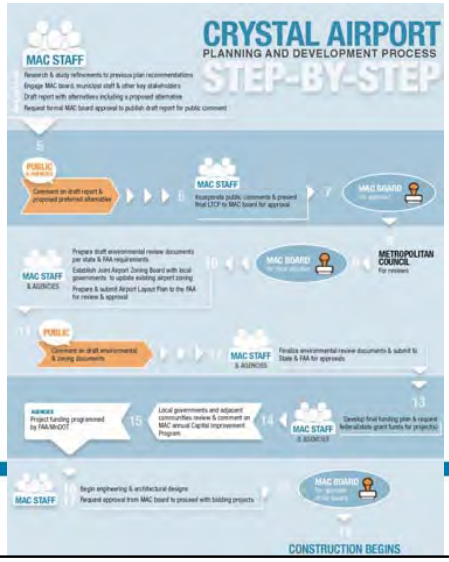
12

Draft 2035 LTCP Preferred Alternative

- Two-runway system from 2025 LTCP
- Utility Runway designations
- Convert RWY 14-32 paved overruns to stopways
- Taxiway configuration changes
- Additional LNAV non-precision instrument approach

13

Stakeholder & Public Engagement



- Pre-Publication Stakeholder Engagement
  - Agencies
  - Tenants
  - Municipal Representatives
- MAC Board Approval to prepare & publish Draft LTCP
- Formal Public Review Period
  - 45-day review period (September 12 – October 26, 2016)
  - Public Information Meetings
    - Tuesday, September 27 @ Crystal Community Center (5-7pm)
    - Thursday, September 29 @ Brooklyn Park City Hall (5-7pm)
- MAC Board Approval to Submit to Met Council
- Metropolitan Council Review
- Final MAC Board Adoption
- Environmental, ALP, Zoning Update

14

Metropolitan Airports Commission

Airport Development Department

Memo

DATE: September 22, 2016

TO: Crystal Airport LTCP Working Group Members

FROM: Neil Ralston, Airport Planner

SUBJECT: **Summary of 09/06/16 Crystal Airport Draft 2035 LTCP Tenant Briefing**

On September 6, 2016, MAC staff hosted a tenant briefing to present information about, and solicit feedback on, the draft 2035 Long-Term Comprehensive Plan (LTCP) for the Crystal Airport. Approximately 20 tenants attended the briefing.

The following topics were covered during the briefing:

- Airport role and activity context
- LTCP aviation forecast summary
- Review of the previous (2025) LTCP Preferred Alternative
- Concept revisions being considered for the 2035 LTCP
- Overview of upcoming stakeholder engagement activities

The draft 2035 LTCP Preferred Alternative presented to the tenants included the following project elements:

- Implement the two-runway system from the previous LTCP (close turf Runway 6R-24L and south parallel Runway 14R-32L)
- Change to Utility Runway designations, resulting in use of smaller-dimension Runway Protection Zones (RPZs)
- Convert the existing Runway 14L-32R paved overruns into stopways so that the additional length could be used for accelerate-stop distance calculations
- Taxiway configuration changes to simplify the airfield and reduce the likelihood of incursion errors
- FBO apron expansion
- Assess the feasibility of requesting an additional LNAV non-precision instrument approach (Runway 32 end)

The tenant group offered the following feedback:

- The turf runway is an asset and it should be retained in the future plan.

  MAC staff pointed out several issues associated with retaining the turf runway, including declining operations (about 60 per month based on Tower counts), its aging condition that will

require rehabilitation in the near future, its contribution to airfield complexity, the need to remove obstructions (trees) in its approach, and the constraint that it has on expanding the FBO apron.

- Closing Runway 14R/32L may be short-sighted if aviation demand grows faster than MAC projects in its latest forecasts.

  MAC staff provided examples of several high-volume general aviation airports that operate with a two-intersecting runway configuration similar to the proposed layout for Crystal. Examples include Republic Airport (FRG) in Farmingdale, NY (~198,000 operations); Fort Lauderdale Executive (FXE) in FL (~160,000 operations), and Teterboro (TEB) in NJ (~172,000 operations). According to FAA guidelines, the annual service volume (estimate of annual airfield capacity) for a two-intersecting runway configuration is approximately 230,000 operations. With annual operations levels expected to remain in the 40,000-range at Crystal for the foreseeable future, a two-runway system appears to be very appropriate.

- The stopway scenario identified as the preferred alternative will not have a noticeable benefit for the majority of operators at Crystal. Converting the existing overruns to runway extensions would provide benefit by allowing all aircraft to use the extra length for takeoff.

  MAC staff talked about the advantages and disadvantages of the full-blown runway extension option evaluated in the draft LTCP. With a length of nearly 4,300 feet, this caliber of runway would likely attract aircraft that are larger than the target design family of propeller-driven airplanes with fewer than 10 passenger seats and a maximum gross takeoff weight of less than 12,500 pounds. Also, the additional cost to extend taxiways to the new runway ends would be about $2,000,000. Finally, pushing the start of takeoff roll closer to neighborhoods is likely to increase noise levels. However, MAC staff encouraged tenants to provide data and information to make a better case for providing additional runway length beyond that proposed in the stopway scenario.

- MAC should at least consider extending the runway on the north end to provide additional takeoff length to the south during the hotter summer months. MAC could also consider a noise wall or berm off the runway ends to help deflect takeoff roll noise.

- A vibrant, healthy FBO and competitive fuel prices are essential components to the future viability of Crystal Airport. The ability to expand the FBO apron to more efficiently accommodate aircraft is also important.

- MAC should have provided information about the Draft 2035 LTCP to the tenants sooner to allow for review and feedback before the plan was presented to the public at large. Tenant input wasn't solicited before the plan was locked in and finalized.

Other questions from the tenants included:

- Why do you call Crystal Airport a Reliever?
- If Crystal is still one of the busiest airports in the state, why are you going to close two runways?
- Will the decommissioning of the two runways impact the viability of retaining the Control Tower?

A copy of the briefing attendance list is attached, along with a copy of the presentation handout materials.

CRYSTAL AIRPORT DRAFT 2035 LTCP

TENANT BRIEFING SIGN-IN SHEET

September 6, 2016 @ 6:00pm

Crystal Airport – MAC Office/Maintenance Building

Name	Representing	Contact Info
DAVE HAHN	SELF GHC EAST SIDE	KMIC@HOTMAIL.COM 612 360 3769
Dale Lotts	Self	612-2[illegible]-9601 dLotts@knightrider.com
Earl Jensen	"	952 935 4306
Ray Marketon	SELF	763-537-3800
Robert Z Meisch	"	763-381-9054
Ken Karpe	"	763 512 3886
WALTER WAFFENSMITH	SELF	612-965-6832
John Krack	RAAC	763-786-5876 averyoo@gmail.com
Bruce Wiley	RAAC - Wiley Fdn.	612-490-7056
Keith Ulstad	Self	612.325-8486 keith.ulstad@uproperties.com
PATRICK FOX	Self	612 710 2050 patrick@patrickfox.com
MARK MAHR	SELF	763 464 2605
Stan BERGER	SELF	WINTERHILL.Stan@GMAIL.Com
Joe Shallbetter	Self	Joes@statesmfg.com
JAKE TESKE	THUNDERBIRD	jteske@thunderbirdaviation.com
CARL RIVERS	MYSELF	CARLRRIVERS@[illegible].com

CRYSTAL AIRPORT DRAFT 2035 LTCP
TENANT BRIEFING SIGN-IN SHEET
September 6, 2016 @ 6:00pm
Crystal Airport – MAC Office/Maintenance Building

Name	Representing	Contact Info
Allenton Paulsen Jr.	Self	763-755-1704 / No computer mail available
Ward Andersen	SELF	612-875-3919

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

08 September 2016 – Crystal City Council Work Session

Draft LTCP Overview

Briefing Agenda

- Airport Role & Context
- Aviation Activity Forecasts
- Development Concepts
- Stakeholder Engagement & Next Steps

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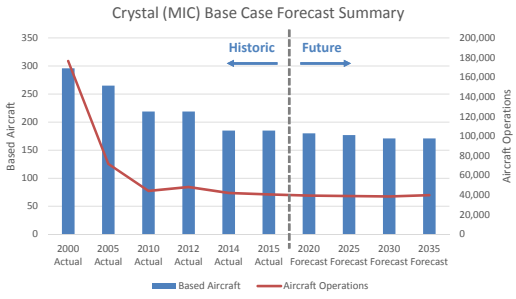
Activity Forecast Summary



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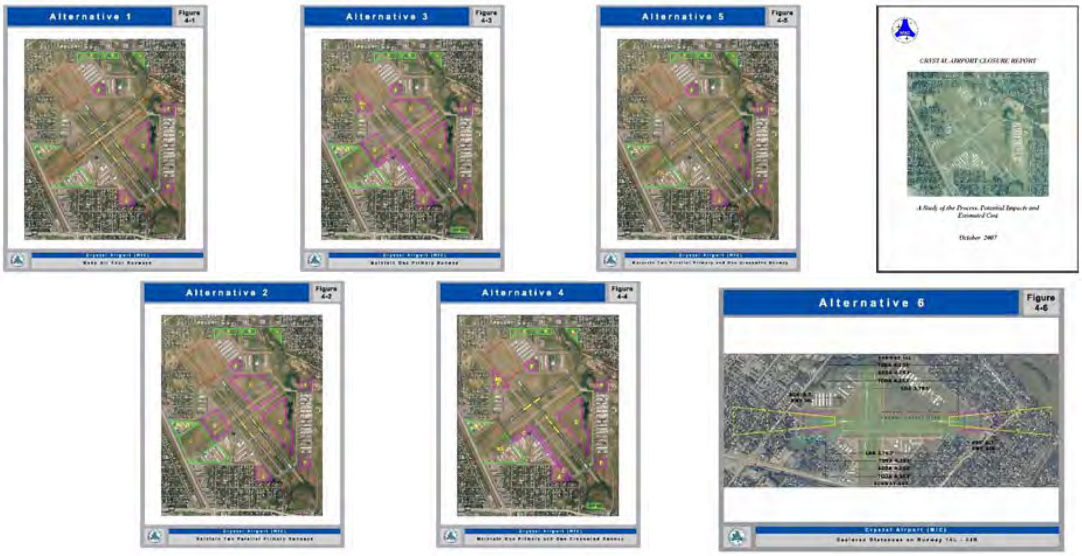

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LTCP Concept Refinements Being Considered

Utility runway designation

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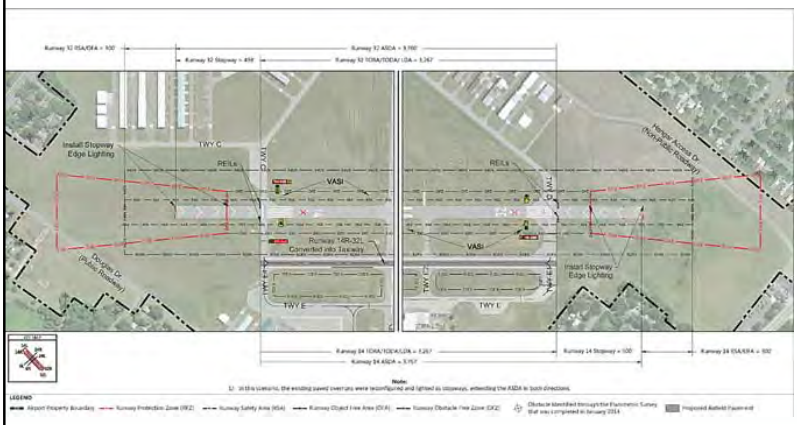
LTCP Concept Refinements Being Considered



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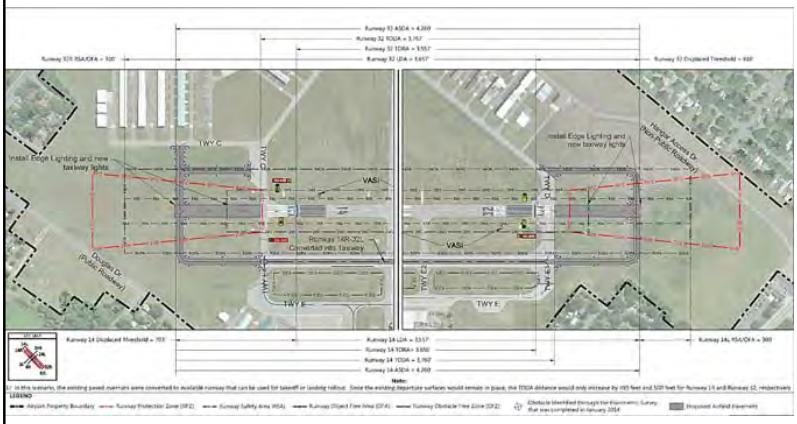

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- Requires taxiway extensions
- Provides for ~4,300 feet Accelerate-Stop Distance
- Potential to attract larger aircraft
- Increases community noise exposure by moving takeoffs closer to homes

Not carried forward as the Preferred Alternative

9

Draft 2035 LTCP Preferred Alternative

- Two-runway system from 2025 LTCP
- Utility Runway designations
- Convert RWY 14-32 paved overruns to stopways
- Taxiway configuration changes
- Additional LNAV non-precision instrument approach if feasible

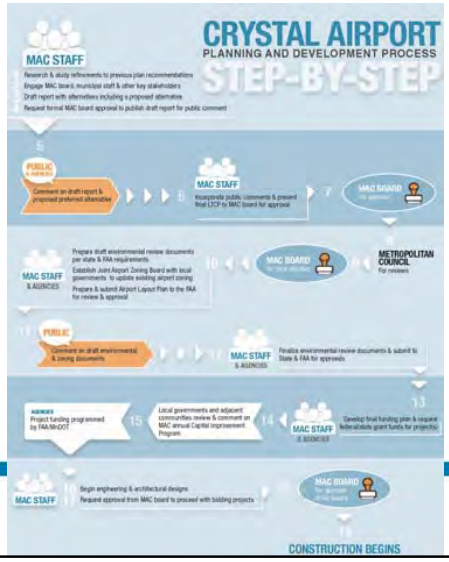
10

Crystal Airport 2035 LTCP Noise Analysis

Baseline Condition Contours | 2035 Preferred Alternative Contours | Contour Comparison

11

Stakeholder & Public Engagement



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Thank you!

13

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

12 September 2016 – Brooklyn Park City Council

Draft LTCP Overview

Briefing Agenda

- Airport Role & Context
- Aviation Activity Forecasts
- Development Concepts
- Stakeholder Engagement & Next Steps

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

2

Crystal Airport Role

- Primary Role of Crystal Airport
  - Integral part of the regional Reliever Airport system
  - Accommodates Personal, Recreational, and some Business Aviation users
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  - Of Peer "Intermediate" Airports (83)
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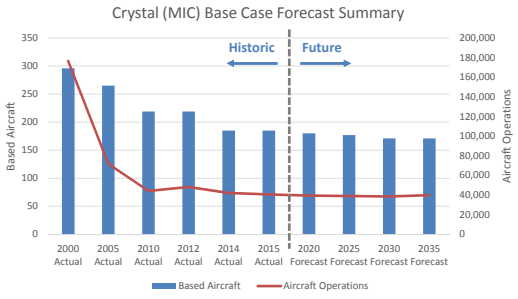
Activity Forecast Summary



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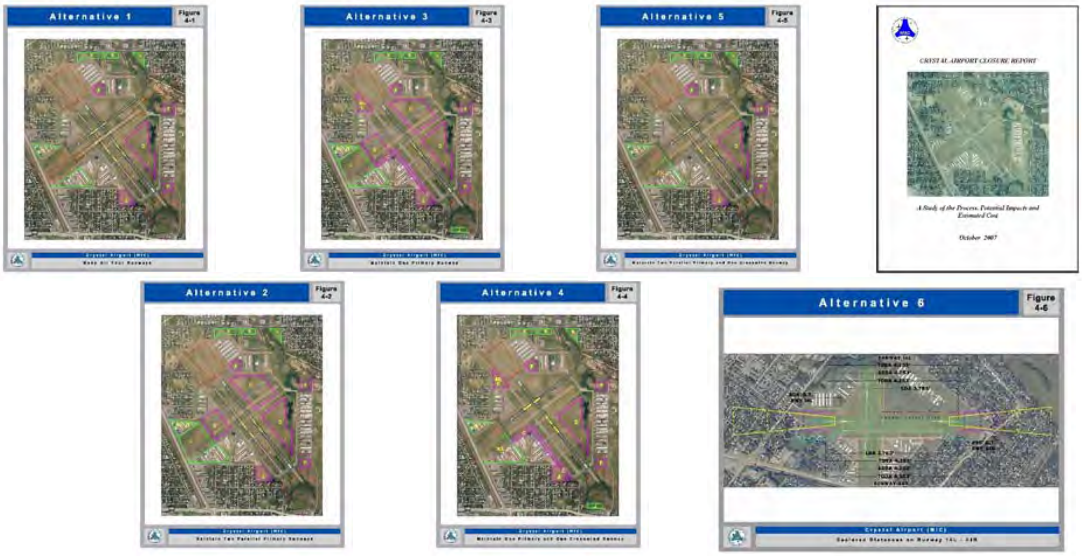
Previous LTCP Alternatives Considered



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Previous LTCP Preferred Alternative

Maintain One Primary and One Crosswind Runway

- Previous LTCP adopted in December 2008
- Recommendation to "right size" the airfield to better align infrastructure with demand
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LTCP Concept Refinements Being Considered

Utility runway designation

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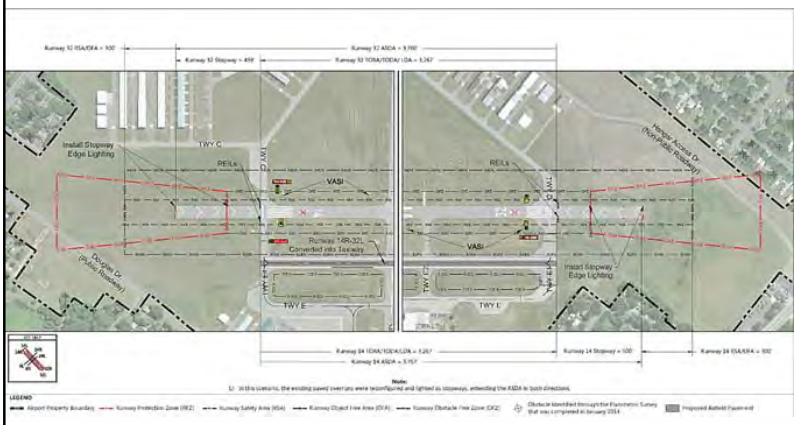

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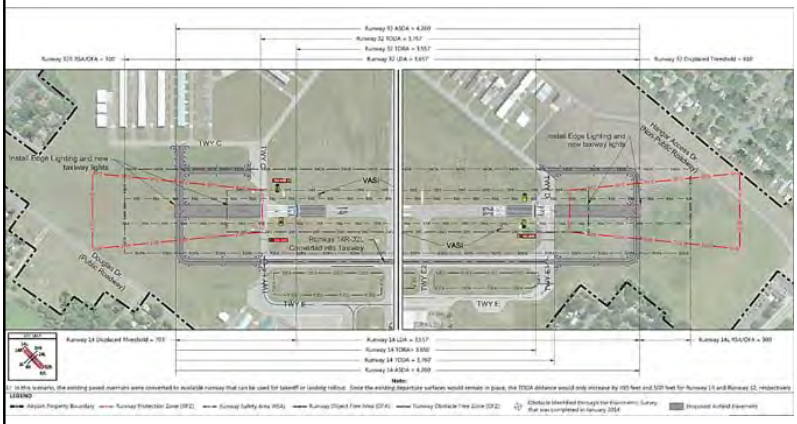

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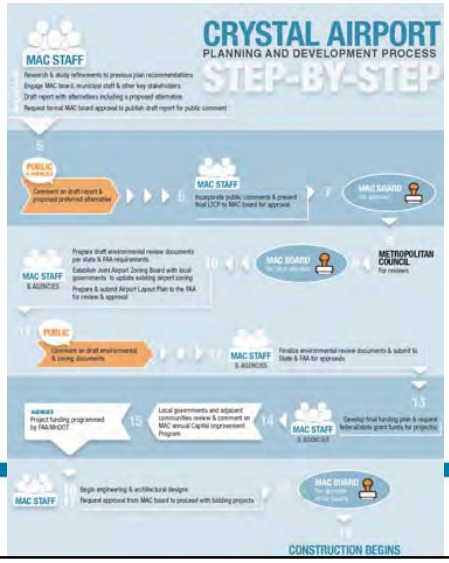

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Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

26 September 2016 – Brooklyn Center City Council

LTCP Overview

Briefing Agenda

- Airport Role & Context
- Aviation Activity Forecasts
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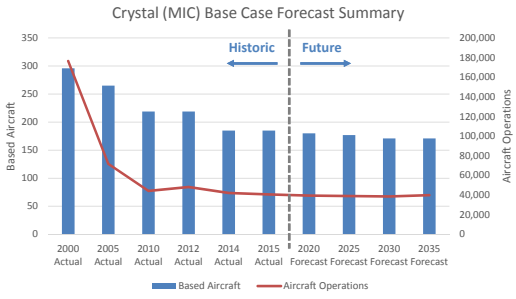

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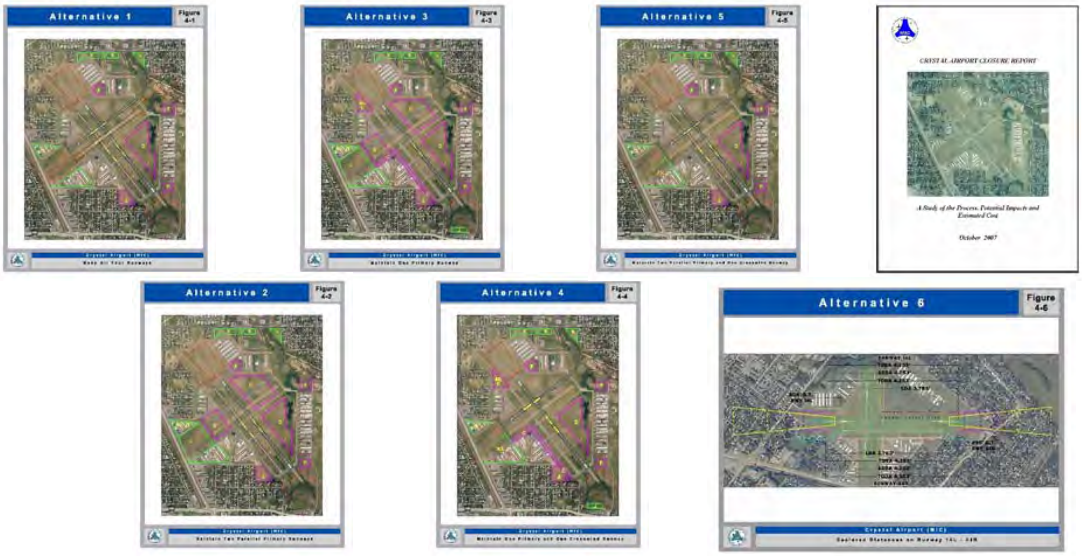

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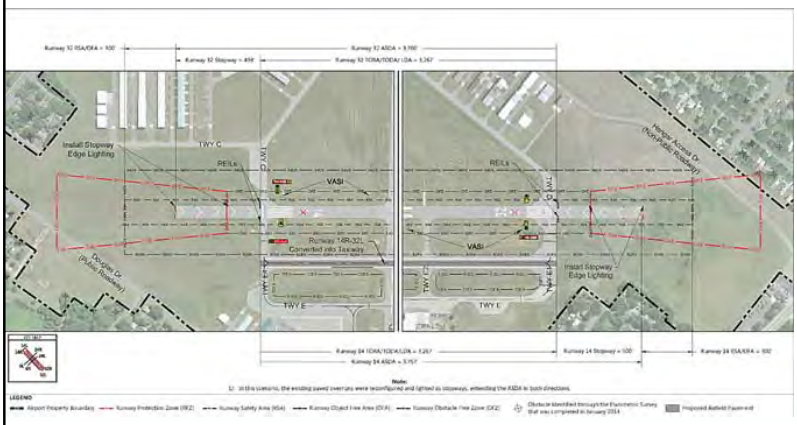

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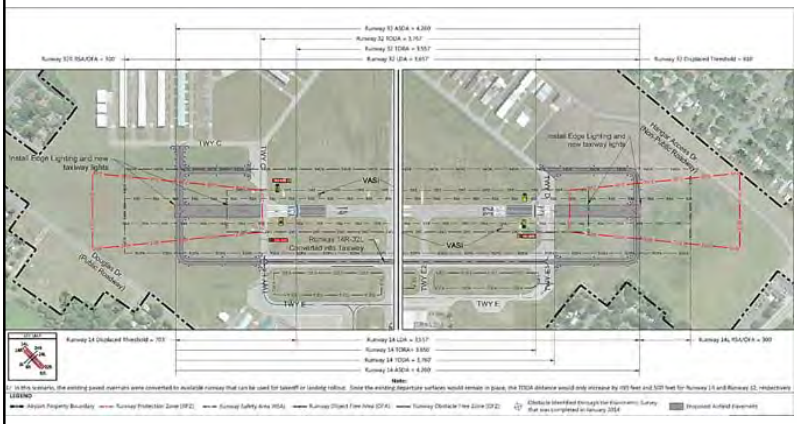

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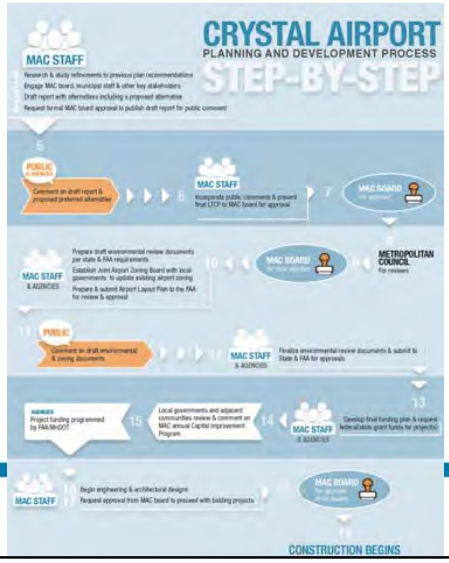

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Thank you!

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PUBLIC NOTICE

DRAFT 2035 LONG-TERM COMPREHENSIVE PLAN
CRYSTAL AIRPORT
Public Comment Period Open

The Metropolitan Airports Commission (MAC) has prepared a draft version of the 2035 Long-Term Comprehensive Plan (LTCP) for Crystal Airport. The purpose of the LTCP is to identify facility needs at Crystal Airport through 2035. The public is invited to review this document and provide written comments to the MAC.

Crystal Airport is located in Hennepin County, approximately seven miles northwest of downtown Minneapolis. It lies within the City of Crystal, with small portions of airport property overlapping into the City of Brooklyn Park and the City of Brooklyn Center. The Draft 2035 LTCP includes a recommendation from the previous plan (completed in 2008) to close existing Runways 14R-32L (parallel to Runway 14L-32R) and 06R-24L (a grass runway), leaving a two-runway airfield in place. Refinements to the previous plan included in this update are: 1] re-designating the remaining runways as "Utility" to better reflect today's and the airport's expected future aircraft activity levels, as well as to permit the use of smaller Runway Protection Zones; 2] converting existing Runway 14L-32R overrun pavement into stopways to improve safety and offer some operational improvements for the types of aircraft already operating at the airport; and 3] modifying the taxiway layouts to reduce the possibility of runway crossings on the airfield.

Copies of the draft LTCP document will be available for distribution, and for viewing on the MAC's website, beginning Monday, September 12, 2016. Written comments will be accepted until Wednesday, October 26, 2016 at 5:00pm CDT.

http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

A printed copy of the document will be available for review at the following locations: MAC General Office building, 6040 28th Avenue South, Minneapolis; Crystal City Hall, 4141 Douglas Drive North, Crystal; Rockford Road Library, 6401 42nd Avenue North, Crystal; and at Crystal Airport, 5800 Crystal Airport Road, Crystal. Requests for a paper copy can be sent to the email address below.

The public is also invited to attend informational meetings to learn more about the proposed improvements included in the draft LTCP. See below for the times and locations:

Tuesday, September 27, 2016
5:00 to 7:00 pm
Crystal Community Center
4800 Douglas Drive North
Crystal, MN 55428

Thursday, September 29, 2016
5:00 to 7:00 pm
Brooklyn Park City Hall, Council Chambers
5200 85th Avenue North
Brooklyn Park, MN 55443

The meetings will include a 6 p.m. presentation by MAC staff, as well as opportunities to ask questions and talk directly with staff.

Written comments can be submitted via email by sending them to Crystal-Airport-LTCP-Comments@mspmac.org, or by physically mailing them to Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

The Metropolitan Airports Commission (MAC) will hold two

OPEN HOUSES FOR THE PUBLIC

to learn more about its proposed long term plans for Crystal Airport.

Please join us! MAC staff will provide a presentation at 6 p.m.

Tues., Sept 27 • 5 to 7pm

Crystal Community Center
4800 Douglas Drive North
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Thurs., Sept 29 • 5 to 7pm

Brooklyn Park City Hall
Council Chambers
5200 85th Avenue North
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Questions about the open houses? Please contact Shelly Cambridge at shelly.cambridge@mspmac.org or at 612-726-8144.

The draft 2035 Long Term Comprehensive Plan and a summary of the changes included in the plan can be found on the MAC's website at **metroairports.org/General-Aviation/Airports/Crystal.aspx**

Crystal Airport
2035 Long-Term Comprehensive Plan (LTCP)

Public Informational Meeting Handout

Thank you for attending this Crystal 2035 Long-Term Comprehensive Plan (LTCP) public informational meeting.

The Metropolitan Airports Commission (MAC) owns and operates Crystal Airport. It is one of six general aviation airports within the MAC's system of airports. The Airport plays an important role in this system by attracting general aviation aircraft away from Minneapolis-St. Paul International Airport (MSP) thereby relieving congestion at MSP. Crystal is the closest MAC airport to downtown Minneapolis.

ABOUT CRYSTAL AIRPORT

Crystal Airport has operated continuously since it opened in September 1950. In 2015, Crystal Airport was home to 185 aircraft and accommodated approximately 40,000 landings and takeoffs – an average of 110 aircraft operations per day. The airport sits on 436 acres of land and has four runways – three paved and one turf. The primary runways, 14L-32R and 14R-32L, are 3,267 feet and 3,266 feet long, respectively, and are 75 feet wide. The paved crosswind runway, 06L-24R, is 2,499 feet long and 75 feet wide. The turf runway, 06R-24L, is 2,123 feet long and 137 feet wide.

Crystal Airport serves personal, recreational, and some business aviation users in the northwest metropolitan area, including the cities of Crystal, Brooklyn Park, Brooklyn Center, and Minneapolis. Examples of business services provided at the Airport include flight training, aircraft rentals, charter flights, aircraft and propeller maintenance, sale of aircraft avionics and parts, and medical flight transportation.

ABOUT THE DRAFT 2035 LTCP

An LTCP is a tool used by airport planners to predict an airport's infrastructure needs into the future. This update to Crystal Airport's LTCP explores the facility's needs out to the year 2035 and includes recommendations for its development over the next 5-10 years. It does not, however, authorize actual construction.

For this LTCP, the overarching objective is to "right-size" the airport to match how it is used today and how it is expected to be used in the future, as well as to improve safety and operational parameters. The role of the Airport is expected to stay the same through 2035. The aircraft anticipated to use the airport – and that which it is designed for – will continue to be a family of small, propeller-driven airplanes with fewer than 10 passenger seats.

The 2035 LTCP is an update to the 2025 LTCP, which was published in 2008. Most of the proposed improvements in the 2025 plan are also part of the 2035 draft document.

The 2025 LTCP recommended the airfield be right sized to better align with the infrastructure needs of aircraft operators today and into the future. To do this, the preferred alternative was to close both the turf runway (06R-24L) and the south parallel runway (14R-32L), leaving a two-runway airfield in place. This plan not only simplifies the airfield, but may also provide additional on-airport property for aeronautical and non-aeronautical development.

The Draft 2035 LTCP proposes to carry the recommendations from the 2025 plan forward, along with a few refinements. Refinements to the 2025 plan included in this draft update are:

- Re-designating the two remaining runways as "Utility" to better reflect today's and the airport's expected future aircraft activity levels, as well as to permit the use of smaller Runway Protection Zones (RPZs) beyond the runway ends.

- Converting the existing Runway 14L-32R overrun pavement on both ends of the runway into stopways to improve safety and offer some operational improvements for aircraft already operating at the airport. Pilots can consider stopways in calculating the length of pavement needed to decelerate and stop an aircraft during an aborted takeoff.

- Modifying the taxiway layouts to reduce opportunities for unintended runway crossings.

The draft LTCP report is available for public review and comment on the MAC website at **www.metroairports.org/General-Aviation/Airports/Crystal.aspx.**

PUBLIC COMMENTS

The MAC is accepting written comments about the plan through October 26, 2016. To provide comments, you can fill out a comment form tonight, mail your form at a later date, or submit your comments via email to **Crystal-Airport-ltcp-comments@mspmac.org.** All comments submitted will be included in the project record and published in the final report. We thank you for taking the time to learn more about this draft plan and for submitting comments.

WHAT'S NEXT?

The 2035 LTCP is in draft form. Following the public comment period, the plan will be completed and presented to the MAC board for its final adoption. It will also be presented to the Metropolitan Council for additional review.

WHAT AIRPORT IMPROVEMENTS ARE PROPOSED IN THE PLAN?

The following improvements are recommended and are shown on the map:

A. Close existing Runways 14R-32L and 06R-24L (turf)

B. Convert existing Runway 14L-32R into a full-length parallel taxiway and add taxiway lights

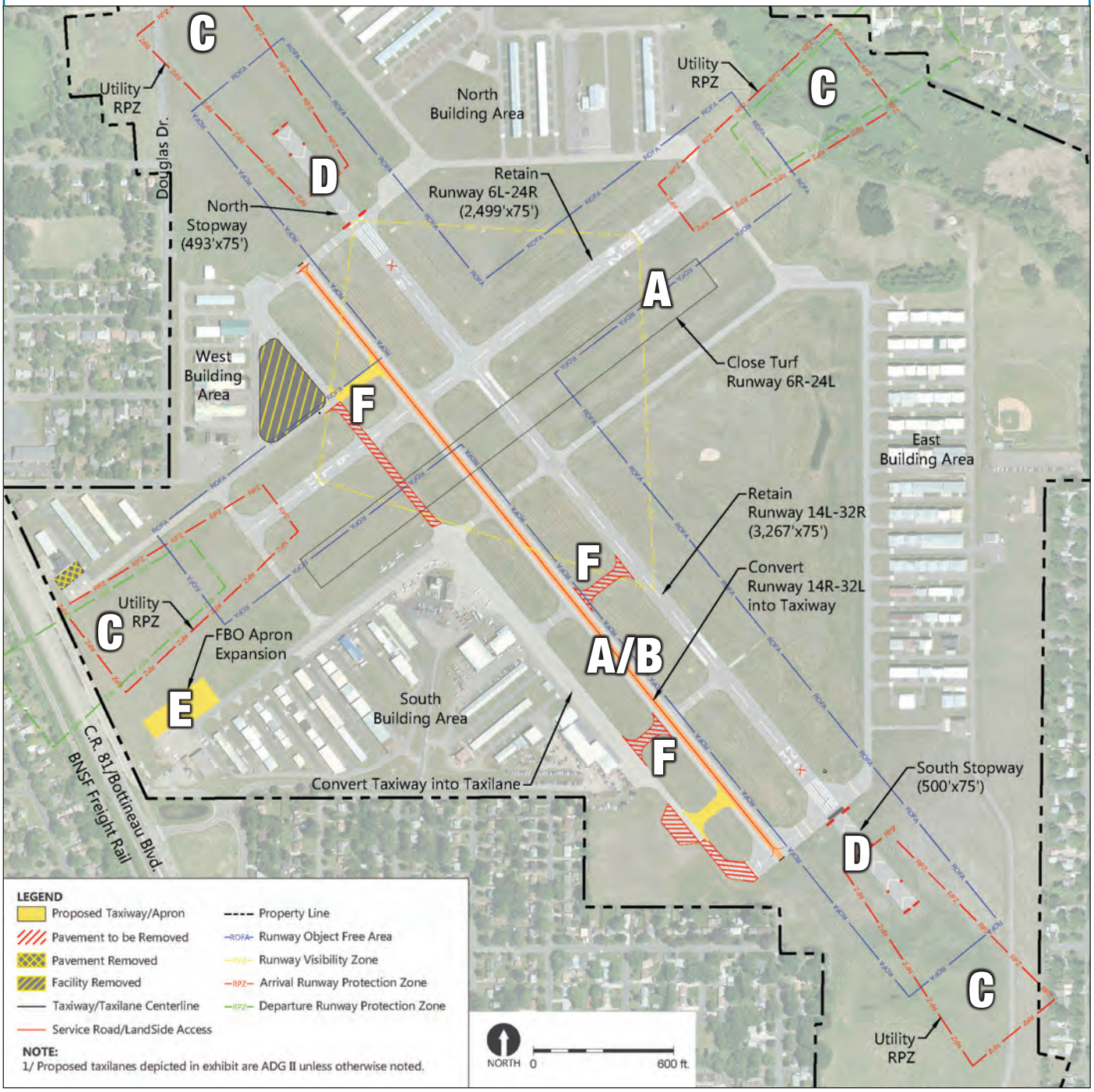
C. Change the runway designation to Utility and use small aircraft design standards to reduce Runway Protection Zone (RPZ) dimensions

D. Convert existing paved overruns on Runway 14L-32R to stopways. Includes adding edge lighting and additional Runway Safety Area (RSA) grading

E. Expand the FBO apron (improvement to be paid for by the tenant)

F. Taxiway configuration changes to reduce airfield complexity

G. Pursue the establishment of a new non-precision instrument approach to the Runway 32 end, if feasible (not shown)



CRYSTAL AIRPORT
PLANNING AND DEVELOPMENT PROCESS
STEP-BY-STEP

MAC STAFF

1. Research & study refinements to previous plan recommendations
2. Engage MAC board, municipal staff & other key stakeholders
3. Draft report with alternatives including a proposed alternative
4. Request formal MAC board approval to publish draft report for public comment

5. **PUBLIC & AGENCIES** — Comment on draft report & proposed preferred alternative

6. **MAC STAFF** — Incorporate public comments & present final LTCP to MAC board for approval

7. **MAC BOARD** — For approval

8. **METROPOLITAN COUNCIL** — For reviews

9. **MAC BOARD** — For final adoption

10. **MAC STAFF & AGENCIES**
    - Prepare draft environmental review documents per state & FAA requirements
    - Establish Joint Airport Zoning Board with local governments to update existing airport zoning
    - Prepare & submit Airport Layout Plan to the FAA for review & approval

11. **PUBLIC** — Comment on draft environmental & zoning documents

12. **MAC STAFF & AGENCIES** — Finalize environmental review documents & submit to State & FAA for approvals

13. **MAC STAFF & AGENCIES** — Develop final funding plan & request federal/state grant funds for project(s)

14. Local governments and adjacent communities review & comment on MAC annual Capital Improvement Program

15. **AGENCIES** — Project funding programmed by FAA/MnDOT

MAC STAFF

16. Begin engineering & architectural designs
17. Request approval from MAC board to proceed with bidding projects

18. **MAC BOARD** — For approval of bid award

19. **CONSTRUCTION BEGINS**

BENEFITS OF THE CRYSTAL AIRPORT

General aviation airports, like Crystal, contribute to the local economy in a number of ways. They provide:

- Employment for airport workers;
- Facilities for personal and business aircraft;
- Charter transportation services for local businesses; and
- Space for general aviation service companies to do business.

As a result, businesses and workers are able to purchase goods and services from other companies in the community, helping to ensure a thriving local economy.

Specific benefits of the Crystal Airport include:

- Direct employment created by the airport's businesses, which include Thunderbird Aviation, North of Sixty Aviation, Maxwell Aircraft Services, and Wentworth Aircraft. Additional employers include the Federal Aviation Administration (FAA) and the MAC. Altogether, these entities provide about 60 full-time and 20 part-time jobs at Crystal Airport.
- MAC operates, maintains, and improves the airport at no cost to local taxpayers. Development at Crystal Airport will continue to be funded by users of the aviation system via FAA and/or MnDOT grant programs, and MAC funds. No local sales or property taxes will be used to fund improvements.
- Airport tenants contribute to the local tax base by paying personal property taxes on hangar facilities and making purchases at local establishments.
- Crystal Airport is home to several tenant groups who emphasize aviation education and awareness, including the North Hennepin Squadron of the Civil Air Patrol.

For more information about Crystal Airport, including efforts to update the airport's Long-Term Comprehensive Plan (LTCP), go to **www.metroairports.org/General-Aviation/Airports/Crystal.aspx.**

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

Public Informational Meetings: September 27 & 29, 2016

LTCP Overview Briefing

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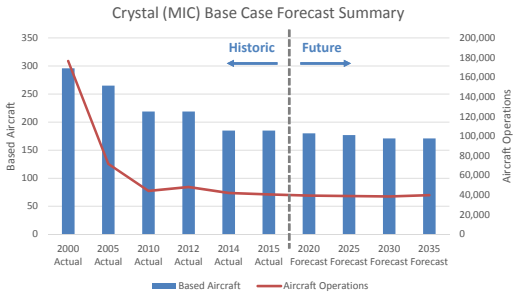

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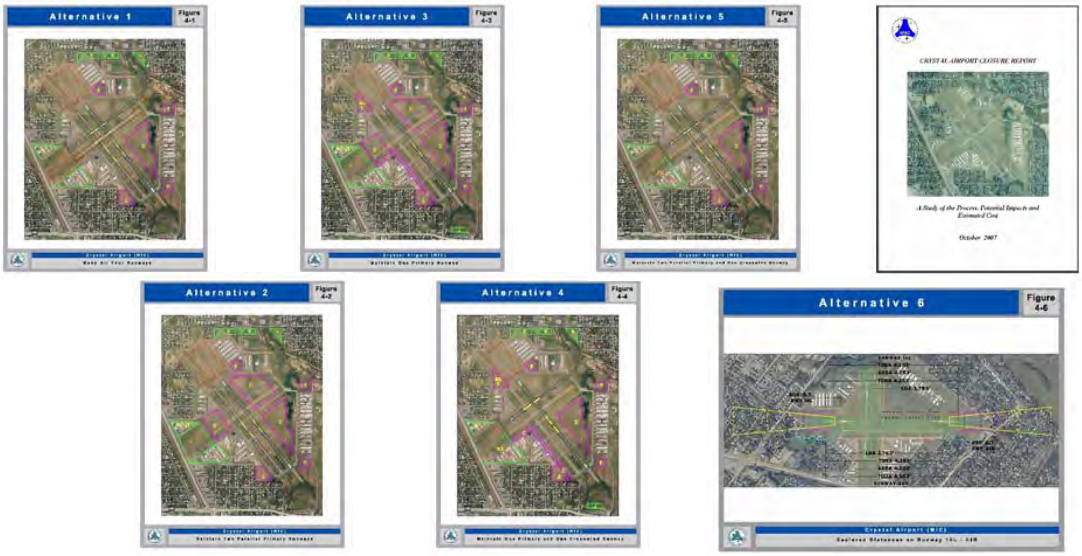

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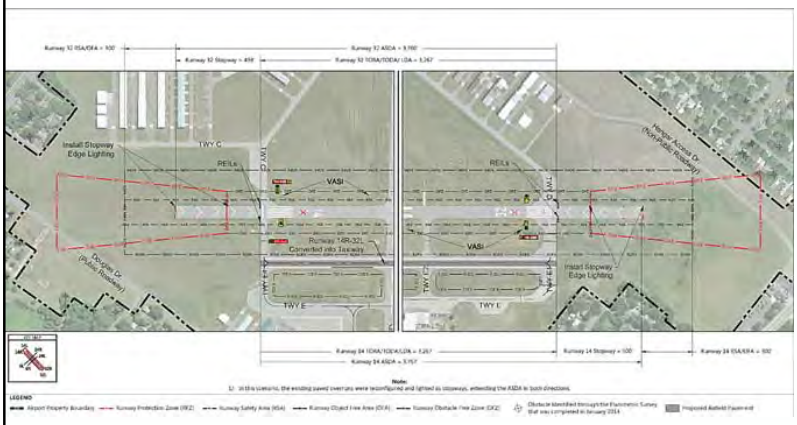

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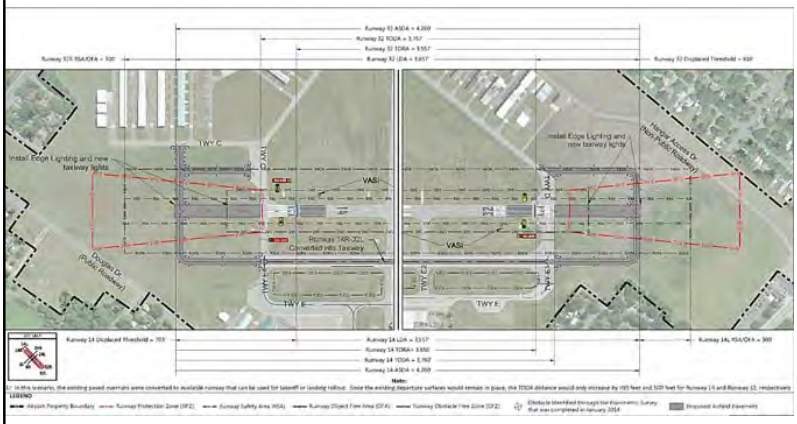

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- Utility Runway designations
- Convert RWY 14-32 paved overruns to stopways
- Taxiway configuration changes
- FBO Apron Expansion
- Additional LNAV non-precision instrument approach if feasible

10

Draft 2035 LTCP Preferred Alternative

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Draft 2035 LTCP Preferred Alternative

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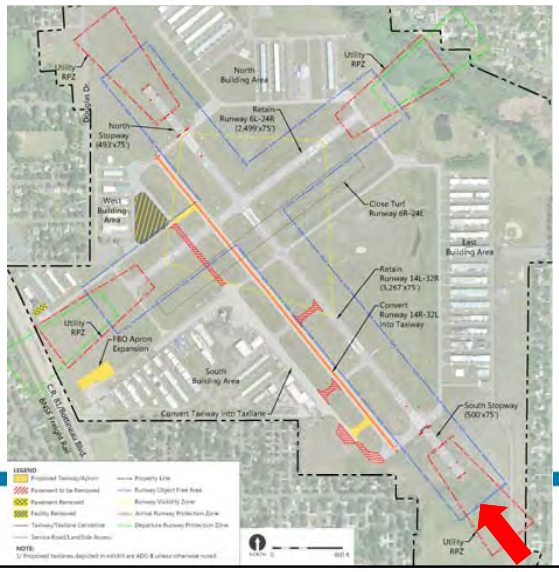
Draft 2035 LTCP Preferred Alternative



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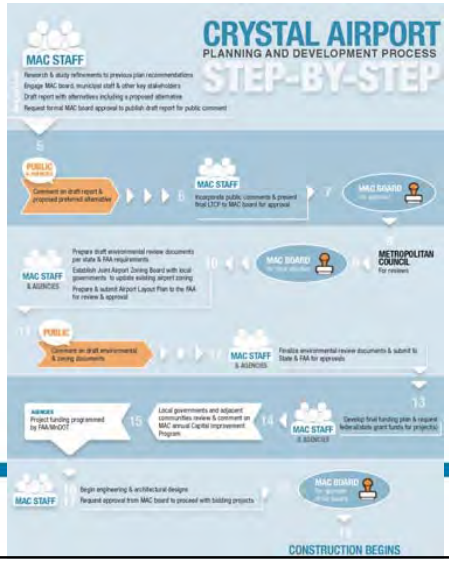
15

Stakeholder & Public Engagement



- Formal Public Review Period
  - 45-day review period (September 12 – October 26, 2016)
    - Public notice in Sun Post
    - Information posted on MAC website (Crystal Airport page) https://metroairports.org/General-Aviation/Airports/Crystal.aspx
  - Public Information Meetings
    - Tuesday, September 27 @ Crystal Community Center (5-7pm)
    - Thursday, September 29 @ Brooklyn Park City Hall (5-7pm)
    - Postcard invitation to airport neighbors
  - Opportunity to submit written comments
    - At public information meetings, via email, or traditional mail Crystal-Airport-LTCP-Comments@mspmac.org
- MAC Board Approval to Submit to Metropolitan Council
- Metropolitan Council Review
- Final MAC Board Adoption
- Environmental & Airport Layout Plan (ALP)

16

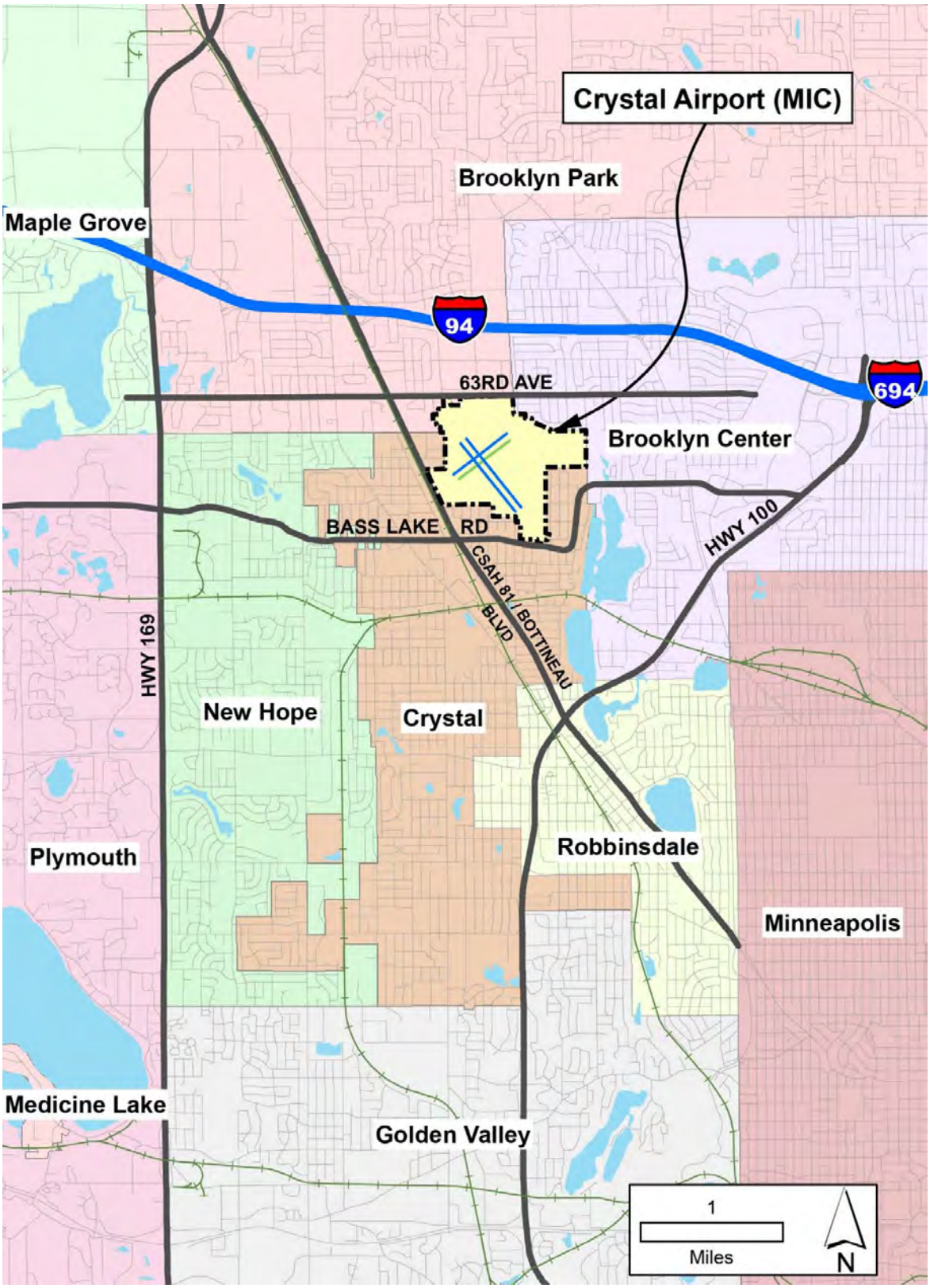
Thank you!

17

Crystal Airport

Draft 2035 Long-Term Comprehensive Plan (LTCP)

Public Informational Meetings – September 27 & 29, 2016



Airport Vicinity

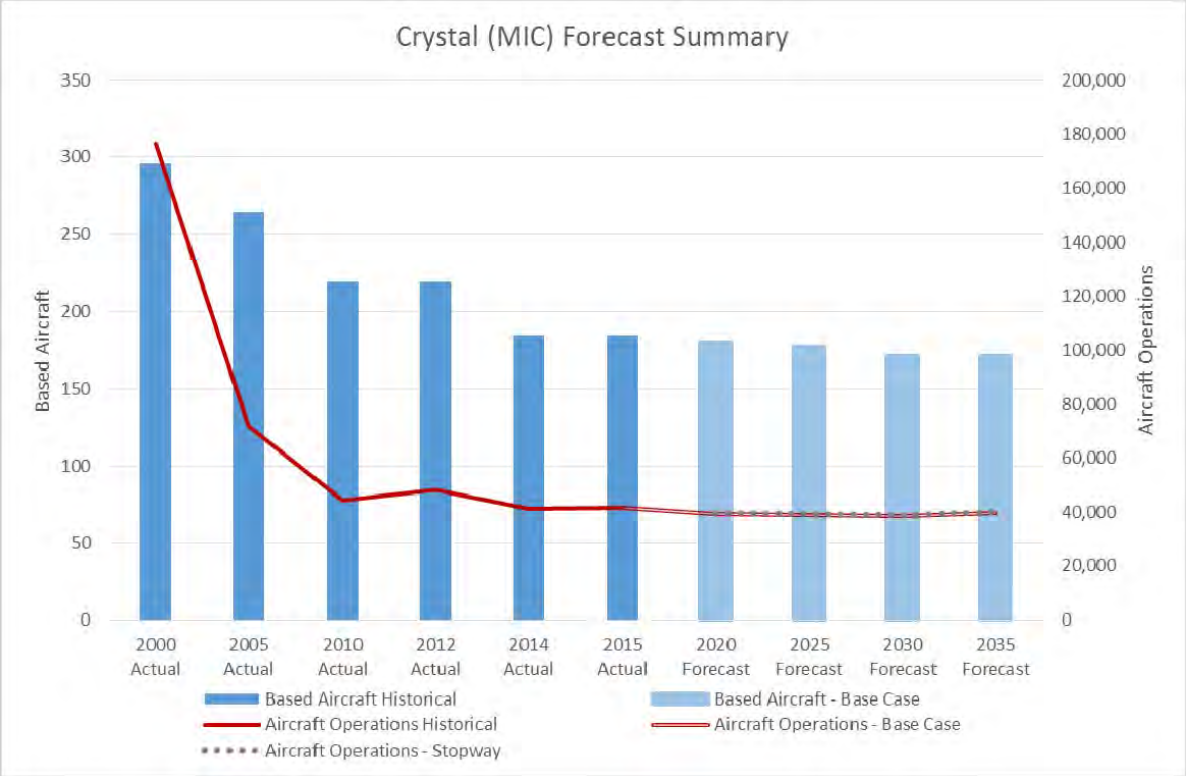
Existing Airport Layout

Year	Total Based Aircraft			Total Number of Operations					Variance
	Base Case	High Range	Low Range	Base Case	High Range	Low Range	Stopway Scenario	2015 TAF	Base Case
2015	185	185	185	41,838	41,838	41,838	41,838	38,917	8%
2020	180	184	177	39,495	40,389	38,818	39,652	39,158	1%
2025	177	184	169	39,025	40,589	37,232	39,196	39,739	-2%
2030	171	183	162	38,578	41,322	36,455	38,774	40,330	-4%
2035	171	187	158	39,904	43,507	36,732	40,135	40,931	-3%
Average Annual Growth Rate									
	-0.4%	0.1%	-0.8%	-0.2%	0.2%	-0.6%	-0.2%	0.3%	

Notes:

TAF - 2015 Terminal Area Forecast published by FAA

Sources: HNTB Analysis.



Aviation Activity Forecast Summary

Airport Reference Code A-I (Maximum Takeoff Weight (MTOW) less than or equal to 12,500lbs

Aircraft	MTOW (lbs.)	Approach Speed (knots)	Wingspan	Tail Height	Aircraft Type
Cessna 172	2,550	62	36' - 1"	8' - 11"	Single-Engine
Cirrus SR22 	3,400	78	38' – 4"	8' - 11"	Single-Engine
TBM 850	7,394	85	41' - 7"	14' - 4"	Single-Engine Turboprop
Diamond DA42	4,189	79	44' - 4"	8' - 2"	Multi-Engine
Eclipse 550	6,000	77	37' - 11"	11' - 0"	Very Light Jet

Airport Reference Code A-II (Maximum Takeoff Weight (MTOW) less than or equal to 12,500lbs

Aircraft	MTOW (lbs.)	Approach Speed (knots)	Wingspan	Tail Height	Aircraft Type
Pilatus PC-12 	10,450	87	53' - 4"	14' - 0"	Single-Engine Turboprop
Cessna Caravan 208	8,000	79	52' - 1"	14'-11"	Single-Engine Turboprop

Airport Reference Code B-I (Maximum Takeoff Weight (MTOW) less than or equal to 12,500lbs

Aircraft	MTOW (lbs.)	Approach Speed (knots)	Wingspan	Tail Height	Aircraft Type
Piper PA-30 Twin Comanche	3,600	95	36' - 0"	8' - 2"	Multi-Engine
Piper PA-31T Cheyenne	9,000	98	42' - 8"	12' - 9"	Multi-Engine Turboprop
Piper PA-31-350 Chieftain 	7,000	96	40' - 8"	13' - 0"	Multi-Engine
Cessna 414A	6,785	94	44' - 2"	11' - 6"	Multi-Engine
Cessna 421C	7,450	96	41' - 1"	11' - 5"	Multi-Engine
Cessna Citation Mustang	8,645	95	43' - 2"	13' - 5"	Very Light Jet

Airport Reference Code B-II (Maximum Takeoff Weight (MTOW) less than or equal to 12,500lbs

Aircraft	MTOW (lbs.)	Approach Speed (knots)	Wingspan	Tail Height	Aircraft Type
Raytheon Beechcraft King Air 200	12,500	103	57' - 11"	14'-10"	Multi-Engine Turboprop
Cessna 441 	9,850	99	49' - 4"	13' - 2"	Multi-Engine Turboprop

Design Aircraft Family

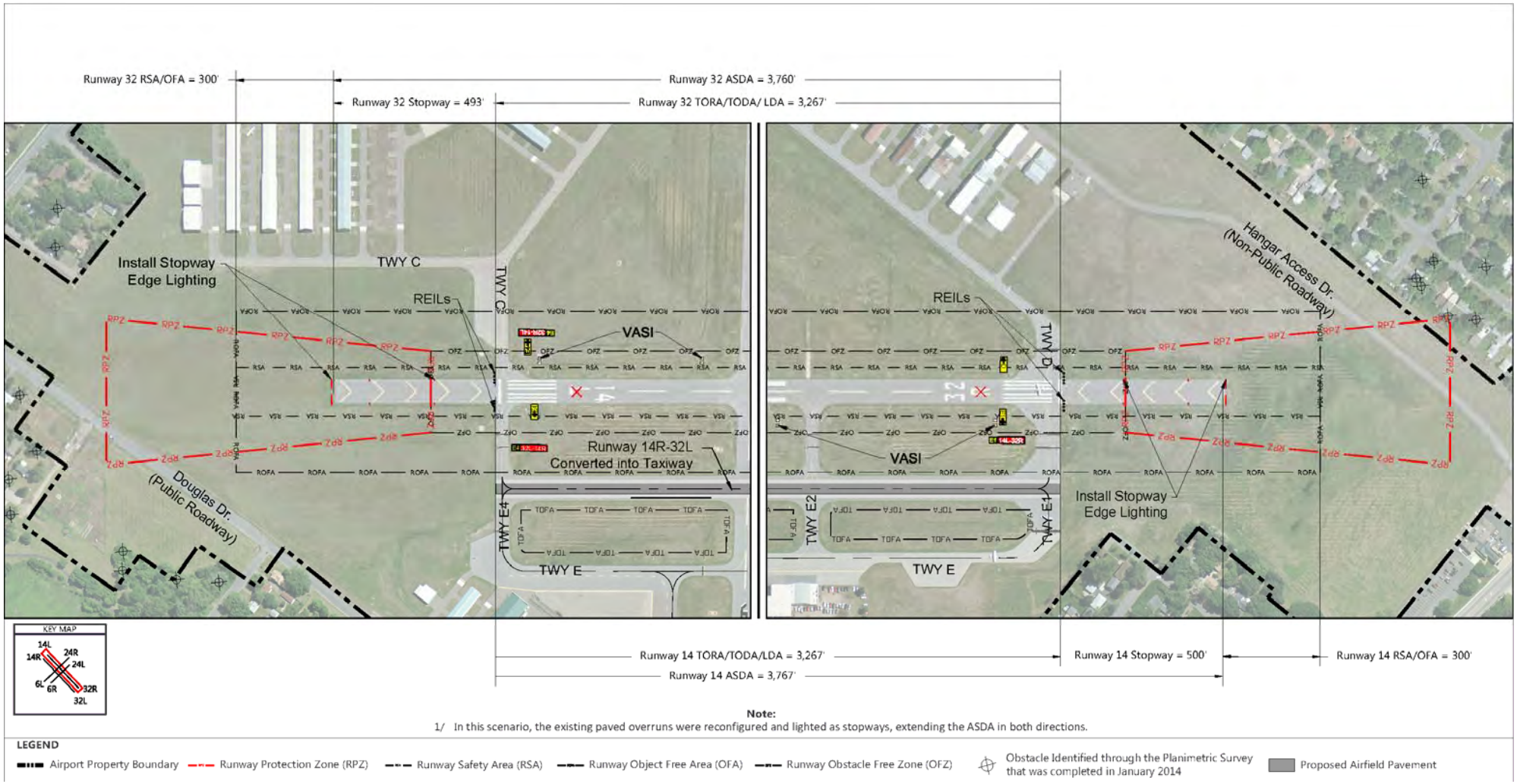
- Small Propeller-Driven Airplanes
- Fewer than 10 Passenger Seats

Primary Runway Length

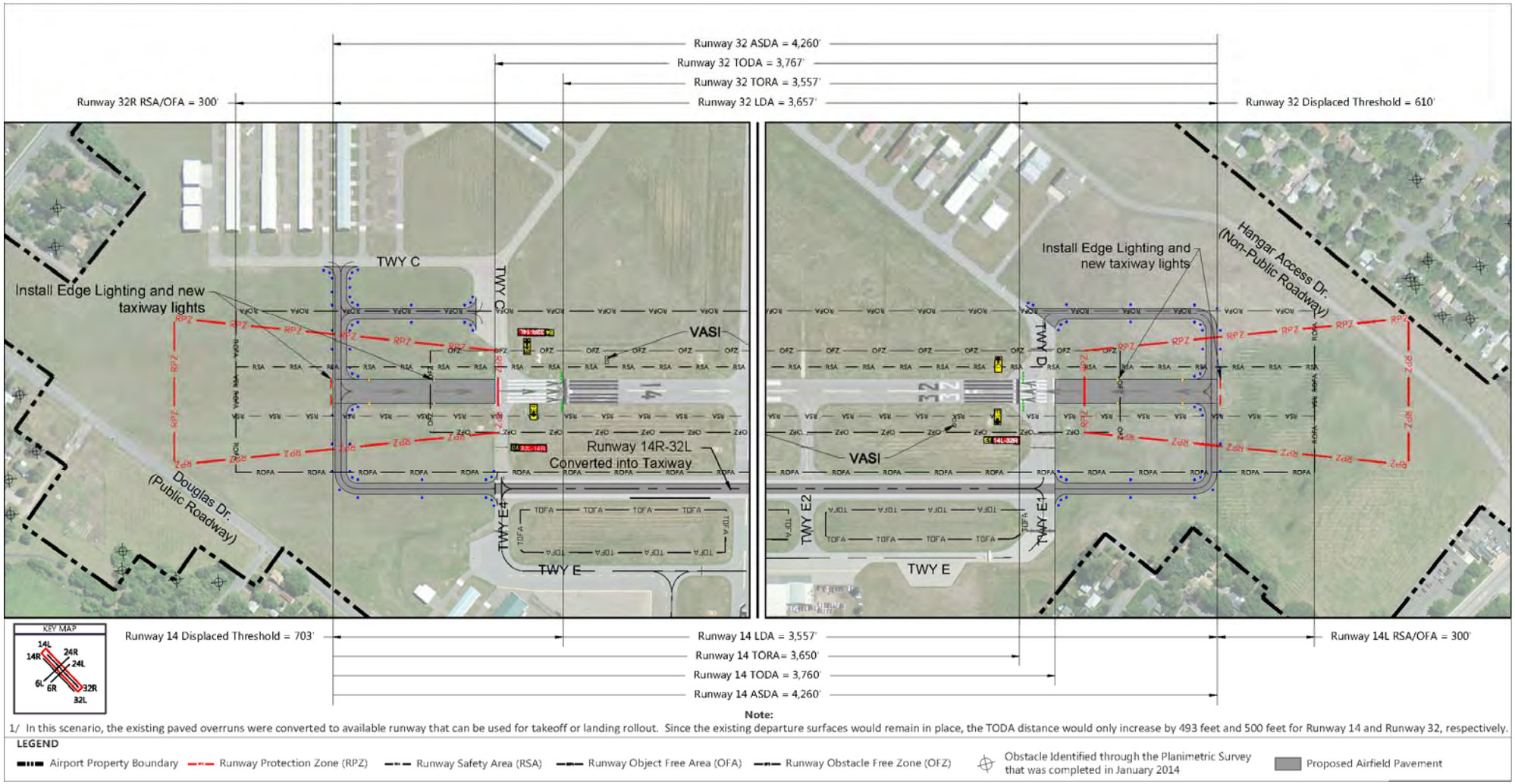
- FAA Guidance: Range 3,300 to 3,900 feet
  - Existing primary runway length is 3,267 feet
- Aircraft-Specific Analysis: ~ 3,600 feet would be appropriate for the design aircraft family
  - Based on Accelerate-Stop Distance (ASD)
  - ASD is the length needed to accelerate an aircraft to takeoff speed, make a decision to abort the takeoff, and then stop the aircraft on available pavement

Typical Aircraft Types

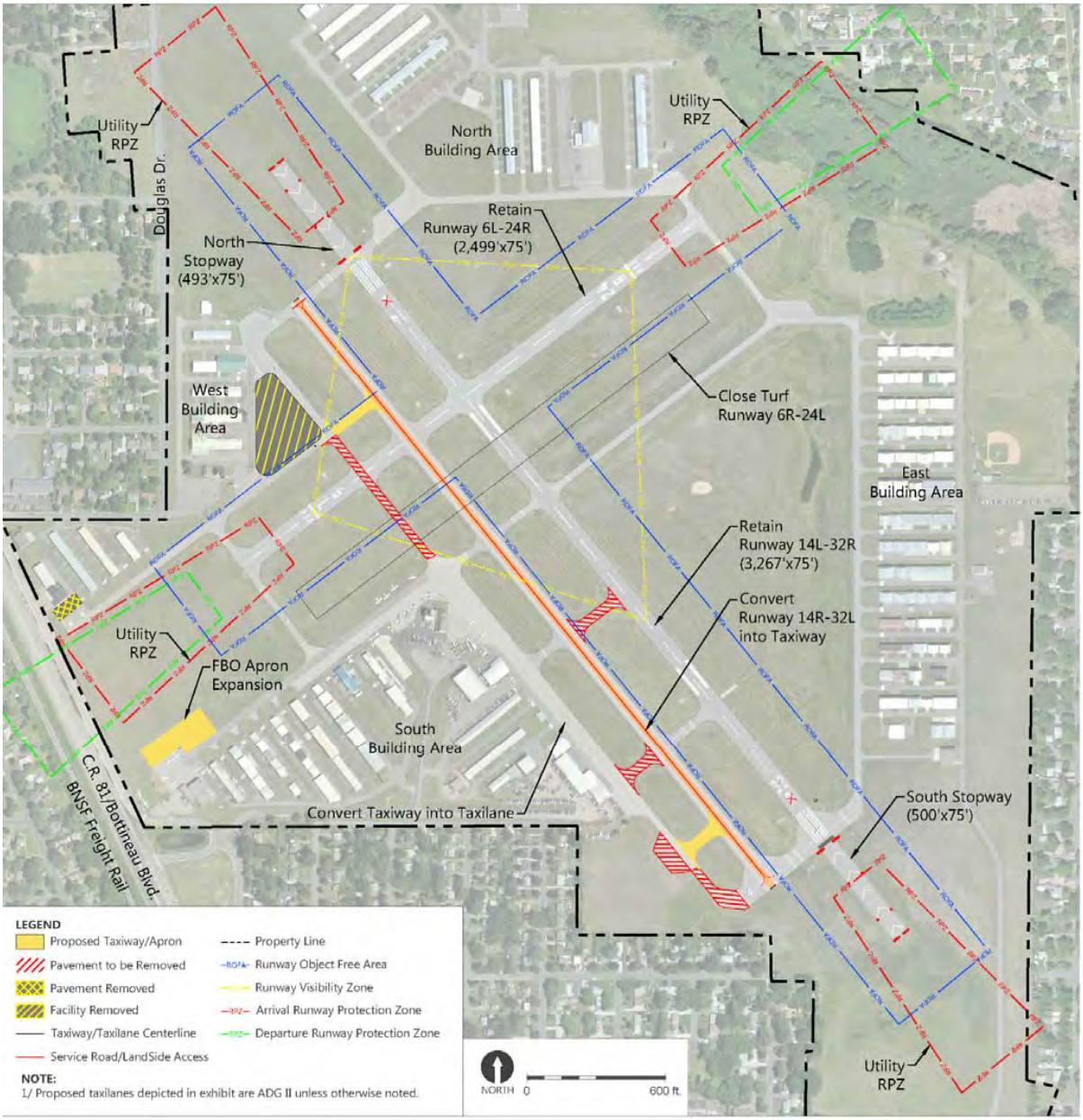
Previous LTCP Preferred Alternative



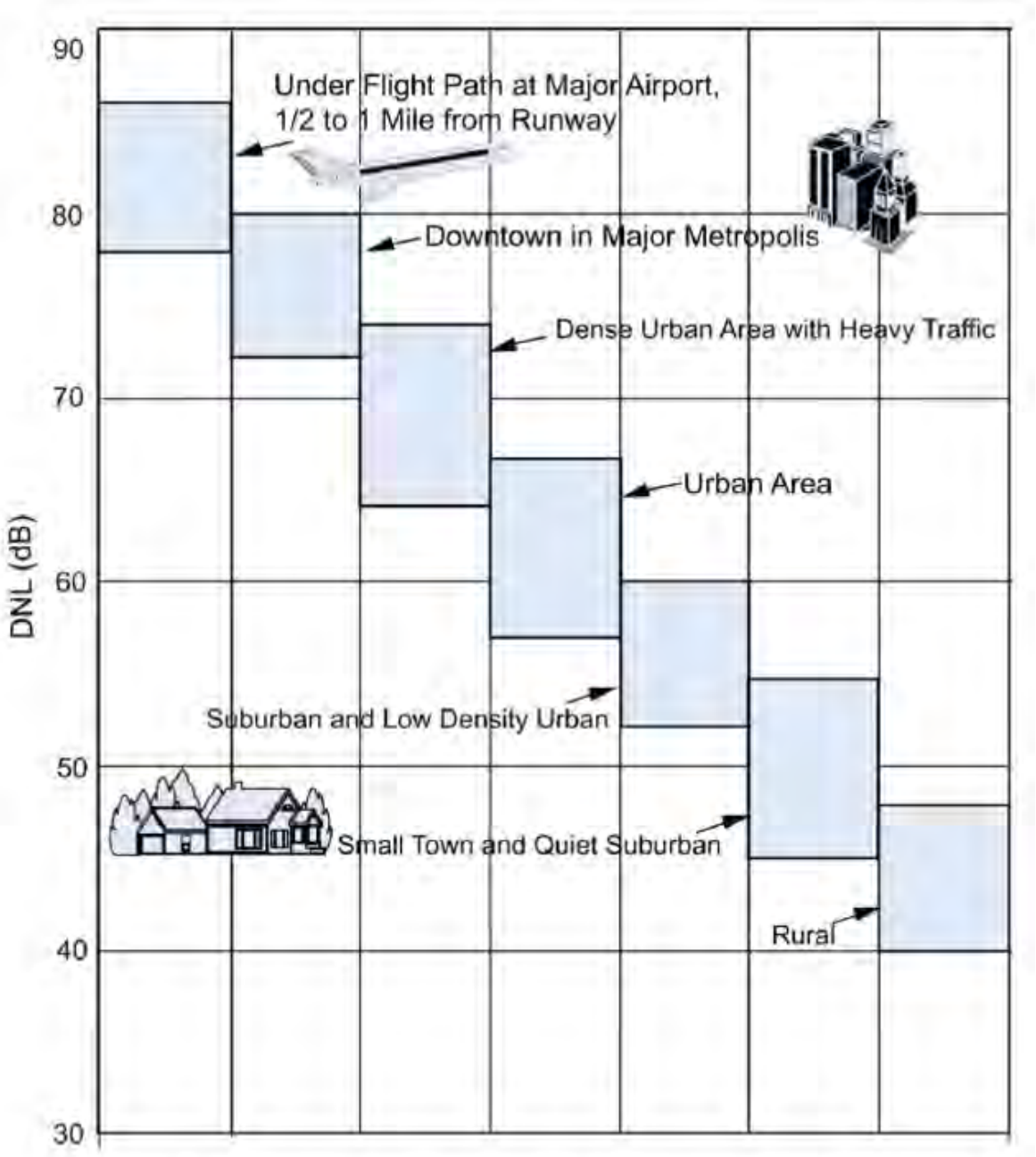
Alternative Refinement Concepts – Stopway Scenario



Alternative Refinement Concepts – Runway Extension Scenario



Preferred Development Alternative



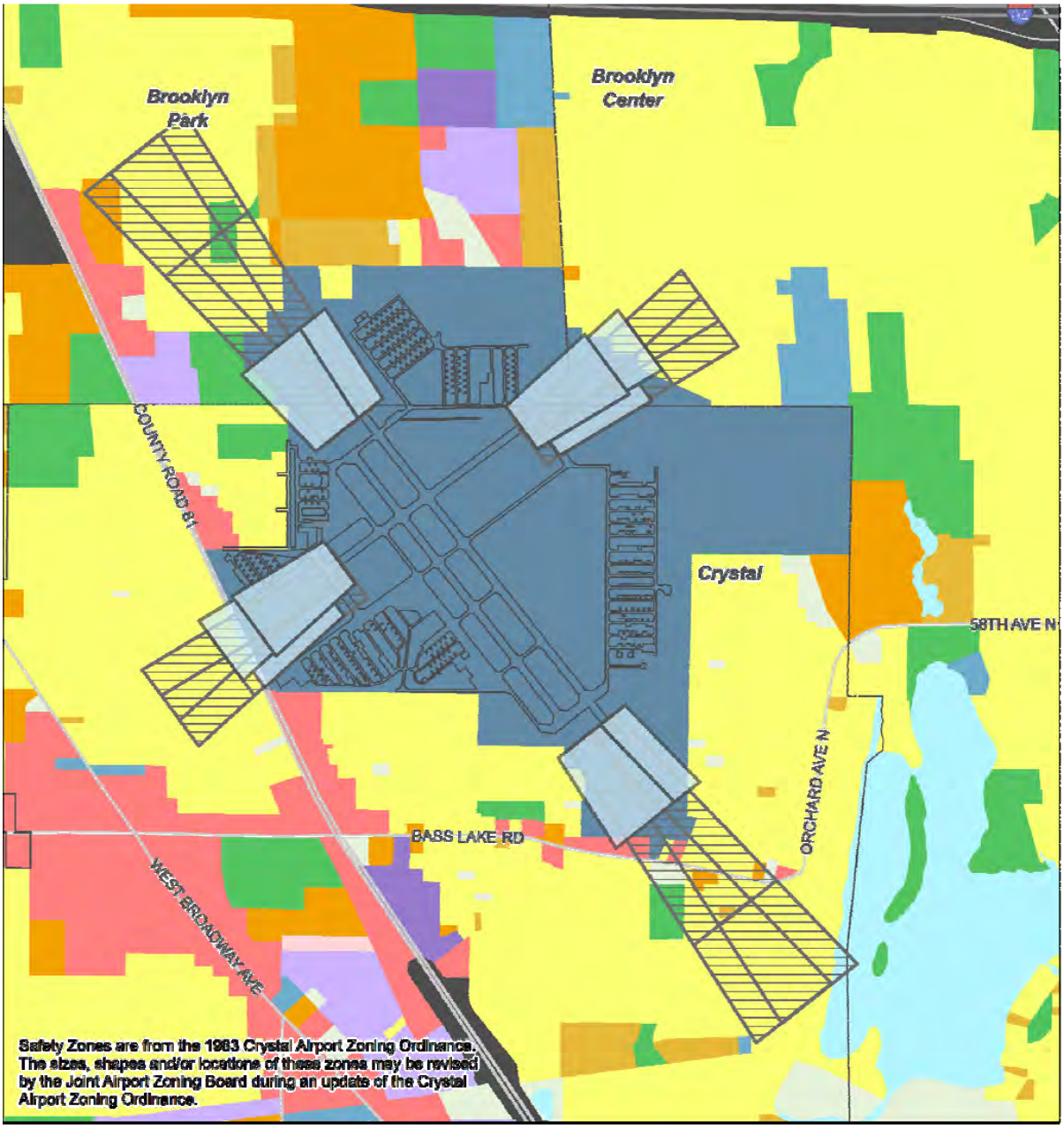
Source: U.S. Department of Defense, Departments of the Air Force, the Army, and the Navy, 1978. *Planning in the Noise Environment*. AFM 19-10, TM 5-803-2, and NAVFAC P-970. Washington, D.C.: U.S. DoD.

The DNL metric is calculated by cumulatively averaging sound levels over a 24-hour period with a 10 dB penalty between 10:00 P.M. and 7:00 A.M.

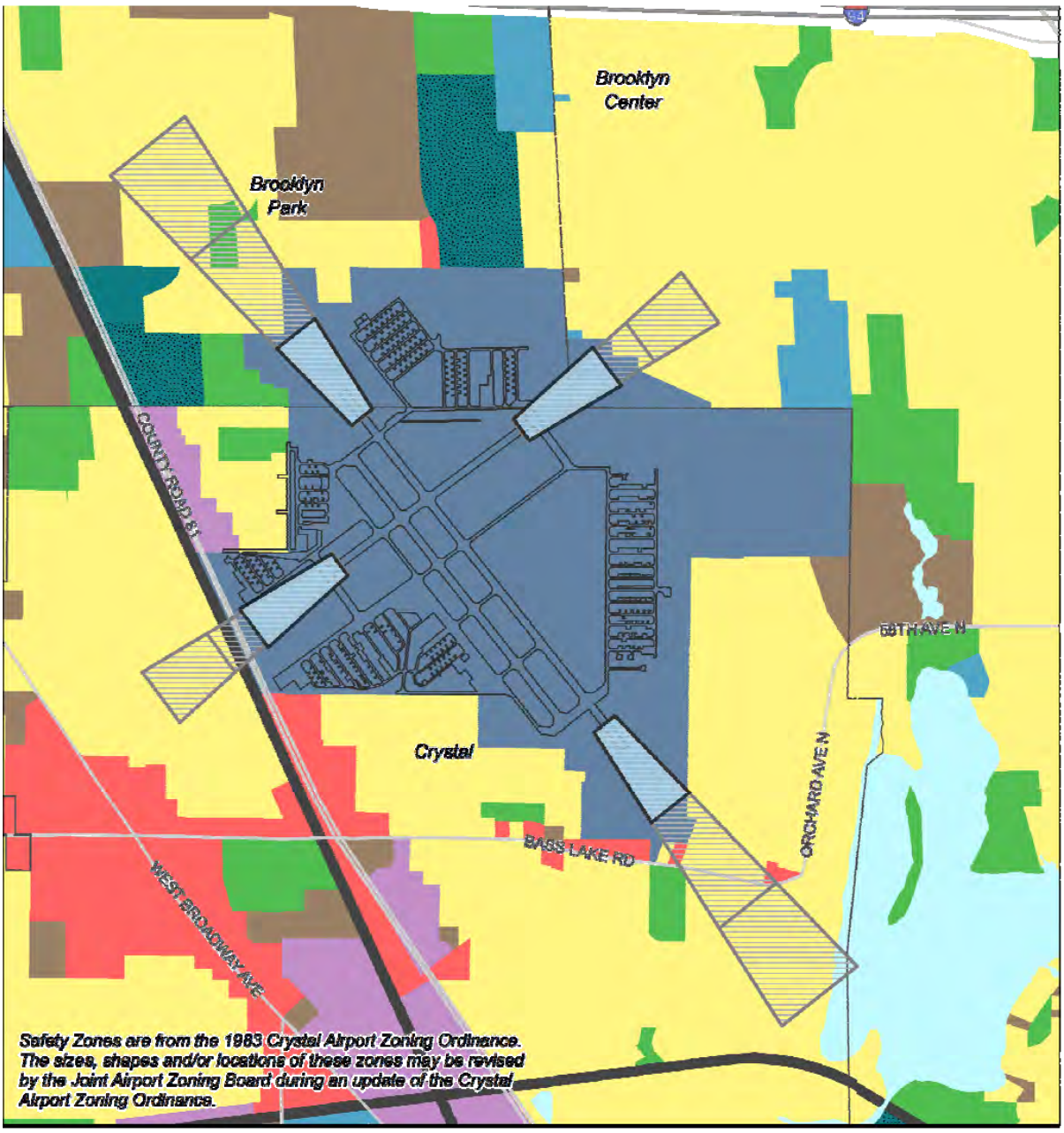
Typical Outdoor Community Day-Night Average Sound Level

Baseline Noise Contour

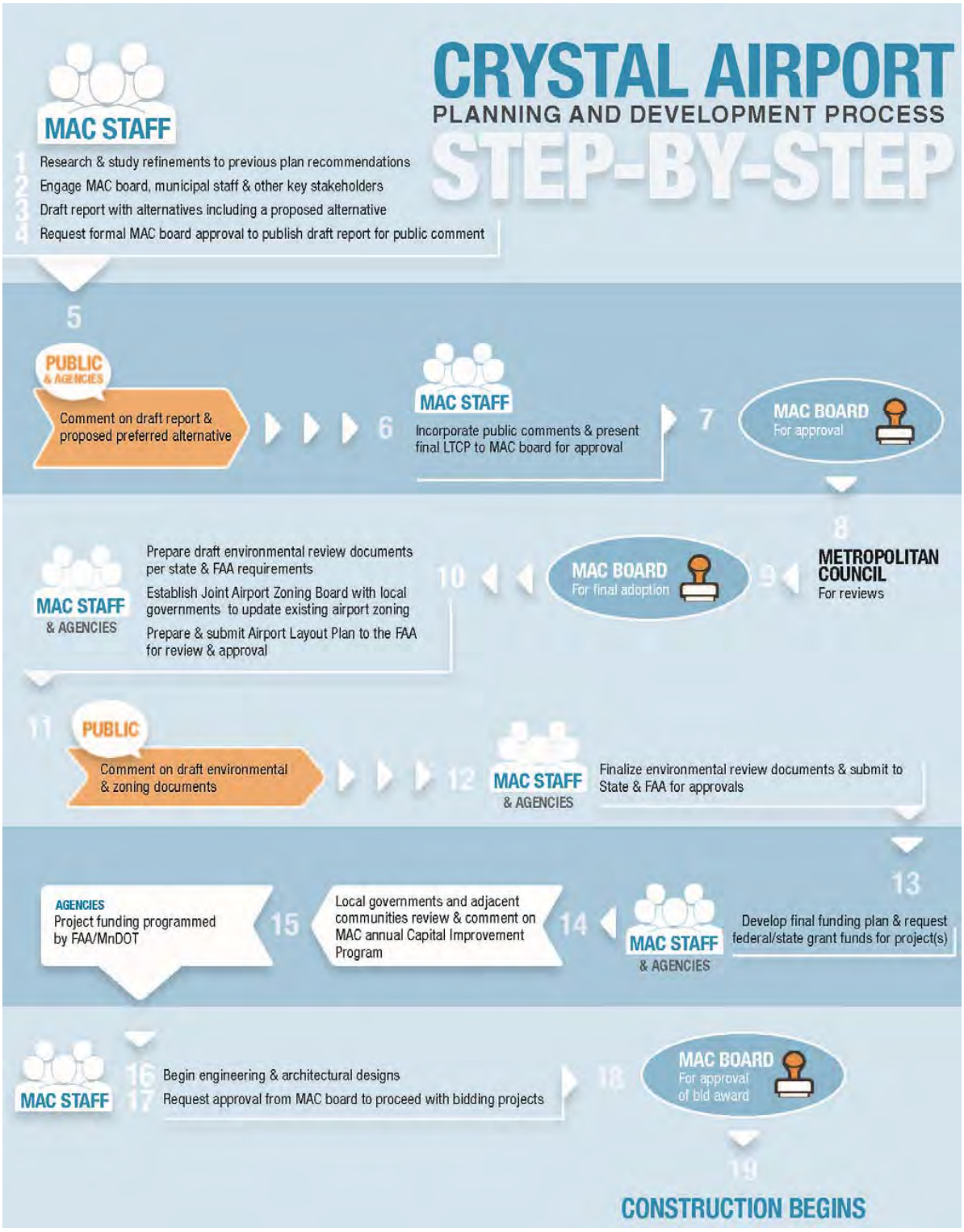
Preferred Alternative Noise Contour



Existing Land Use Compatibility



Future Land Use Compatibility



Planning & Development Process

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Julie Deshler	5645 Zane Ave No	Crystal City Council
Tom Van Housen	6322 45th Pl. N Crystal, MN 55428	763-999-6130
James Einfeldt-Brown	6315 54 1/2 Ave. #124 55428	City Planner
Cliff & Dolores Simpson	5624 Regent Ave N. 55429	Homeowner
Warren Batzlaff	6603 46th Ave No Crystal 55428	Pilot, hangarowner, Home owner
Jan Trover	8200 67th Ave N BP 55428	Pilot 99s International women pilots organization
Roger McGowan	6264 Edgewood Brooklyn Park	Home Owner
Rick & Becky Burton	6301 Florida Ave N - B.P. 55428	Homeowner
[illegible]	6319 61st Ave N 55428	N6161J B.A + Pilot
John Krack	7629 Lakeside Rd. NE, Fridley 55432	RAAC
John Sutter	City of Crystal	Staff
Dale Mendenhall	5700-50th ave. no. Crystal 55429	Home Owner
Tony McGarvey	7017 Dutton Ave Brooklyn Pk MN	ILPAT DC82
Kevin & Debbie Bauder	5756 Adair Ave N Crystal 55429	
Renae Bowman	3916 Edgewood Ave No Crystal 55427	Resident
Joe Shallbetter	6780 Lakeview Circ. Corcoran MN 55340	Pilot / Tennant MIC

Draft Crystal 2035 LTCP
Comprehensive Development Plan
Public Information Meeting

September 27, 2016

Crystal Community Center

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Dan Olson	City Hall, Crystal	City of Crystal
Marge & Joe Fautsch	5816 Regent Ave. N.	Crystal
Beverley Maar	6308 Douglas Dr. North	Brooklyn Park
Lawrence & LaVonne Rathbeck	Brooklyn Park, MN	Selves
FRED NAUER	5537 30th AVE S MPLS, MN	THUNDERBIRD
Lou Petros	5910 Kirkwood Cir Plymouth MN	6333 Douglas LLC
Jennie & Leonard Nordstrom	5657 Regent Ave N, Crystal, MN	Selves
JAKE TESKE	5800 Crystal Airport Rd, Crystal, MN 55429	Thunderbird
Shane Silbaugh	4916 60th Ave N Crystal MN 55429	Myself
BRITTON A. TEENSING	5514-57th Ave. No. CRYSTAL MN 55429	MYSELF
Judy Gydt	6712 Cloverdale Ave. N. Crystal, MN 55428	myself
Bev Gustafson	5300 62 Ave N. B. Center 55429	Myself
TIM STANLEY	5708 ADAIR AVE N CRYSTAL, MN	MYSELF
Ruth Rudolph	5750 Adair Ave. N. Crystal MN	myself

Draft Crystal 2035 LTCP
Comprehensive Development Plan
Public Information Meeting

September 27, 2016

Crystal Community Center

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Jeremy Vecoli	7500 16TH AVE S, RICHFIELD, 55423	N25WE
DARRELL WINCEK	6307-61ST AVE N. CRYSTAL 55428	
BRYAN SIEVE	5800 CRYSTAL AIRPORT RD, BOX 5 55428	ODYSSEY ENTERTAINMENT
John Krack	7629 Lakeside Rd NE Fridley, MN 55432	RAAC
Warren Starkebaum	4230 Trenton Ln, Plymouth 55441	N671CW
August Hengel	6533 GEORGIA AV B.P.	
Yackie Wright	6624 LAKELAND AV N B.P.	
ROBERT A. JOHNSON	6624 LAKELAND AVE NO BROOKLYN PARK MN.	
Mark & Cathy Cocker	6133/6206 Scott Ave N B.C.	
Jan Trover	8200 67th Ave N BP 55428	pilot BP resident
JOEL DRESEL	3535 Vadnais Ctr. Dr., St. Paul	SEH
Jenny Olson / Kathy Noren	5502-57th Ave No Crystal 55429	
TIM STANLEY	5708 ADAIR AVE N	SELF
Mark Olson	4817 Pleasant Ave S. Mpls 55419	Wenck Assoc
AL LINDQUIST	7525 Maplewood Dr MAPLE GROVE MN 55311	SELF
BARB WICKEY	" "	SELF

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

26 January 2017– Crystal Tenant Briefing

LTCP Progress Update

LTCP Progress Update

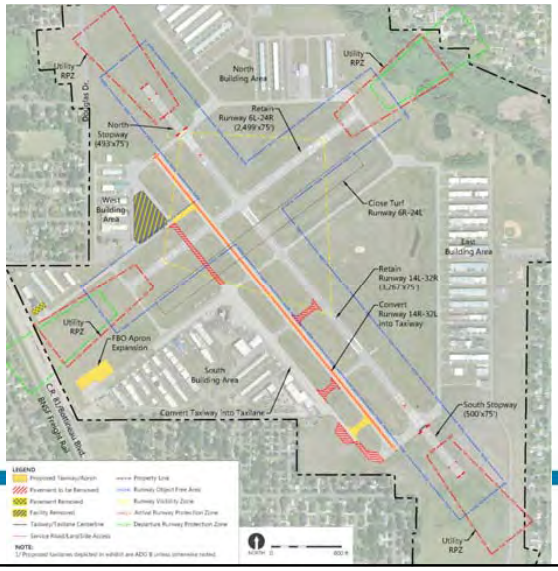
- Issued Draft LTCP in September
- Public Review Period ended in late October
- Assessing Comments/Input
- Considering concept revisions

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

2

Draft 2035 LTCP Preferred Alternative

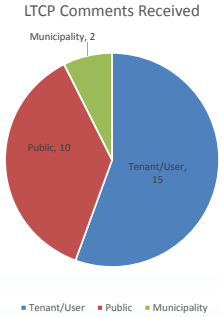


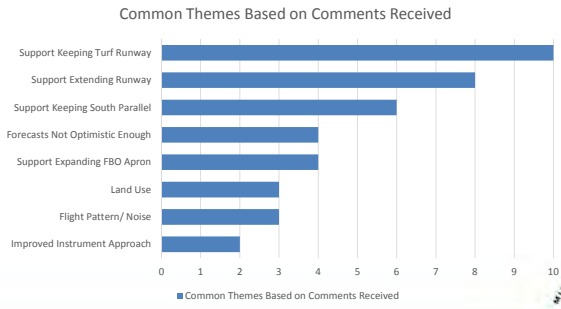
- Two-runway system from 2025 LTCP to better align infrastructure with demand
- Convert RWY 14L-32R paved blast pads to stopways
- Utility Runway designations
- Taxiway configuration changes
- FBO Apron expansion
- Additional LNAV non-precision instrument approach if feasible

3

Summary of Comments Received

- 27 total comments
  - 15 from Tenants/Users
  - 10 from citizens/public
  - 2 from municipal representatives
- Most Common Themes
  - Turf runway
  - South parallel runway
  - Primary runway length





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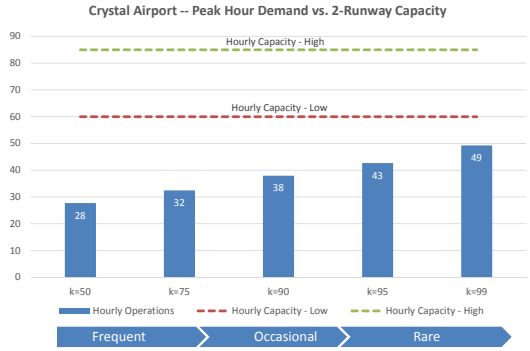
Two-Runway Airfield Capacity vs. Demand

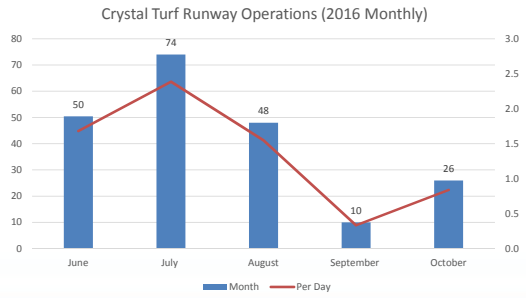
- Airfield Capacity (two intersecting runways)
  - Range of ~60 - 85 operations per hour in mixed operations
  - Factors: direction of flow, touch and go volume, aircraft separation buffers
- Operational hourly demand profile
  - ~30 hourly operations frequent
  - ~40 hourly operations occurs occasionally
  - Peak ~50 hour operations infrequent
- Two runway system appears capable of accommodating projected demand

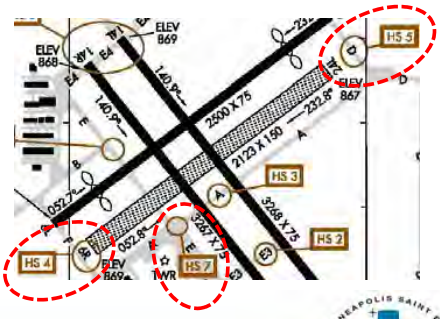


5

Turf Runway

- Turf Runway Challenges
  - Adds to airfield complexity: 3 of 8 Hot Spots on the airfield are associated with the turf runway
  - Low usage
  - Airspace/zoning/land use
  - Ageing condition





6

Adjacent Turf Landing Area Concept

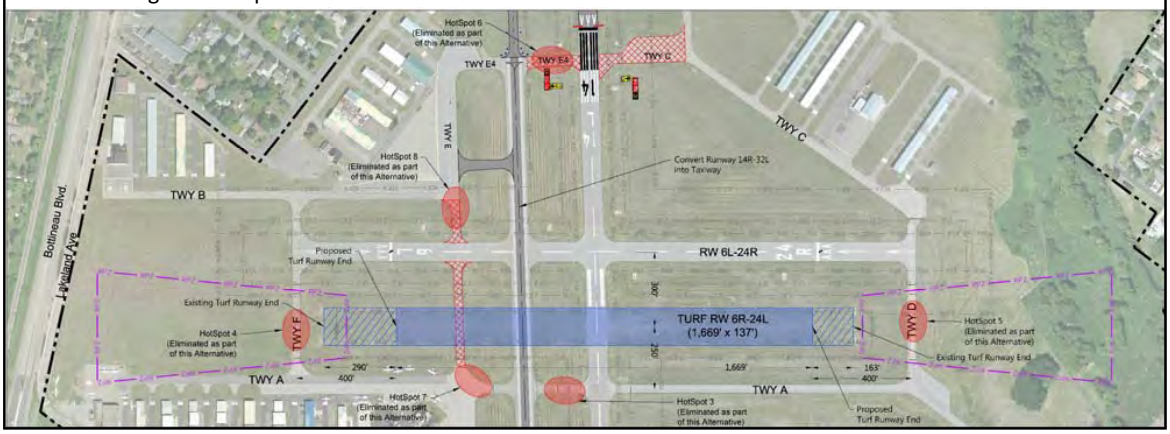
7

Adjacent Turf Landing Area Concept

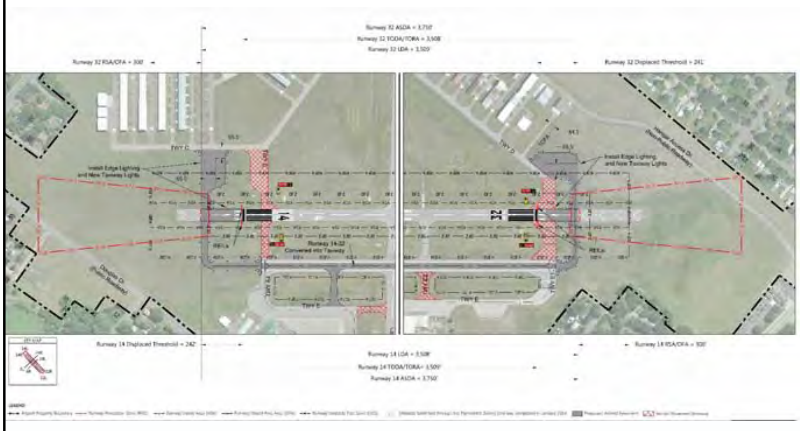
8

Shortened Turf Runway Concept

- Reduce Length of Turf Runway 6R-24L to ~1,670 feet
  - Removes TWY F and D crossings from Turf Runway Safety & Object Free Areas
  - 20-foot tail clears approach surfaces
  - Free-flow taxi vs. Approach/Departure hold shorts
  - Mitigates hot spots?



Refined Primary Runway Concept



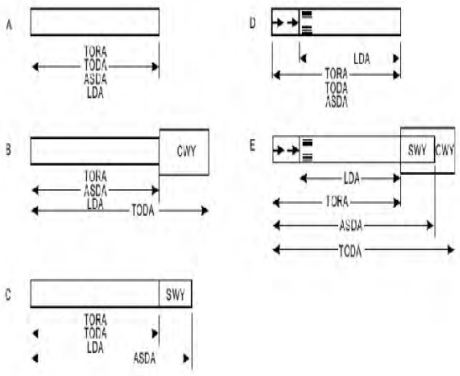
Convert Portions of RWY 14-32 Blast Pads to Runway

- Published length ~ 3,750 feet
- Provides additional takeoff and landing distance (~ 3,500 feet) for all users
- Runway shifts NW to improve RPZ compliance
- Implements declared distances
  - Takeoff Run Distance Available
  - Takeoff Distance Available
  - Accelerate-Stop Distance Available
  - Landing Distance Available
- Other factors: noise, airspace

10

Declared Distance Overview

- **Takeoff Run Available (TORA)**
  - Runway length declared available and suitable for the ground run of an aircraft taking off
- **Takeoff Distance Available (TODA)**
  - TORA plus the length of any remaining runway or clearway beyond the far end of the takeoff run available
  - Distance from brake release past liftoff to start of takeoff climb
  - No clearway @ MIC, so TORA = TODA
- **Accelerate-Stop Distance Available (ASDA)**
  - Runway length declared available and suitable for acceleration and deceleration of an airplane aborting a takeoff
- **Landing Distance Available (LDA)**
  - Runway length declared available and suitable for a landing airplane
  - Displaced threshold



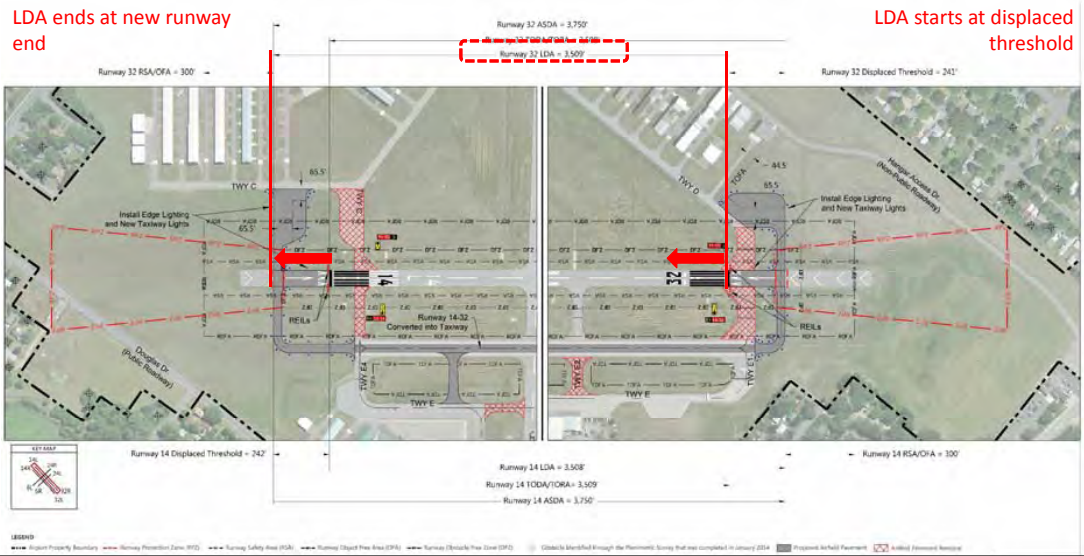
11

Refined Runway Concept Declared Distances

RWY 32 Landing Distance Available (LDA)

LDA ends at new runway end

LDA starts at displaced threshold



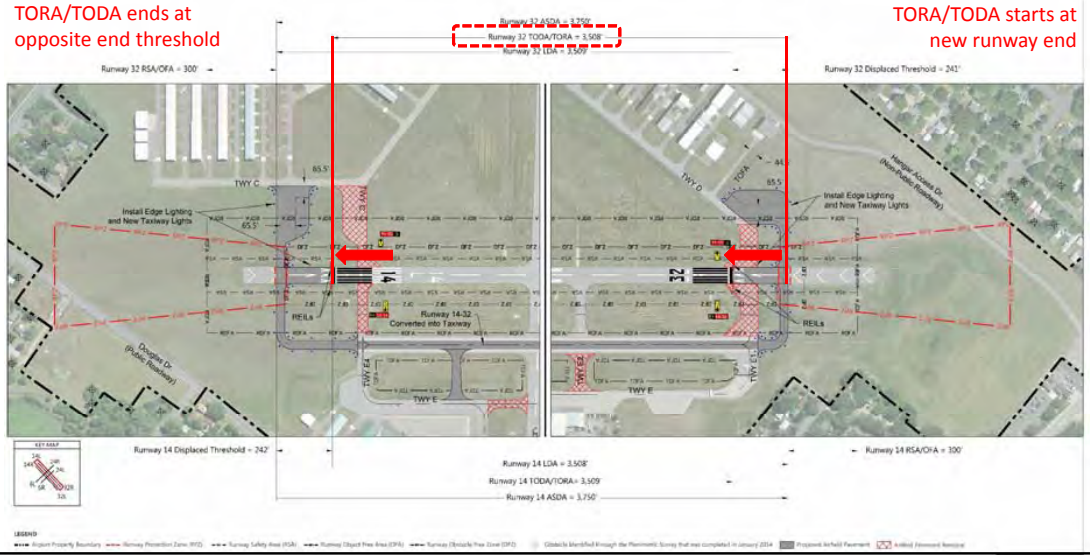
12

Refined Runway Concept Declared Distances

Runway 32 Takeoff Run & Distance Available (TORA/TODA)

TORA/TODA ends at opposite end threshold

TORA/TODA starts at new runway end



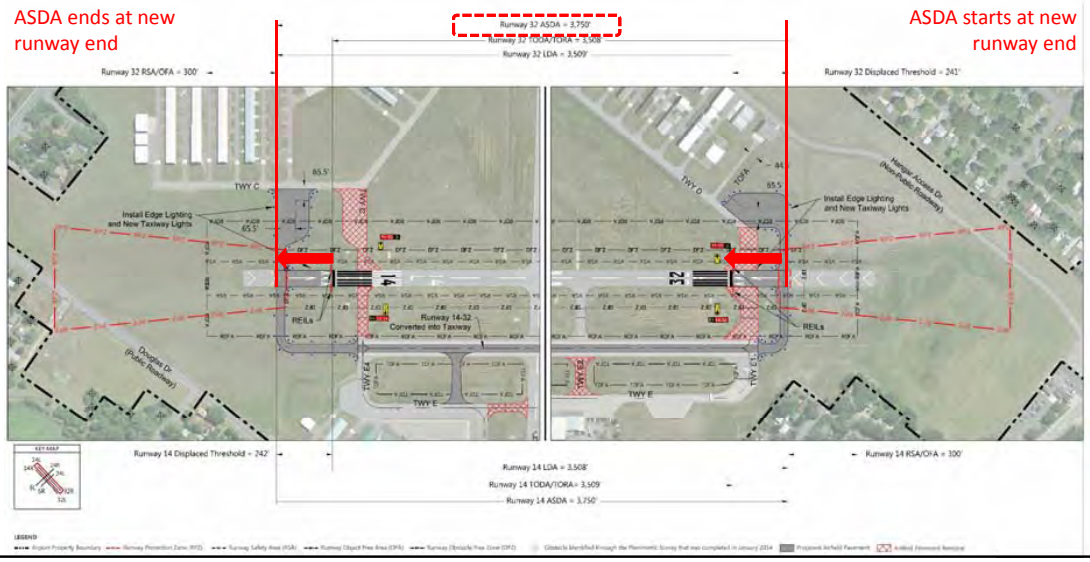
13

Refined Runway Concept Declared Distances

Runway 32 Accelerate-Stop Distance Available (ASDA)

ASDA ends at new runway end

ASDA starts at new runway end



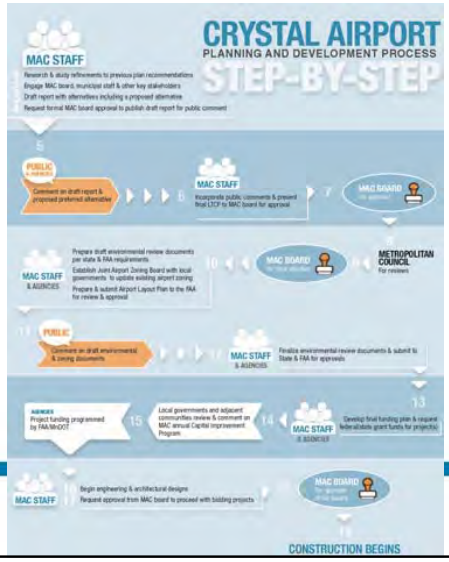
14

Refined Preferred Alternative?

- Retain portion of existing Turf Runway 6R-24L
- Convert portion of paved blast pads to useable Primary Runway
- Incorporate declared distances
  - 3,750' published length/ASDA
  - ~3,500' TORA/TODA/LDA
- Additional taxiway configuration changes
- Continue to assess feasibility of RWY 32 non-precision approach

15

Next Steps



- Next Steps for a Refined Alternative
  - Stakeholder engagement
  - MAC Board concurrence to consider Refined Alternative
  - Prepare LTCP Report Addendum
  - Hold supplemental public comment period to solicit feedback
- MAC Board Approval to Submit to Metropolitan Council
- Metropolitan Council Review
- Final MAC Board Adoption
- Environmental & Airport Layout Plan (ALP)

16

CRYSTAL AIRPORT DRAFT 2035 LTCP
TENANT BRIEFING SIGN-IN SHEET
January 26, 2017 @ 6:00pm
Crystal Airport – MAC Office/Maintenance Building

Name	Representing	Contact Info
DAVE HAHN	HANGAR OWNER	KMICC@HOTMAIL.COM
Earl Jensen		
Joe Shuttleworth	Hanger owner	
Chris Glaeser	Yankee flying Club	Chris.Glaeser@gmail.com
DALE MENDENHALL		
Ted Wyrowski	Aircraft Owner	WYROWS@Comcast.Net
ROBERT C MEISCH	TENANT / AC OWNER	THEMEISCHS1@MSN.COM
Steve Wentworth	Wentworth Aircraft	Wentacpnt@Aol.com
JAMES DUHL	TC TECHSUPPORT (JDUHL@ENGINEERING.COM)	WWW.TCTECHSUPPORT.COM
Michael Finn		Mickfinn.eaglelake@gmail.com
Philip Nelson		phil.pgnelson@gmail.com
Heidi Wulf	FAA	heidi.c.wiest@faa.gov
JACK FORTMAN	SELF	763-533-9308
BRYAN STEVE	HANGER 3-28	612-719-4640
FRED BILLS	SELF	MAILAIRMARK@AOL.COM

JDUHL@JD-ENGINEERING.COM

CRYSTAL AIRPORT DRAFT 2035 LTCP
TENANT BRIEFING SIGN-IN SHEET
January 26, 2017 @ 6:00pm
Crystal Airport – MAC Office/Maintenance Building

Name	Representing	Contact Info
MARK PITMAN	N5270Q	612-963-8149 mtp:tman@industrialinside.com
Jeff Dinsmore	Yankee Flying Club	jdinsmore@bracutflight.com
Kelly Gerads	MAC	kelly.gerads@mspmac.org
Bruce Killen	Club Cherokee	bruce@brucekillen.com
MIKE DANIELSON	Scotchman Hangar N143CR	MIKE@eidecom.com
Dick JOHNSON	Civil Air Patrol	richielj40@MSN.COM
Robert W Eckstein	Hangar Owner	rwxstein@comcast.net
Barb Wiley	Wileys	barbwiley@wileyproperties.com
Lindsay Reidt	SEH	lreidt@sehinc.com
Mike Wilson	MAC	mike.wilson@mspmac.org
D.A. Clark	Tenant	execnaire@gmail.com
ENNIS E. DIGGS, JR	N7596M	N7596M@...
Charles Eide	N143CR	Charles@eidecom.com

CRYSTAL AIRPORT DRAFT 2035 LTCP
TENANT BRIEFING SIGN-IN SHEET
January 26, 2017 @ 6:00pm
Crystal Airport – MAC Office/Maintenance Building

Name	Representing	Contact Info
Warren Batzlaff	Private Pilot Hangar owner	warrenbatzlaff@gmail.com
PAUL BLOCH	PR Hangar owner	PRBCOMPANY@YAHOO.COM
PATRICK FOX	Private Pilot Hangar-owner	patrick@patrickfox.com
Stan Berger	" "	WINTERHILL.Stan@GMail.com
Keith Ulstad	Hangar 74E - East Side	keith-ulstad@appropertics.com

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

27 January 2017

LTCP Progress Update to Municipal Planners

LTCP Progress Update

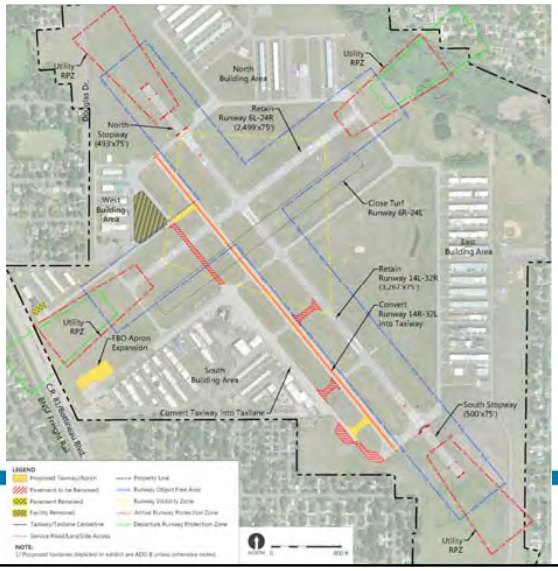
- Issued Draft LTCP in September
- Public Review Period ended in late October
- Assessing Comments/Input
- Considering concept revisions

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

2

Draft 2035 LTCP Preferred Alternative

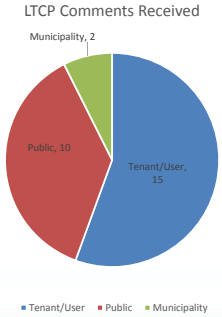


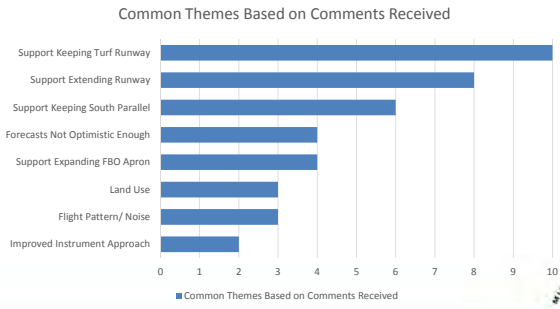
- "Right-sized" two-runway system from 2025 LTCP to better align infrastructure with demand
- Convert RWY 14L-32R paved blast pads to stopways
- Utility Runway designations
- Taxiway configuration changes
- FBO Apron expansion
- Additional LNAV non-precision instrument approach if feasible

3

Summary of Comments Received

- 27 total comments
  - 15 from Tenants/Users
  - 10 from citizens/public
  - 2 from municipal representatives
- Most Common Themes
  - Turf runway
  - South parallel runway
  - Primary runway length





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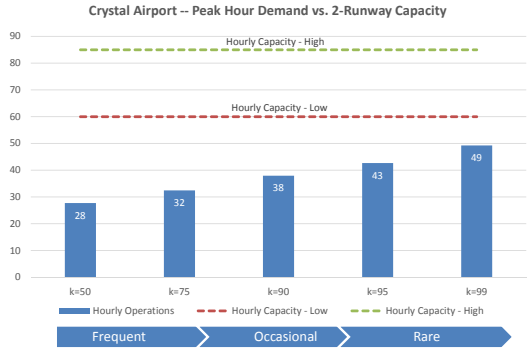
Two-Runway Airfield Capacity vs. Demand

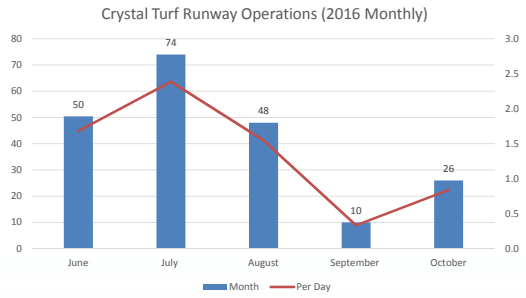
- Airfield Capacity (two intersecting runways)
  - Range of ~60 - 85 operations per hour in mixed operations
  - Factors: direction of flow, touch and go volume, aircraft separation buffers
- Operational hourly demand profile
  - ~30 hourly operations frequent
  - ~40 hourly operations occurs occasionally
  - Peak ~50 hour operations infrequent
- Two runway system appears capable of accommodating projected demand

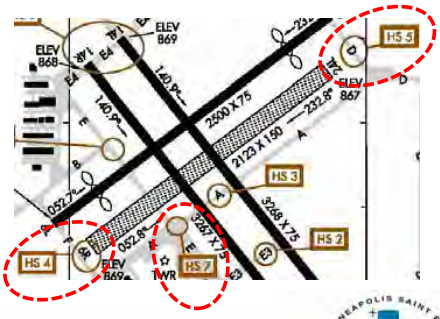


5

Turf Runway

- Turf Runway Challenges
  - Adds to airfield complexity: 3 of 8 Hot Spots on the airfield are associated with the turf runway
  - Low usage
  - Airspace/zoning/land use
  - Ageing condition

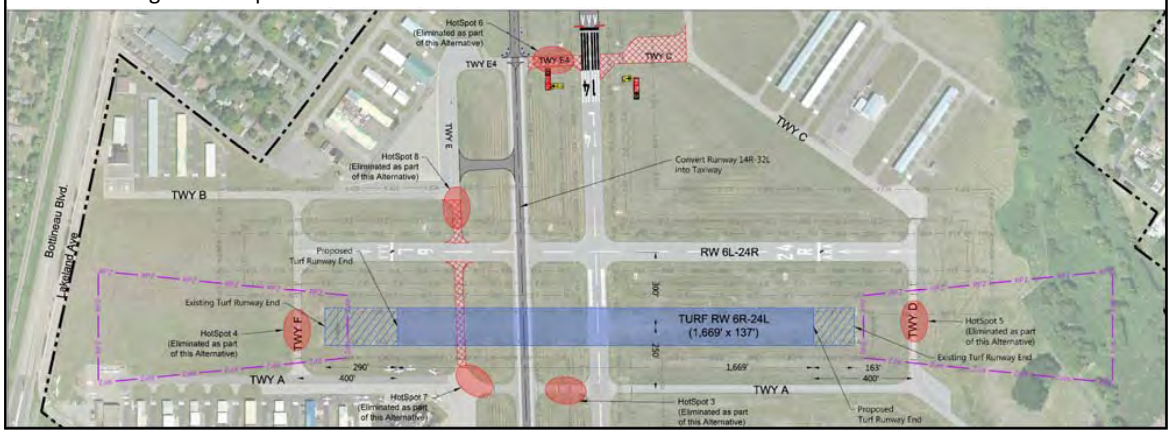




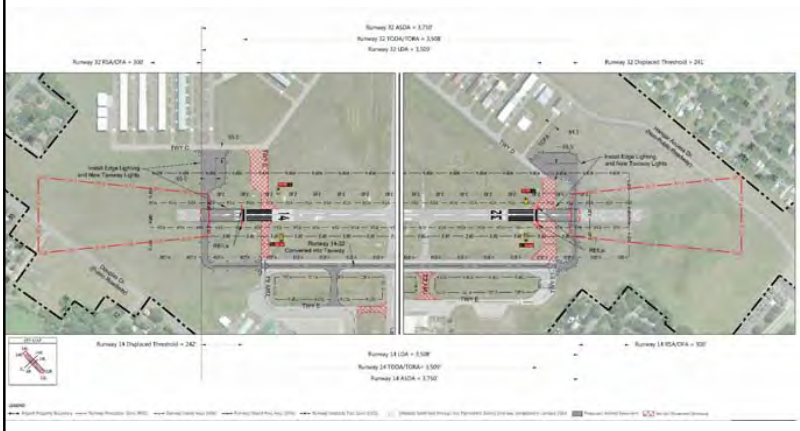
6

Shortened Turf Runway Concept

- Reduce Length of Turf Runway 6R-24L to ~1,670 feet
  - Removes TWY F and D crossings from Turf Runway Safety & Object Free Areas
  - 20-foot tail clears approach surfaces
  - Free-flow taxi vs. Approach/Departure hold shorts
  - Mitigates hot spots?



Refined Primary Runway Concept



Convert Portions of RWY 14-32 Blast Pads to Runway

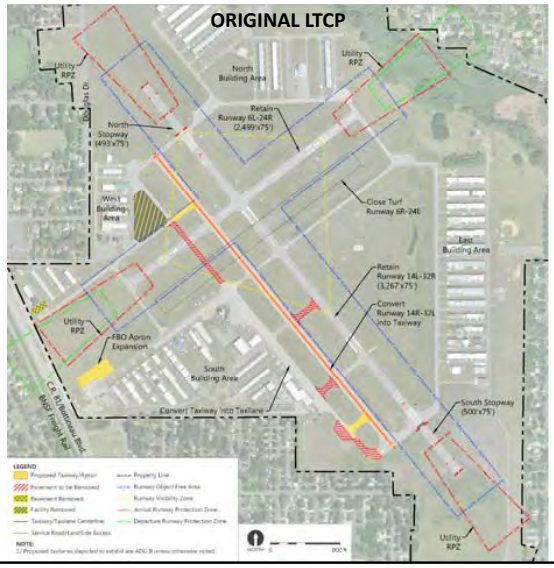
- Published length ~ 3,750 feet
- Provides additional takeoff and landing distance (~ 3,500 feet) for all users
- Runway shifts NW to improve RPZ compliance
- Implements declared distances
  - Takeoff Run Distance Available
  - Takeoff Distance Available
  - Accelerate-Stop Distance Available
  - Landing Distance Available
- Other factors: noise, airspace

8

Refined Preferred Alternative?

- Retain portion of existing Turf Runway 6R-24L
- Convert portion of paved blast pads to useable Primary Runway
- Incorporate declared distances
  - 3,750' published length/ASDA
  - ~3,500' TORA/TODA/LDA
- Additional taxiway configuration changes
- Continue to assess feasibility of RWY 32 non-precision approach

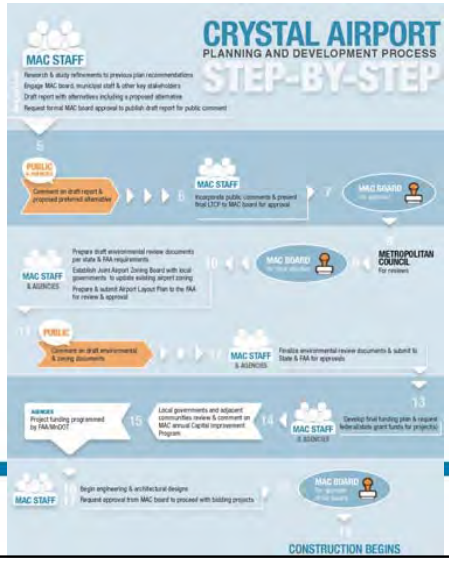
Crystal LTCP Concept Comparison



Refined Runway Concept – Noise Contour

11

Next Steps



- Next Steps for a Refined Alternative
  - Stakeholder engagement
  - MAC Board concurrence to consider Refined Alternative
  - Prepare LTCP Report Addendum
  - Hold supplemental public comment period to solicit feedback
- MAC Board Approval to Submit to Metropolitan Council
- Metropolitan Council Review
- Final MAC Board Adoption
- Environmental & Airport Layout Plan (ALP)

12

PUBLIC NOTICE

DRAFT 2035 LONG-TERM COMPREHENSIVE PLAN
CRYSTAL AIRPORT
REFINED PREFERRED ALTERNATIVE
Draft Plan Addendum and Supplemental Public Comment Period

The Metropolitan Airports Commission (MAC) has prepared an Addendum to the draft 2035 Long-Term Comprehensive Plan (LTCP) for Crystal Airport. The Addendum describes a Refined Preferred Alternative that was developed in response to public and stakeholder feedback about the original plan, which was issued for public comment in September 2016. The updated plan proposes to (1) provide additional primary runway length to better accommodate the types of aircraft already operating at the airport and (2) keep a portion of the existing grass runway operational.

MAC will be hosting a public information meeting regarding the Addendum:

Thursday, March 30, 2017
5:00 PM to 7:00 PM
Presentation beginning at 6:00 PM
Odyssey Academy
6201 Noble Avenue N
Brooklyn Center, MN 55429

The public is invited to attend to learn more about the proposed changes, as well as provide comments regarding the plan. The meeting offers an opportunity for one-to-one interaction with MAC staff in an open house setting with an overview presentation beginning at 6:00pm.

Beginning Wednesday, March 15, 2017, the public is invited to review the Draft LTCP Addendum and provide written comments to the MAC.

Copies of the draft LTCP Addendum document will be available for distribution, and for viewing on the MAC's website, beginning Wednesday, March 15, 2017. Written comments will be accepted until Friday, April 14, 2017 at 5:00pm CDT.

http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

A printed copy of the Addendum document will be available for review at the following locations: MAC General Office building, 6040 28th Avenue South, Minneapolis; Crystal City Hall, 4141 Douglas Drive North, Crystal; Rockford Road Library, 6401 42nd Avenue North, Crystal; and at Crystal Airport, 5800 Crystal Airport Road, Crystal. Requests for a paper copy can be sent to the email address below.

Written comments can be submitted via email by sending them to **Crystal-Airport-LTCP-Comments@mspmac.org**, or by mailing them to Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

PUBLIC MEETING ANNOUNCEMENT

The Metropolitan Airports Commission (MAC) is holding an informational meeting for the public to learn more about proposed refinements to its long-term plans for Crystal Airport.

Please join us!

Thursday, March 30 • 5 to 7p.m.

MAC staff will provide a presentation at 6 p.m.

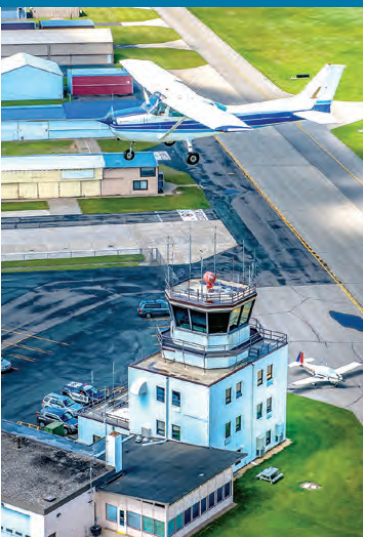
Odyssey Academy
6201 Noble Avenue N, Brooklyn Center, MN 55429

The MAC is proposing several refinements to the draft Crystal Airport 2035 Long-Term Comprehensive Plan in response to public and stakeholder feedback. The original plan was issued for review in September 2016. A summary of the proposed refinements can be found on the MAC's website at:

metroairports.org/General-Aviation/Airports/Crystal.aspx

Questions about the plan or the informational meeting?

Please contact Neil Ralston at neil.ralston@mspmac.org or 612-726-8129.



Crystal Airport DRAFT 2035 Long-Term Comprehensive Plan (LTCP)

Supplemental Public Informational Meeting Handout

Thank you for attending this supplemental Crystal Airport 2035 Long Term Comprehensive Plan (LTCP) public information meeting.

We appreciate you taking the time to attend and learn more about the changes we have made to the draft LTCP. Based on feedback received during the first public comment period, the MAC is proposing a Refined Preferred Alternative. This Refined Alternative seeks to fine-tune the recommended improvements to enhance safety and operational capabilities for the current types of aircraft using the airport – but without changing its role as a "complimentary reliever" in the regional airport system.

This handout provides information about Crystal Airport, a summary of the planning process and the refined recommendations.

Airport Development, Environment, and Reliever Airports

PUBLIC COMMENTS

The MAC is accepting written comments about the revised plan for Crystal Airport through Friday, April 14, 2017. To provide comments, you can fill out a comment form tonight, mail your form at a later date, or submit your comments via email to **Crystal-Airport-LTCP-Comments@mspmac.org**. All comments submitted will be made a part of the project record and published in the final report.

ABOUT CRYSTAL AIRPORT

The Metropolitan Airports Commission (MAC) owns and operates Crystal Airport. It is one of six general aviation airports within the MAC's system of airports. The airport plays an important role in this system by attracting general aviation aircraft away from Minneapolis-St. Paul International Airport (MSP) thereby relieving congestion at MSP. Crystal is the closest MAC airport to downtown Minneapolis.

Crystal Airport has operated continuously since it opened in September 1950. It serves personal, recreational, and some business aviation users in the northwest metropolitan area, including the cities of Crystal, Brooklyn Park, Brooklyn Center, and Minneapolis.

WHY IS THE LTCP BEING UPDATED? WHAT IS ITS STATUS?

An LTCP is a tool used by airport planners to predict an airport's infrastructure needs into the future. This update to Crystal Airport's LTCP explores the facility's needs out to the year 2035 and includes recommendations for its development over the next 5-10 years. It does not, however, authorize construction.

The **original** draft LTCP report, issued in September 2016, is available for public review and comment on the MAC website at **http:/metroairports.org/General-Aviation/Airports/Crystal.aspx.**

In response to public and stakeholder feedback about the original plan, MAC is proposing to make several refinements to it. An **Addendum** to the draft 2035 LTCP report, which describes a Refined Preferred Alternative, is also available on the same web page.

WHAT ARE THE PROPOSED REFINEMENTS TO THE PLAN?

The updated plan proposes to (1) provide additional runway length to the primary runway to better accommodate the types of aircraft already operating at the airport and (2) keep a portion of the existing grass runway operational.

- **Primary Runway Length:** The original plan proposed to convert the existing Runway 14L-32R blast pads/overruns pavement on both ends of the runway into stopways to improve safety and offer some operational improvements for aircraft already operating at the airport.

  However, several commenters stated that establishing stopways would not result in a significant operational benefit for most users of the airfield. Commenters encouraged the MAC to, instead, consider using the existing pavement blast pads/overruns to increase the length of this runway in order to improve operational capabilities for more aircraft types currently operating at Crystal Airport.

  Based on this feedback, MAC is now proposing to convert portions of the existing Runway 14L-32R blast pads/overruns pavement on each end to useable runway. This would result in a runway length of 3,750 feet, approximately 500 feet longer than the existing runway length. This concept also recommends shifting the entire runway approximately 115 feet to the northwest along its centerline, which moves the entire Runway Protection Zone (RPZ), at the southeast end, fully onto airport property. Today, as well as in the original draft plan, a corner of the Runway Protection Zone extends off the airport onto private residential property.

WHAT AIRPORT IMPROVEMENTS ARE PROPOSED IN THE PLAN?

The following improvements are recommended and are shown on the map:

A. REFINED: (A1) Keep a portion of existing turf Runway 06R-24L open (approximately 1,670 feet). (A2) Close existing Runway 14R-32L.

ORIGINAL: Close existing Runways 14R-32L and 06R-24L (turf).

B. Convert existing Runway 14L-32R into a full-length parallel taxiway and add taxiway lights.

C. Change the runway designation to Utility and use small aircraft design standards to reduce Runway Protection Zone (RPZ) dimensions

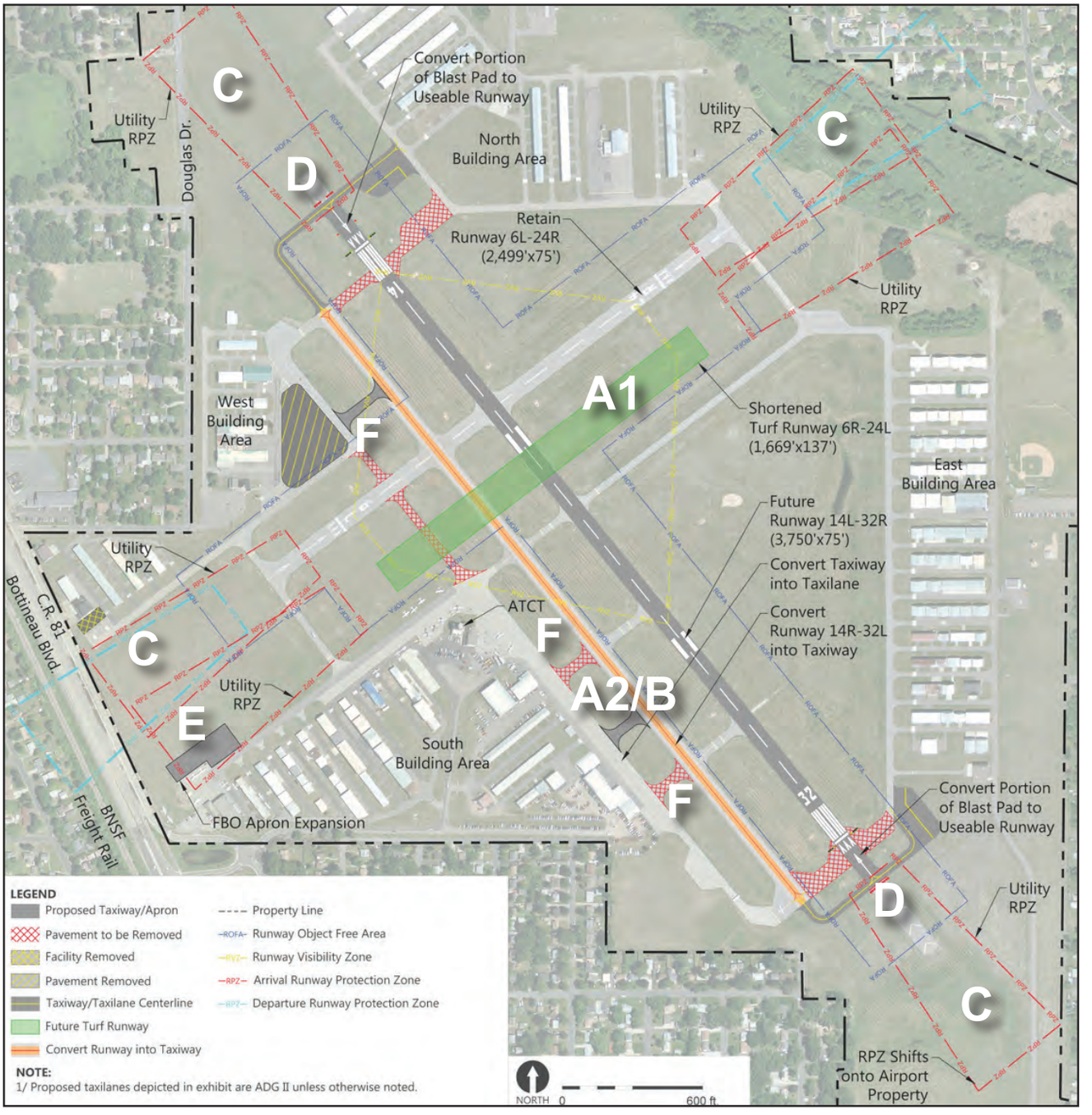
D. REFINED: Convert a portion of paved blast pads/overruns on each end of Runway 14L-32R to useable runway. Includes shifting the runway approximately 115 feet to the northwest to improve Runway Protection Zone compatibility and adding new connector taxiways.

ORIGINAL: Convert existing paved blast pads/overruns on Runway 14L-32R to stopways. Includes adding edge lighting and additional Runway Safety Area (RSA) grading.

E. Expand the Fixed Base Operator apron.

F. Taxiway configuration adjustments to reduce airfield complexity.

G. Pursue the establishment of a new non-precision instrument approach to the Runway 32 end, if feasible (not shown).



Lengthening the runway benefits all aircraft users by providing additional useable pavement for takeoffs and landings.

- **Turf Runway:** The original plan proposed closing the turf runway in order to simplify airfield geometry and reduce the number of locations where aircraft could inadvertently cross an active runway.

  Several commenters were concerned that this proposal could limit tailwheel aircraft operations and flight training opportunities. In their comments they also noted that the only close-by turf runway (in Forest Lake) had been paved, eliminating that runway as an option for pilots seeking a turf landing option. In fact, the turf runway at Crystal is the last one available at a public-use airport in the metropolitan area.

  In response, the MAC identified a concept that reduces the length of the turf runway, lessening the possibility of inadvertent runway crossings. While the MAC believes this plan better meets the needs of airport users, it is subject to further coordination with the Federal Aviation Administration and the Minnesota Department of Transportation.

CRYSTAL AIRPORT
PLANNING AND DEVELOPMENT PROCESS
STEP-BY-STEP

MAC STAFF

1. Research & study refinements to previous plan recommendations
2. Engage MAC board, municipal staff & other key stakeholders
3. Draft report with alternatives including a proposed alternative
4. Request formal MAC board approval to publish draft report for public comment

5. **PUBLIC & AGENCIES** — Comment on draft report & proposed preferred alternative

6. **MAC STAFF** — Consider public comments, develop refined alternative, initiate supplemental public comment period

WE ARE HERE

7. **PUBLIC & AGENCIES** — Comment on refined preferred alternative

8. **MAC STAFF** — Incorporate public comments & present final LTCP to MAC Board for approval

9. **MAC BOARD** — For approval

10. **METROPOLITAN COUNCIL** — For reviews

11. **MAC BOARD** — For final adoption

12. **MAC STAFF & AGENCIES**
    - Prepare draft environmental review documents per state & FAA requirements
    - Establish Joint Airport Zoning Board with local governments to update existing airport zoning
    - Prepare & submit Airport Layout Plan to the FAA for review & approval

13. **PUBLIC** — Comment on draft environmental & zoning documents

14. **MAC STAFF & AGENCIES** — Finalize environmental review documents & submit to State & FAA for approvals

15. **MAC STAFF & AGENCIES** — Develop final funding plan & request federal/state grant funds for project(s)

16. Local governments and adjacent communities review & comment on MAC annual Capital Improvement Program

17. **AGENCIES** — Project funding programmed by FAA/MnDOT

MAC STAFF

18. Begin engineering & architectural designs
19. Request approval from MAC board to proceed with bidding projects

20. **MAC BOARD** — For approval of bid award

21. **CONSTRUCTION BEGINS**

Crystal Airport

2035 Long-Term Comprehensive Plan (LTCP)

30 March 2017 – Supplemental Public Information Meeting

Refined Preferred Development Alternative Briefing

LTCP Progress Update

- Issued Draft LTCP in September
- Public Review Period ended in late October
- Assessing Comments/Input
- Refined Preferred Development Alternative

Crystal Airport 2035 LTCP Purpose:

- Update view of future facility needs
- Serve as the "road map" to guide our development strategy for Crystal Airport
- Shape the 7-Year Capital Improvement Program (CIP)

2

Crystal Airport Role & Plan Objectives

- Primary Role of Crystal Airport
  - Integral part of the regional Reliever Airport system
  - Accommodates Personal, Recreational, and some Business Aviation users
  - Design Aircraft is and will continue to be small, propeller driven aircraft with < 10 passenger seats
  - Role not expected to change
- Primary LTCP Objectives
  - Better align airfield infrastructure with demand levels
  - Preserve and, if possible, improve operational capabilities for the current family of aircraft using the facility
  - Enhance safety by simplifying the runway and taxiway layout

3

Draft 2035 LTCP Preferred Alternative

- Two-runway system from 2025 LTCP to better align infrastructure with demand
- Convert RWY 14L-32R paved blast pads to stopways
- Utility Runway designations
- Taxiway configuration changes
- FBO Apron expansion
- Additional LNAV non-precision instrument approach if feasible

4

Summary of Comments Received

- 27 total comments
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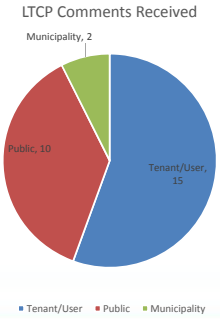

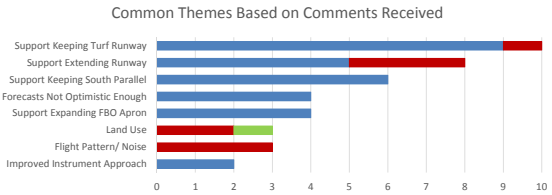

	Improved Instrument Approach	Flight Pattern/ Noise	Land Use	Support Expanding FBO Apron	Forecasts Not Optimistic Enough	Support Keeping South Parallel	Support Extending Runway	Support Keeping Turf Runway
Tenant/User	2	0	0	4	4	6	5	9
Public	0	3	2	0	0	0	3	1
Municipality	0	0	1	0	0	0	0	0

5

Two-Runway Airfield Capacity vs. Demand

- Airfield Capacity (two intersecting runways)
  - Range of ~60 - 85 operations per hour in mixed operations
- Operational hourly demand profile
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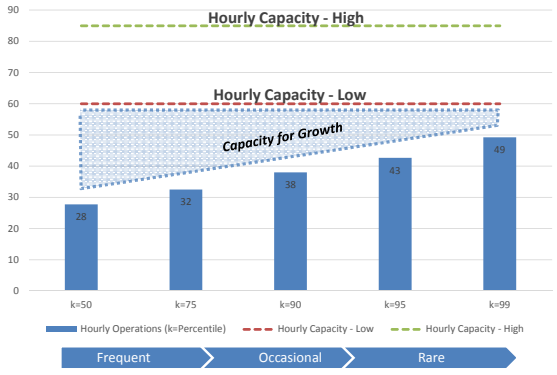

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Shortened Turf Runway Concept

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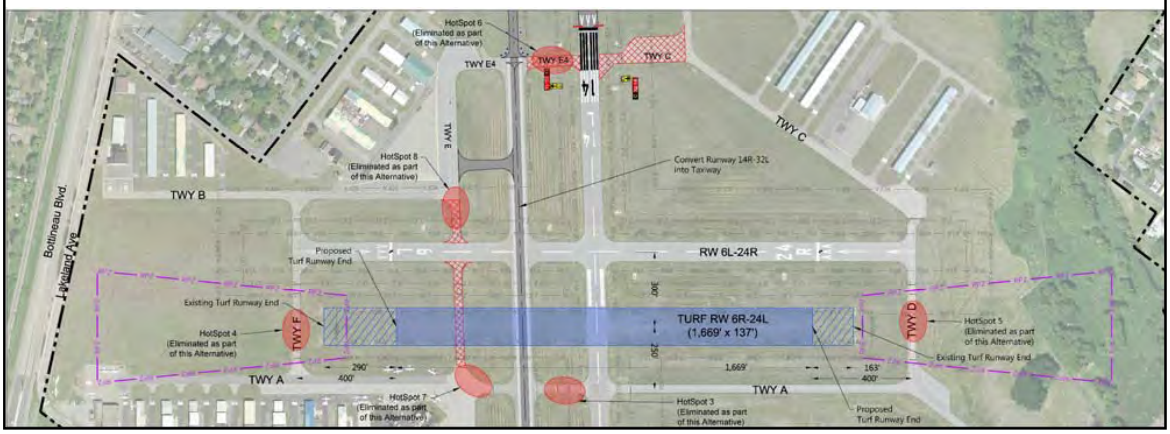
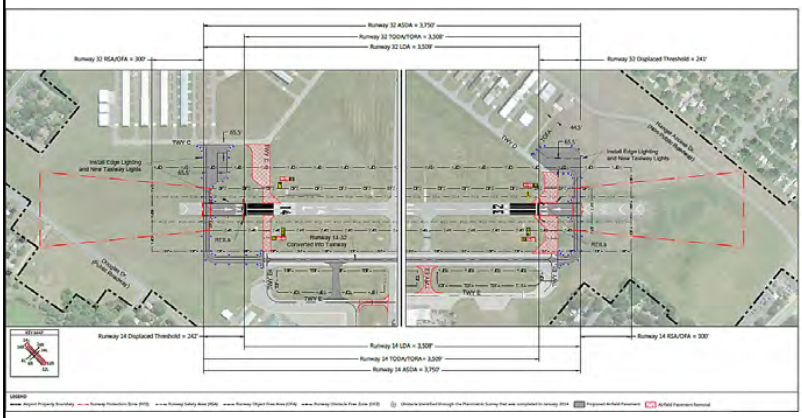
  - Mitigates hot spots



Refined Primary Runway Concept



Convert Portions of RWY 14-32 Blast Pads to Runway

- Published length ~ 3,750 feet
- Provides additional takeoff and landing distance (~ 3,500 feet) for all users
- Runway shifts NW to improve RPZ compliance

Refined Preferred Alternative

- Retain portion of existing Turf Runway 6R-24L
- Convert portion of paved blast pads to useable Primary Runway
- Additional taxiway configuration changes

9

Refined Preferred Alternative

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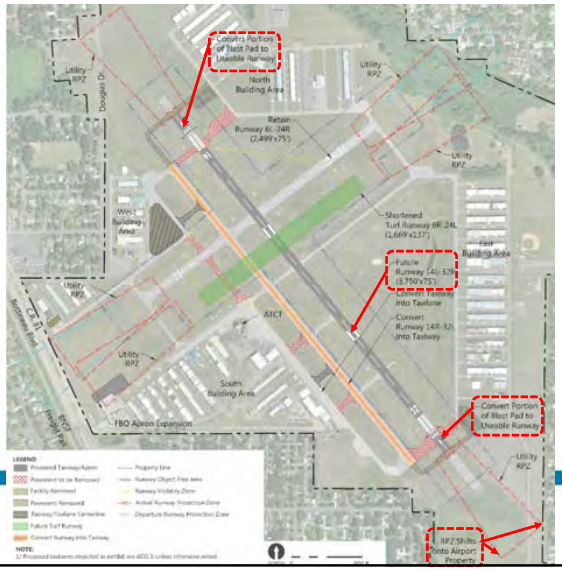
Refined Preferred Alternative



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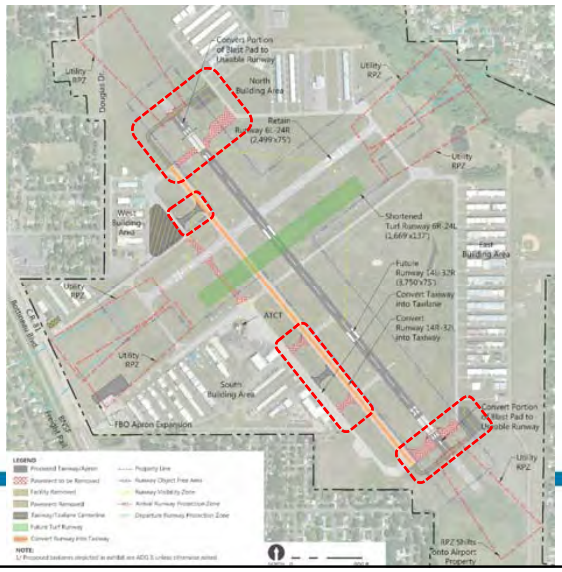
Refined Preferred Alternative



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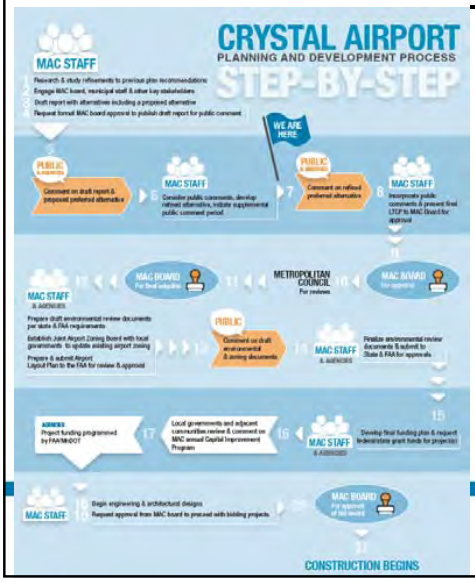
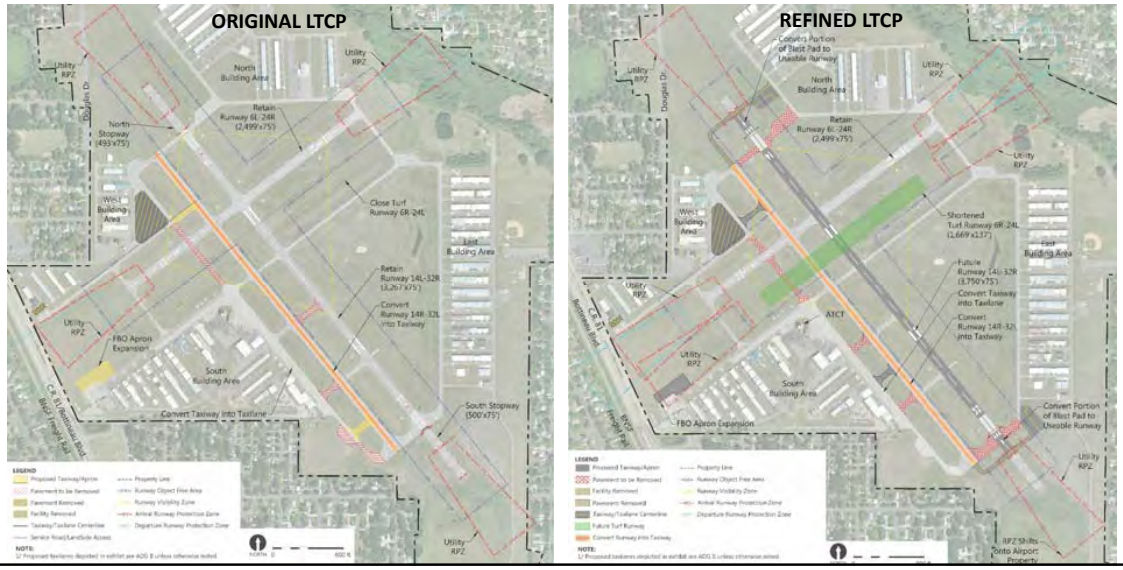
Next Steps



- Supplemental Public Review Period
  - 30-day review period (March 15– April 14, 2017)
    - Public notice in Sun Post
    - Postcard mailing
    - Information posted on MAC website (Crystal Airport page) https://metroairports.org/General-Aviation/Airports/Crystal.aspx
  - Public Information Meeting
    - Thursday, March 30@ Odyssey Academy (5-7pm)
    - Postcard invitation to airport neighbors
  - Opportunity to submit written comments
    - At public information meetings, via email, or traditional mail Crystal-Airport-LTCP-Comments@mspmac.org
- MAC Board Approval to Submit to Metropolitan Council
- Metropolitan Council Review
- Final MAC Board Adoption
- Environmental Review Process

13

Crystal LTCP Concept Comparison



Question & Answer Session

MAC Staff will be available until 7pm to address any questions you may have

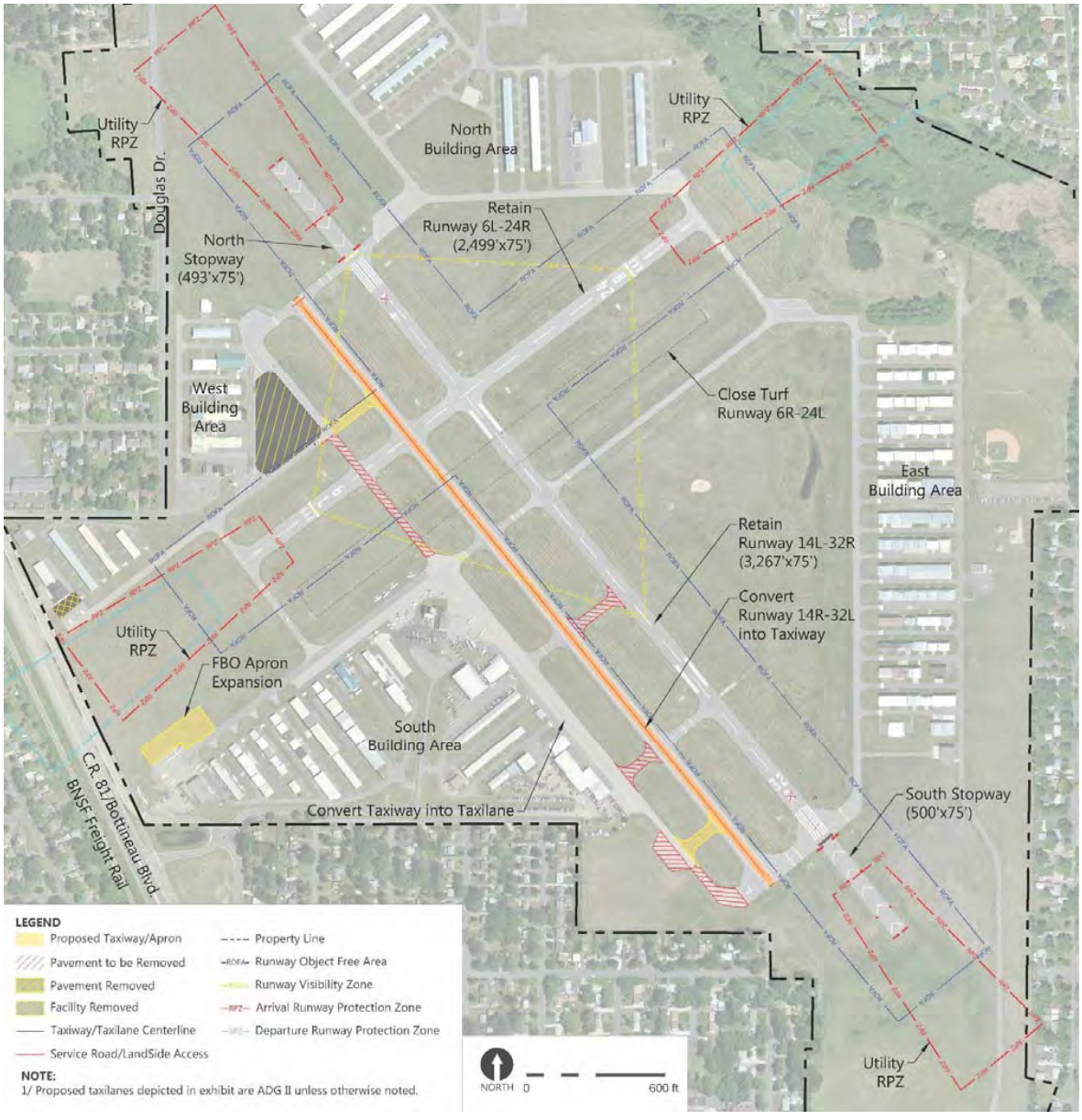
12

Crystal Airport

Draft 2035 Long-Term Comprehensive Plan (LTCP)

Refined Preferred Alternative

Supplemental Public Informational Meeting – March 30, 2017

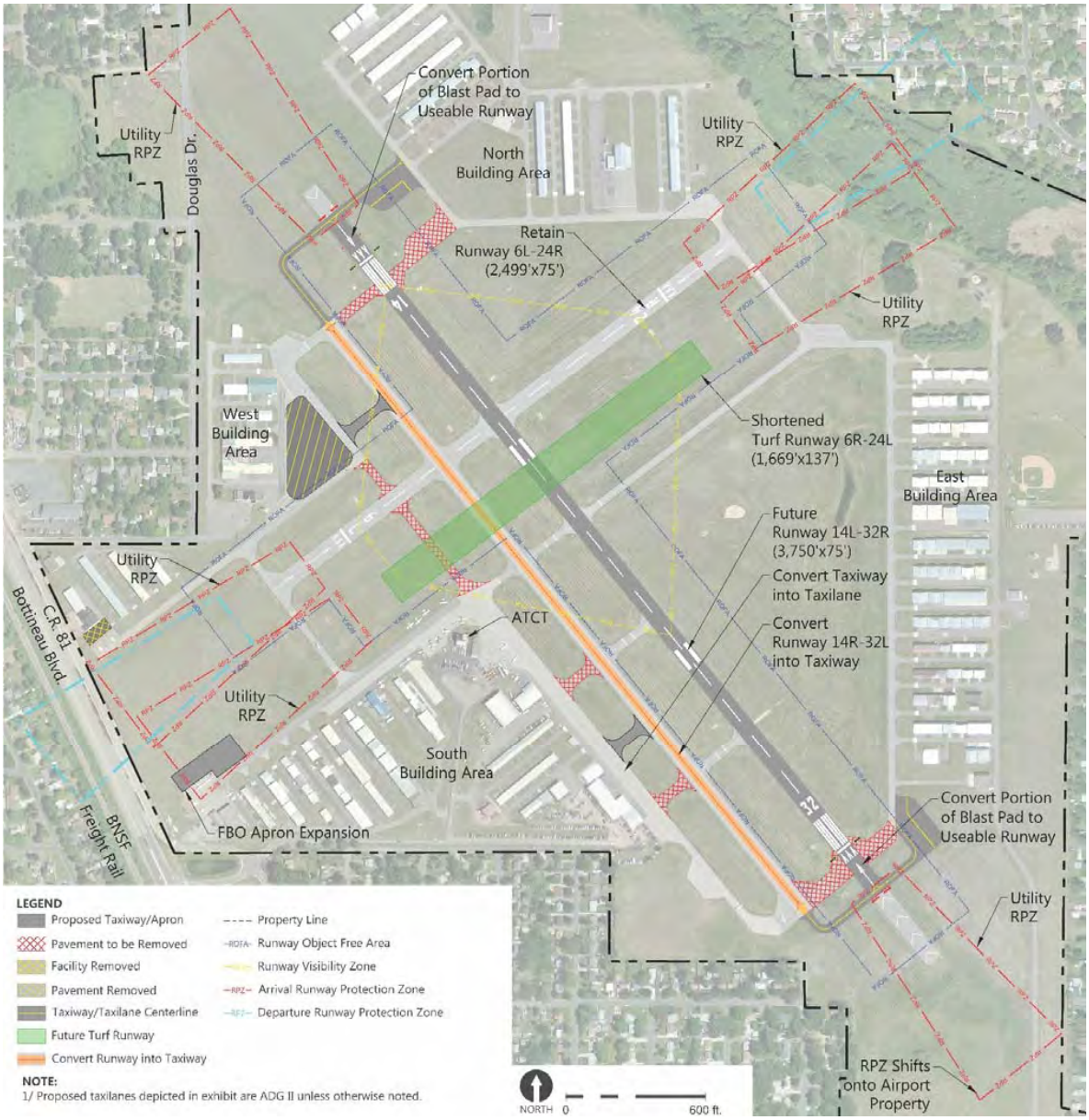


Original LTCP Preferred Alternative

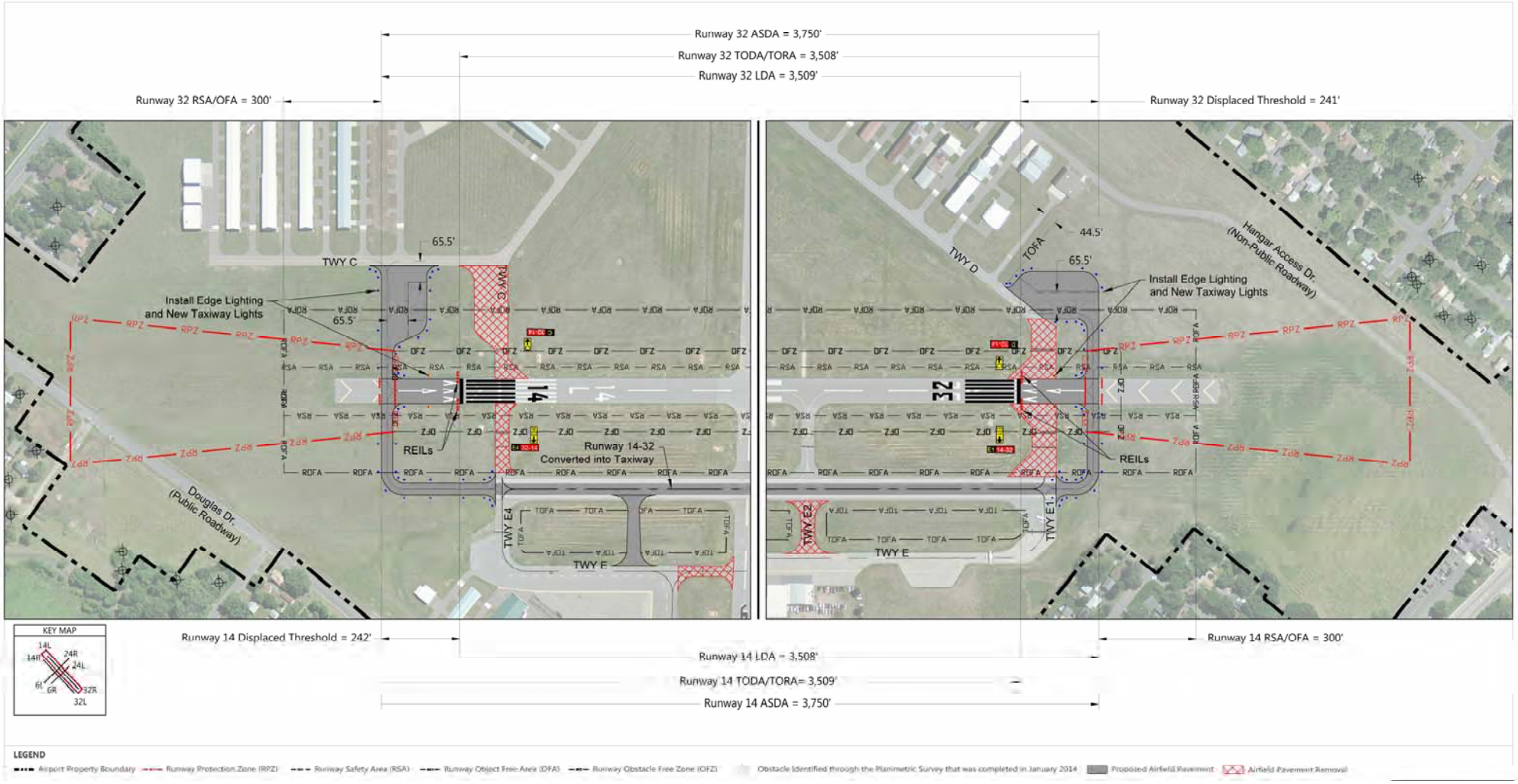
Year	Aircraft Operations Forecast			Change from Base Case	
	Base Case	Stopway Scenario	Increased Length (3,750')	Stopway Scenario	Increased Length (3,750')
2015 (a)	41,838	41,838	41,838	0	0
2020	39,495	39,652	39,707	157	212
2025	39,025	39,196	39,258	171	233
2030	38,578	38,774	38,845	196	267
2035	39,904	40,135	40,218	231	314

Source: HNTB Activity Forecasts and MAC analysis

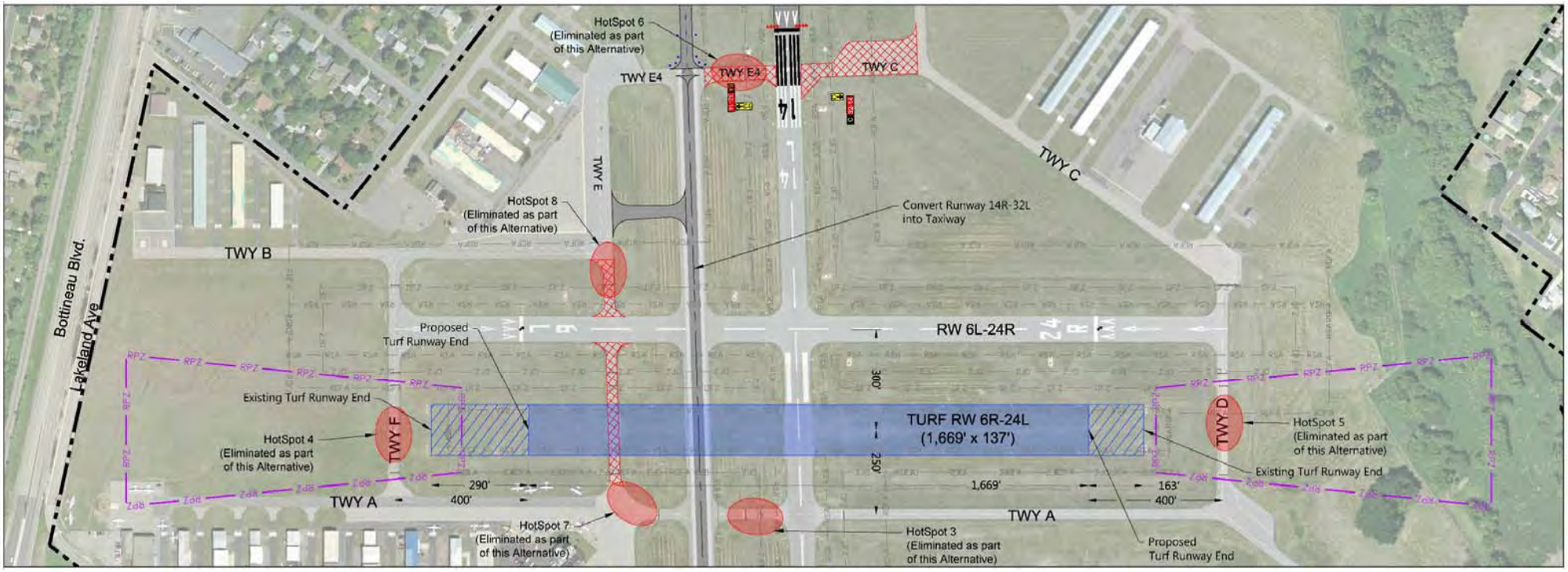
Aviation Activity Forecast Summary



Refined LTCP Preferred Alternative

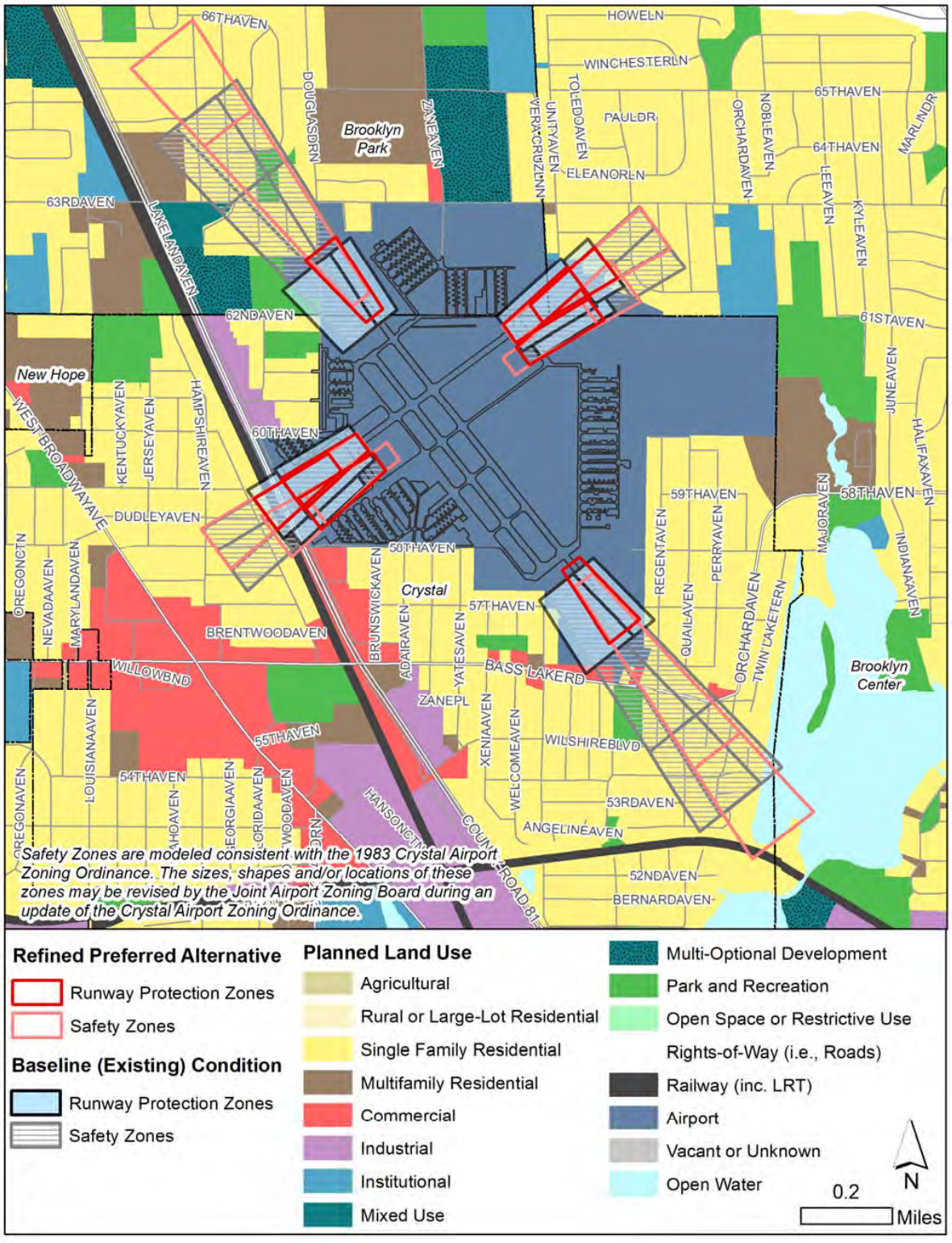


Refined Preferred Alternative – Primary Runway 14-32 (3,750 feet)

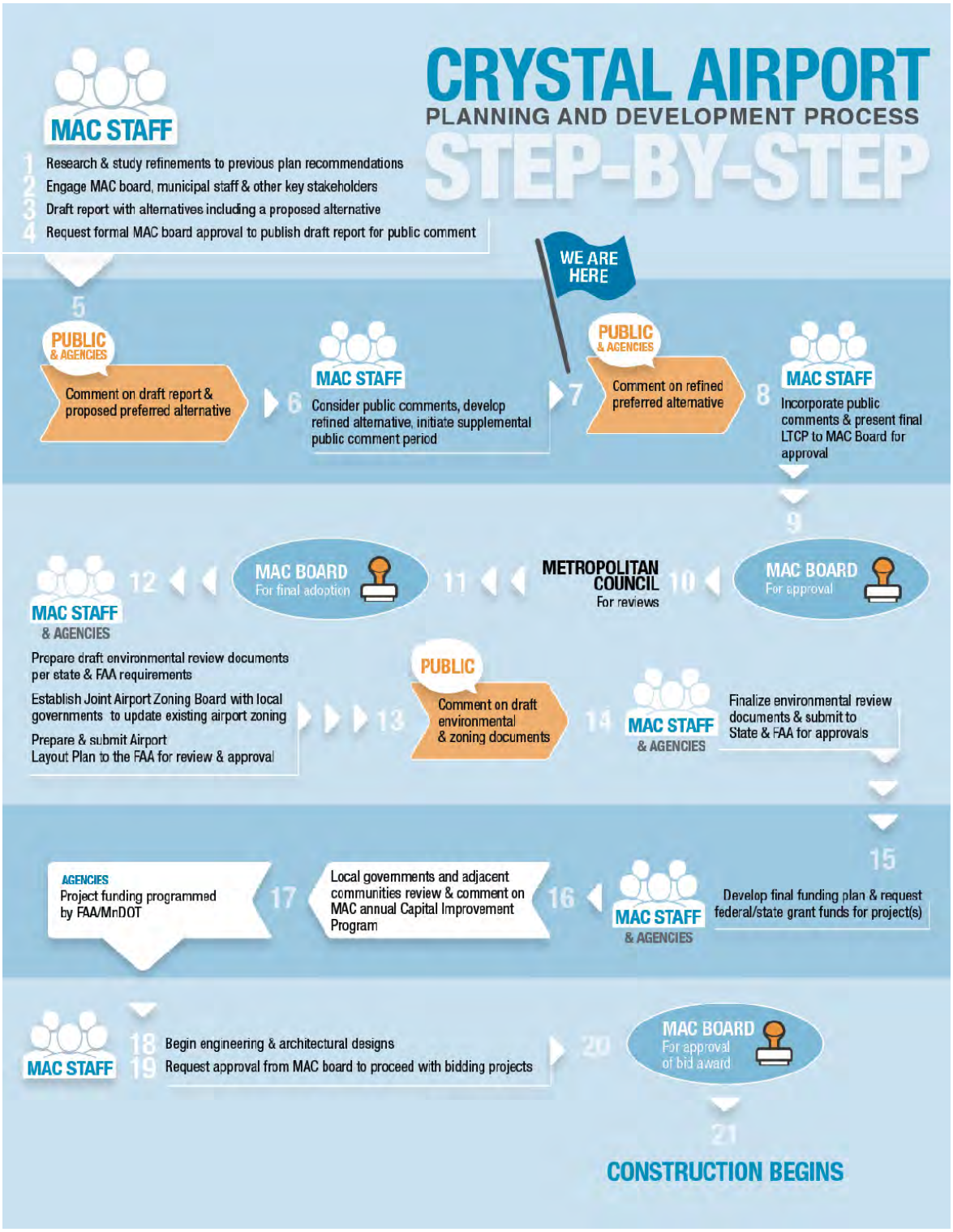


Refined Preferred Alternative – Shortened Turf Runway 6R-24L

Noise Contour Comparison (Baseline vs. Refined Alternative)



Future Land Use Compatibility (Baseline vs. Refined Alternative)



Planning & Development Process

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Sandra Baker	6225 Unity Ave no	
Marge Kirch	5641 Quail Ave N.	
RUTH HOOVER	5001-61ST AVE. N	
Jamie Spencer	6101 Quail Ave No	
Wm Gentz	5306 62nd Ave N.	
Eli Wolter	7674 Everest LN Maple Grove 55311	
CARL CRIMMINS	MAC Crystal	DISTRICT A
JAMES EINFELDT-BROWN	6315 55TH AVE. N. 55429	
Beverly Gustafson	5300 62 Ave N	
Warren Batzlaff	6603-46th Ave No Crystal	
Sean Berry	4640 York Ave S mpls	Acapulco Flyers @ Wiley
Brandon Bena	11528 Oregon Ave N	

DRAFT Crystal Airport 2035 LTCP
Refined Preferred Alternative
Public Information Meeting

March 30, 2017

Odyssey Academy
Brooklyn Center

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Jeff Dinsmore	5805 Minnetonka Dr. Sherwood, MN	Yankee Flying Club
Don Hoff	Stillwater, MN	Self
Chris Glaeser	6140 Cheshire LN N Plymouth, MN	Yankee Flying Club, KMIC
Elaine Seiden	B.P. MN 6323 Vera Cruz Ln	Town House President
Darrel A. Bjorge	6320-60th Ave. N	
Len Nordstrom	5657 Regent Av N	
Johannes Grosan	16213 70th N N	Yankee Flying Club
Robert + Linda Meisel	6319 61st Ave N	Aircraft Owner, Resident
Annie Parr	6409 Florida Av N.	Self
Catherine Binder	6417 Florida Ave N	Self
Donald Johnson	1043 Crystal Ct Lino Lakes	Self
Keith Ulstad	1602 Woodstone Dr Victoria, MN 55386	Self

DRAFT Crystal Airport 2035 LTCP
Refined Preferred Alternative
Public Information Meeting

March 30, 2017

Odyssey Academy
Brooklyn Center

PLEASE SIGN IN

NAME	ADDRESS	REPRESENTING
Dick Johnson	17215-13th Ave N Plymouth MN 55447	Self & Civil Air Patrol
Dean Schwartz	5656 Yates Ave N	Self
Tiffany Kovaloski	5626 57th	Self
Doug Goedert	6318 61st Ave	Self
Dan Olson	city of Crystal	self
Verlyn Husman	6281 Edgewood Ave N	self
Roger F. Seaman	6012 64th Ave	Self
Julie Deshler	5643 Zane Ave No	Crystal City Council

DRAFT Crystal Airport 2035 LTCP
Refined Preferred Alternative
Public Information Meeting

March 30, 2017

Odyssey Academy
Brooklyn Center

AFFIDAVIT OF PUBLICATION

STATE OF MINNESOTA)
COUNTY OF HENNEPIN) ss

Charlene Vold being duly sworn on an oath, states or affirms that he/she is the Publisher's Designated Agent of the newspaper(s) known as:

SP Robb/Crystal/NewHope/GoldV

with the known office of issue being located in the county of:

HENNEPIN

with additional circulation in the counties of:

HENNEPIN

and has full knowledge of the facts stated below:

(A) The newspaper has complied with all of the requirements constituting qualification as a qualified newspaper as provided by Minn. Stat. §331A.02.

(B) This Public Notice was printed and published in said newspaper(s) once each week, for 1 successive week(s); the first insertion being on 09/08/2016 and the last insertion being on 09/08/2016.

MORTGAGE FORECLOSURE NOTICES Pursuant to Minnesota Stat. §580.033 relating to the publication of mortgage foreclosure notices: The newspaper complies with the conditions described in §580.033, subd. 1, clause (1) or (2). If the newspaper's known office of issue is located in a county adjoining the county where the mortgaged premises or some part of the mortgaged premises described in the notice are located, a substantial portion of the newspaper's circulation is in the latter county.

By: Charlene Vold
Designated Agent

Subscribed and sworn to or affirmed before me on 09/08/2016 by Charlene Vold.

Pauline L. Lee
Notary Public

PAULINE L LEE
Notary Public-Minnesota
My Commission Expires Jan 31, 2021

Rate Information:
(1) Lowest classified rate paid by commercial users for comparable space:
$46.90 per column inch

Ad ID 592690

DRAFT 2035 LONG-TERM COMPREHENSIVE PLAN CRYSTAL AIRPORT PUBLIC COMMENT PERIOD OPEN

The Metropolitan Airports Commission (MAC) has prepared a draft version of the 2035 Long-Term Comprehensive Plan (LTCP) for Crystal Airport. The purpose of the LTCP is to identify facility needs at Crystal Airport through 2035. The public is invited to review this document and provide written comments to the MAC.

Crystal Airport is located in Hennepin County, approximately seven miles northwest of downtown Minneapolis. It lies within the City of Crystal, with small portions of airport property overlapping into the City of Brooklyn Park and the City of Brooklyn Center. The Draft 2035 LTCP includes a recommendation from the previous plan (completed in 2008) to close existing Runways 14R-32L (parallel to Runway 14L-32R) and 06R-24L (a grass runway), leaving a two-runway airfield in place. Refinements to the previous plan included in this update are: 1] re-designating the remaining runways as "Utility" to better reflect today's and the airport's expected future aircraft activity levels, as well as to permit the use of smaller Runway Protection Zones; 2] converting existing Runway 14L-32R overrun pavement into stopways to improve safety and offer some operational improvements for the types of aircraft already operating at the airport; and 3] modifying the taxiway layouts to reduce the possibility of runway crossings on the airfield.

Copies of the draft LTCP document will be available for distribution, and for viewing on the MAC's website, beginning Monday, September 12, 2016. Written comments will be accepted until Wednesday, October 26, 2016 at 5:00pm CDT.

http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

A printed copy of the document will be available for review at the following locations: MAC General Office building, 6040 28th Avenue South, Minneapolis; Crystal City Hall, 4141 Douglas Drive North, Crystal; Rockford Road Library, 6401 42nd Avenue North, Crystal; and at Crystal Airport, 5800 Crystal Airport Road, Crystal. Requests for a paper copy can be sent to the email address below.

The public is also invited to attend informational meetings to learn more about the proposed improvements included in the draft LTCP. See below for the times and locations:

Tuesday, September 27, 2016
5:00 to 7:00 pm
Crystal Community Center
4800 Douglas Drive North
Crystal, MN 55428

Thursday, September 29, 2016
5:00 to 7:00 pm
Brooklyn Park City Hall,
Council Chambers
5200 85th Avenue North
Brooklyn Park, MN 55443

The meetings will include a 6 p.m. presentation by MAC staff, as well as opportunities to ask questions and talk directly with staff.

Written comments can be submitted via email by sending them to Crystal-Airport-LTCP-Comments@mspmac.org, or by physically mailing them to Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Published in the
Crystal-Robbinsdale Sun Post
September 8, 2016
592690

AFFIDAVIT OF PUBLICATION

STATE OF MINNESOTA)
COUNTY OF HENNEPIN) ss

Charlene Vold being duly sworn on an oath, states or affirms that he/she is the Publisher's Designated Agent of the newspaper(s) known as:

SP Robb/Crystal/NewHope/GoldV

with the known office of issue being located in the county of:

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and has full knowledge of the facts stated below:

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By: Charlene Vold
Designated Agent

Subscribed and sworn to or affirmed before me on 03/09/2017 by Charlene Vold.

Darlene M MacPherson
Notary Public

DARLENE MARIE MACPHERSON
Notary Public-Minnesota
My Commission Expires Jan 31, 2019

Rate Information:
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PUBLIC NOTICE
DRAFT 2035 LONG-TERM COMPREHENSIVE PLAN
CRYSTAL AIRPORT
REFINED PREFERRED ALTERNATIVE
DRAFT PLAN ADDENDUM AND SUPPLEMENTAL PUBLIC COMMENT PERIOD

The Metropolitan Airports Commission (MAC) has prepared an Addendum to the draft 2035 Long-Term Comprehensive Plan (LTCP) for Crystal Airport. The Addendum describes a Refined Preferred Alternative that was developed in response to public and stakeholder feedback about the original plan, which was issued for public comment in September 2016. The updated plan proposes to (1) provide additional primary runway length to better accommodate the types of aircraft already operating at the airport and (2) keep a portion of the existing grass runway operational.

MAC will be hosting a public information meeting regarding the Addendum:

Thursday, March 30, 2017
5:00 PM to 7:00 PM
Presentation beginning at 6:00 PM
Odyssey Academy
6201 Noble Avenue N
Brooklyn Center, MN 55429

The public is invited to attend to learn more about the proposed changes, as well as provide comments regarding the plan. The meeting offers an opportunity for one-to-one interaction with MAC staff in an open house setting with an overview presentation beginning at 6:00pm.

Beginning Wednesday, March 15, 2017, the public is invited to review the Draft LTCP Addendum and provide written comments to the MAC.

Copies of the draft LTCP Addendum document will be available for distribution, and for viewing on the MAC's website, beginning Wednesday, March 15, 2017. Written comments will be accepted until Friday, April 14, 2017 at 5:00pm CDT.

http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

A printed copy of the Addendum document will be available for review at the following locations: MAC General Office building, 6040 28th Avenue South, Minneapolis; Crystal City Hall, 4141 Douglas Drive North, Crystal; Rockford Road Library, 6401 42nd Avenue North, Crystal; and at Crystal Airport, 5800 Crystal Airport Road, Crystal. Requests for a paper copy can be sent to the email address below.

Written comments can be submitted via email by sending them to Crystal-Airport-LTCP-Comments@mspmac.org, or by physically mailing them to Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Published in the
Crystal-Robbinsdale Sun Post
March 9, 2017
660413

Appendix 9: Public Comments and Responses

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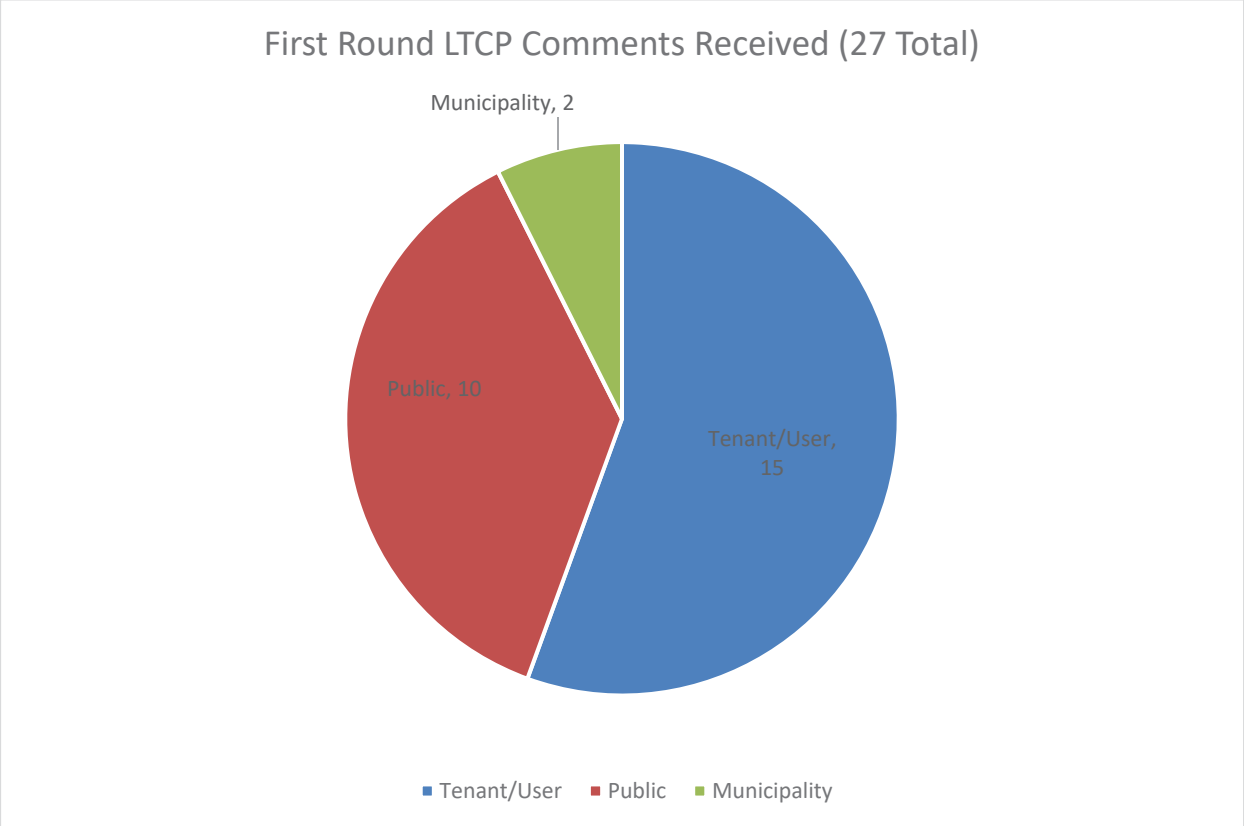
CRYSTAL AIRPORT 2035 LONG-TERM COMPREHENSIVE PLAN PUBLIC COMMENTS AND RESPONSES

INTRODUCTION

The Original Draft 2035 LTCP for Crystal Airport was issued for public review and comment on Monday, September 12, 2016. Two public information meetings were held in September 2016 to provide information about the draft plan to interested stakeholders. The first round public comment period closed on Wednesday, October 26, 2016.

Feedback from the First Round Public Comment Period (September 12 – October 26, 2016)

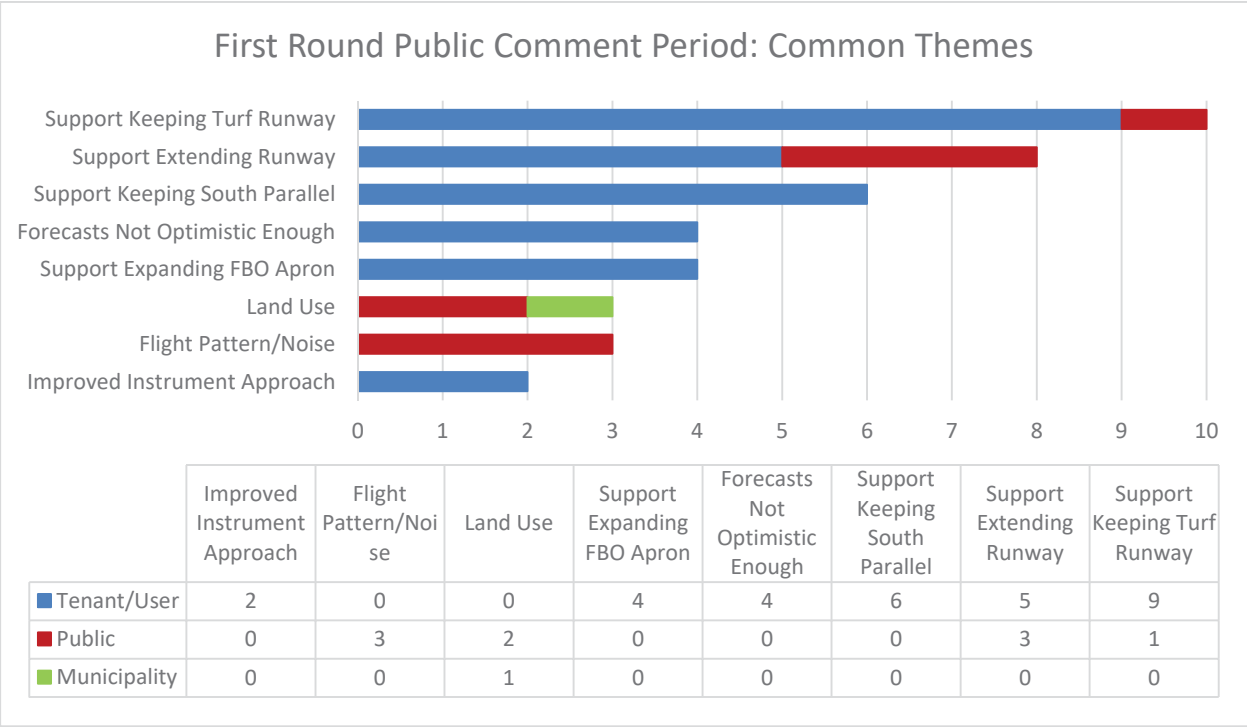
During the first round public comment period, the MAC received a total of 27 written comments. Of the comments, 15 were from airport tenants and users, 10 from members of the public, and 2 from municipal representatives.



Many of the airport tenants and users expressed concern over some or all elements of the plan. Notably, Thunderbird Aviation, the full-service Fixed Base Operator (FBO) at the Airport, submitted comments in opposition to the proposed plan. The top three themes based on tenants and user comments include:

- Support for keeping turf Runway 6R-24L open;
- Support for keeping south parallel Runway 14R-32L open; and,
- Support for providing additional useable length on Runway 14L-32R beyond that provided by the Stopway concept recommended in the draft plan.

The City of Crystal provided a letter of support for the LTCP Preferred Alternative, while Hennepin County requested coordination in advance of any development/redevelopment initiatives along any county roadway frontage. Of the comments from members of the general public, three were related to concerns over flight patterns and aircraft noise. All common themes that emerged during the comment period are summarized below:



	Improved Instrument Approach	Flight Pattern/Noise	Land Use	Support Expanding FBO Apron	Forecasts Not Optimistic Enough	Support Keeping South Parallel	Support Extending Runway	Support Keeping Turf Runway
Tenant/User	2	0	0	4	4	6	5	9
Public	0	3	2	0	0	0	3	1
Municipality	0	0	1	0	0	0	0	0

MAC Response to Public and Stakeholder Feedback

Throughout the public process, MAC made a commitment to consider the concerns voiced by stakeholders and evaluate if any related adjustments to the proposed plan were feasible. In this spirit of this commitment, MAC staff developed a Refined Preferred Alternative in response to public and stakeholder input.

Throughout the public process, MAC made a commitment to consider the concerns voiced by stakeholders and evaluate if any related adjustments to the proposed plan were feasible. In this spirit of this commitment, MAC staff developed a Refined Preferred Alternative in response to public and stakeholder input.

When compared with the Original Preferred Alternative, the Refined concept includes the following adjustments:

- **Primary Runway length**: Convert portions of the paved blast pads on primary Runway 14L-32R to useable runway for a published length of 3,750 feet with declared distances in effect and extend taxiways to new runway ends.
- **Primary Runway location**: Shift the primary runway approximately 115 feet to the northwest along its centerline to locate all of the Runway Protection Zone (RPZ) for Runway 32R on MAC property, improving land use compatibility over the existing condition.

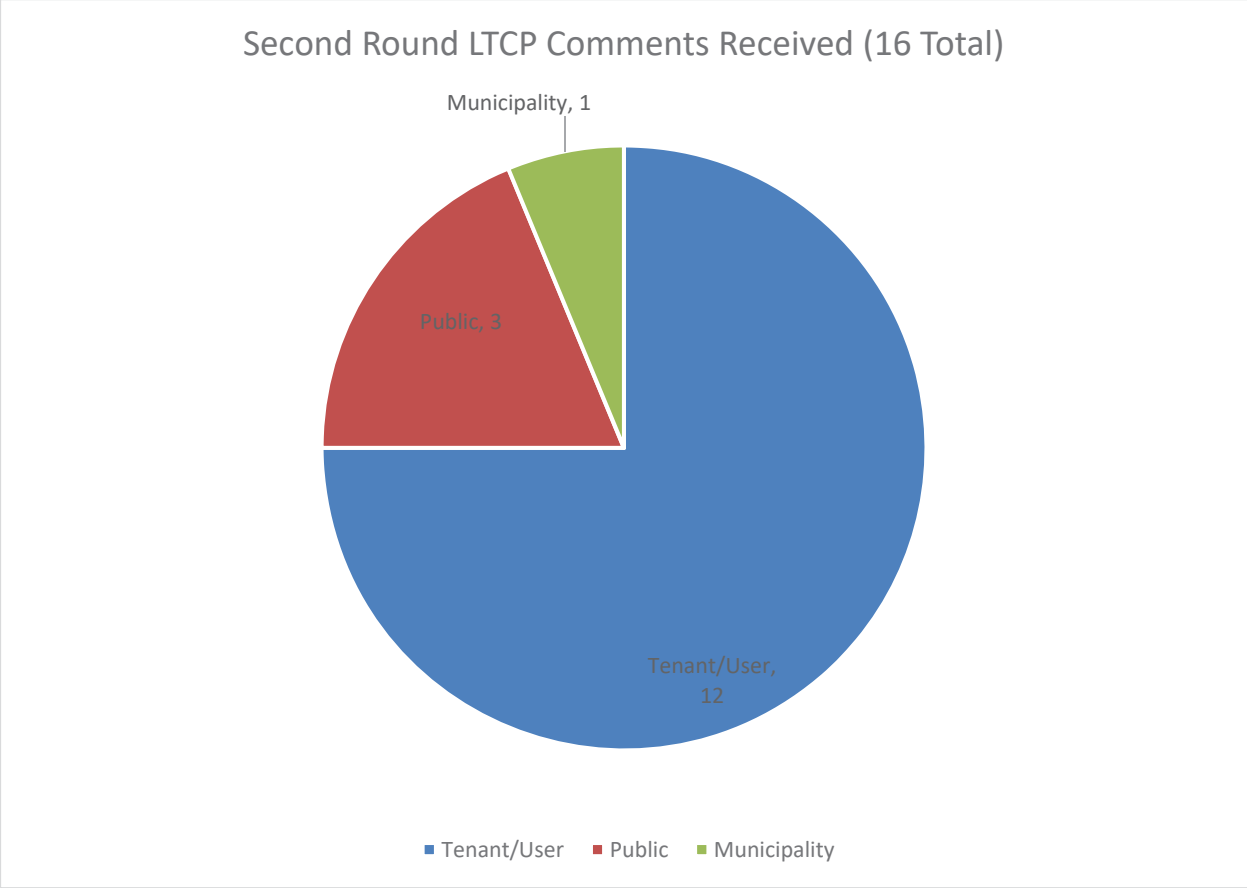
- **Turf Runway**: Retain a portion of the existing turf runway and operate it in a manner that will reduce runway crossing points, airfield complexity, and incursion potential while preserving turf operational capabilities at a metropolitan area airport.
- **Taxiway configuration changes** as recommended by Air Traffic Control Tower and Airport Operations staff to make the airfield more efficient and to further simplify geometry.

Feedback from the Second Round Public Comment Period (March 15 – April 14, 2017)

An Addendum to the Draft 2035 LTCP was prepared to describe the features of and rationale behind the development of the Refined Preferred Alternative.

The Addendum was published for public review and comment on Wednesday, March 15, 2017. A supplemental public information meeting was held on March 30, 2017 to provide more information about the Refined Preferred Alternative to interested citizens. The supplemental public comment period closed on Friday, April 14, 2017.

During the supplemental public comment period, MAC received 16 additional written comments. Of the comments, 12 were from airport tenants and users, 3 from members of the public, and 1 from a municipality.



Airport users and tenants who submitted comments expressed a much greater level of support for the Refined concept than for the original alternative. In particular, preserving a turf runway at Crystal Airport was viewed as a positive factor by many tenants. However, some continued to express reservations about the capacity implications of closing the south parallel Runway 14R-32L.

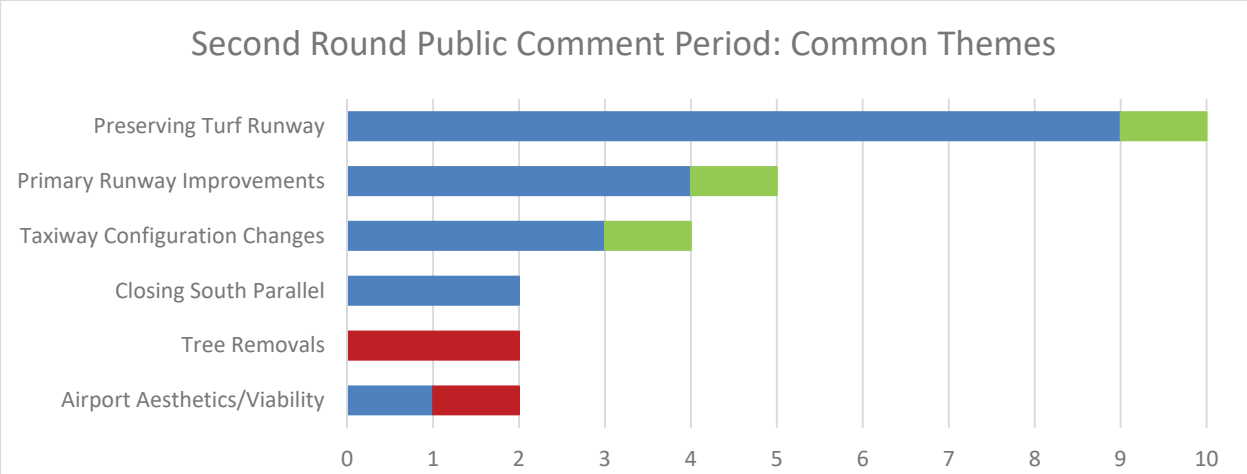
Notably, Thunderbird Aviation, (the full-service Fixed Base Operator (FBO) at the Airport, submitted comments supporting the refined plan concept – a reversal from their position opposing the original plan recommendations. Key factors that enabled Thunderbird to support the Refined concept are the longer primary runway length and retention of the turf runway to facilitate flight-training opportunities.

The City of Crystal also provided a letter of support for the LTCP Refined Preferred Alternative.

The common comment themes that emerged from the second round of public comment were similar to those received during the first round. In addition, a user suggestion was made to add on-airport service roads around runway ends so that vehicles (including fuel trucks) do not have to cross active runways to reach hangar areas. This recommendation has merit and will be evaluated further during the subsequent environmental review and Airport Layout Plan (ALP) preparation phases.

From a public perspective, comments were submitted that identified recent tree removals as a concern. However, no written comments were received from members of the public in opposition to the proposed improvements contemplated in the refined planning concept.

The common themes that emerged during the second round comment period are summarized below:



	Airport Aesthetics/Viability	Tree Removals	Closing South Parallel	Taxiway Configuration Changes	Primary Runway Improvements	Preserving Turf Runway
Tenant/User	1	0	2	3	4	9
Public	1	2	0	0	0	0
Municipality	0	0	0	1	1	1

RESPONSES TO PUBLIC COMMENTS

General responses were developed to address questions and concerns that were consistent among the comments received during both rounds of public comment about the Draft 2035 LTCP. Specific responses to comments received from municipalities and agencies are provided in the next section. The following topics are covered by the suite of general responses:

1. Support for keeping turf Runway 6R-24L open
2. Support for keeping south parallel Runway 14R-32L open
3. Support for providing additional useable length on Runway 14L-32R beyond that provided by the Stopway concept recommended in the draft plan
4. Forecasts are not optimistic enough
5. Support expanding Fixed Base Operator (FBO) apron
6. Land Use / Future Airport Property Re-Development
7. Flight Patterns and Aircraft Noise
8. Support for improved instrument approaches
9. Tree removals

All written comments received from members of the public are reproduced in their entirety at the end of this appendix.

General responses #1 through #9 follow.

1. Support for keeping turf Runway 6R-24L open

The Draft 2035 LTCP proposed to close and decommission the seasonal turf Runway 6R-24L.

A key objective for airfield improvements at Crystal Airport is to simplify the airfield geometry by reducing the number of designated “hot spots” on the airfield, which represent the areas with the greatest potential for pilot confusion and incursion errors. This is consistent with a nationwide initiative by the Federal Aviation Administration (FAA) to reduce the number of runway incursions and increase airfield safety. Of the eight existing airfield “hot spots” at Crystal Airport, three of them are associated with taxiways crossing turf Runway 6R-24L.

Based on manual counts taken by ATCT controllers in 2015 and 2016, the number of annual aircraft operations on the turf runway during the six months it is operational (May – October) is estimated to be approximately 300. This equates to an average of approximately 1.6 operations per day. During the peak operational months (May and June), operations reached an average of approximately 2.5 per day.

Proponents of the turf runway suggest that it provides several unique benefits to the metropolitan airports system, including operational advantages for tailwheel aircraft – of which approximately 26 are based at Crystal Airport – particularly during landing operations with gusty winds. It also facilitates “soft field” flight training opportunities. Now that the turf runway at the Forest Lake Airport (25D) has been paved, the closest turf runways to Crystal Airport are located approximately 30 miles away at the privately-owned Belle ARS Sport Strip Airfield (7Y7) near Belle Plaine and the Winsted Municipal Airport (10D).

MAC acknowledges the legitimacy of these benefits despite the low usage numbers. However, the contribution of the turf runway to airfield complexity and incursion "hot spots" cannot be disregarded and must be addressed in the long-term plan for the airfield.

Based on the volume of comments received on this item, MAC decided to explore two additional concepts that would preserve some form of turf operational area for pilots while still seeking to reduce overall airfield complexity and the number of designated hot spots. These concepts include:

- Allowing aircraft to land in a designated turf area adjacent to a paved runway, within that paved runway's operational environment, at the pilot's own risk; or
- Reducing the length of the current turf runway so that aircraft on Taxiways F and D would no longer penetrate the turf runway's safety area, object free area, or approach surface.

MAC requested that FAA review these concepts and render a determination as to whether or not they comply with current airport design standards and could be approved on the Airport Layout Plan (ALP) for Crystal Airport.

FAA's preliminary review indicated that they would not support allowing an aircraft to land in a designated turf area adjacent to a paved runway, as this practice would not comply with current airport design standards. However, the concept of reducing the length of the existing turf runway so that aircraft on Taxiways F and D would remain clear of the turf runway's protected surfaces may have some merit to reduce the number of formal runway crossings, thereby, reducing incursion potential. Although further review will be required during Airport Layout Plan (ALP) development, this concept is now incorporated into the Refined Preferred Alternative.

2. Support for keeping south parallel Runway 14R-32L open

The Draft LTCP proposed to close and decommission the paved south parallel Runway 14R-32L and convert it into a full-length parallel taxiway for primary Runway 14L-32R.

As noted in Response #1, a key objective for airfield improvements at Crystal Airport is to simplify the airfield geometry by reducing the number of designated "hot spots" on the airfield, which represent the areas with the greatest potential for pilot confusion and incursion errors.

Of the eight existing airfield "hot spots" at Crystal Airport, four of them are associated with the close proximity (300-foot separation) of Runway 14R-32L to Runway 14L-32R. Furthermore, the existing pavement on Runway 14R-32L is in poor condition and would require significant rehabilitation to remain serviceable.

Proponents of keeping the south parallel Runway 14R-32L open, including Thunderbird Aviation, suggest that its decommissioning would have a negative effect on Crystal Airport's ability to efficiently handle air traffic demand during peak operational periods, and further, does not consider the possibility of expanded flight training programs.

Based on the forecasted operational information contained in the Draft LTCP, the proposed airfield configuration without the south parallel runway would easily accommodate projected demand levels on an annual basis. In response to the FBO's concern about peak-hour capacity, staff conducted further analysis. Using a spreadsheet-based capacity modeling tool recently developed by the Airport Cooperative Research Program (ACRP)[1], the maximum hourly capacity of the proposed runway configuration at Crystal is estimated to be in the range of approximately 61-89 VFR aircraft operations per hour. The tool takes into account a variety of factors such as runway configuration, touch and go volume, and aircraft separation buffers between departing and arriving aircraft. Due to the configuration of the airfield, it operates more efficiently and thus has more capacity when aircraft are landing and taking off to the south versus the north. The 61-per-hour VFR capacity level is based on north flow operations while the 89 per hour VFR capacity level is representative of south flow operations.

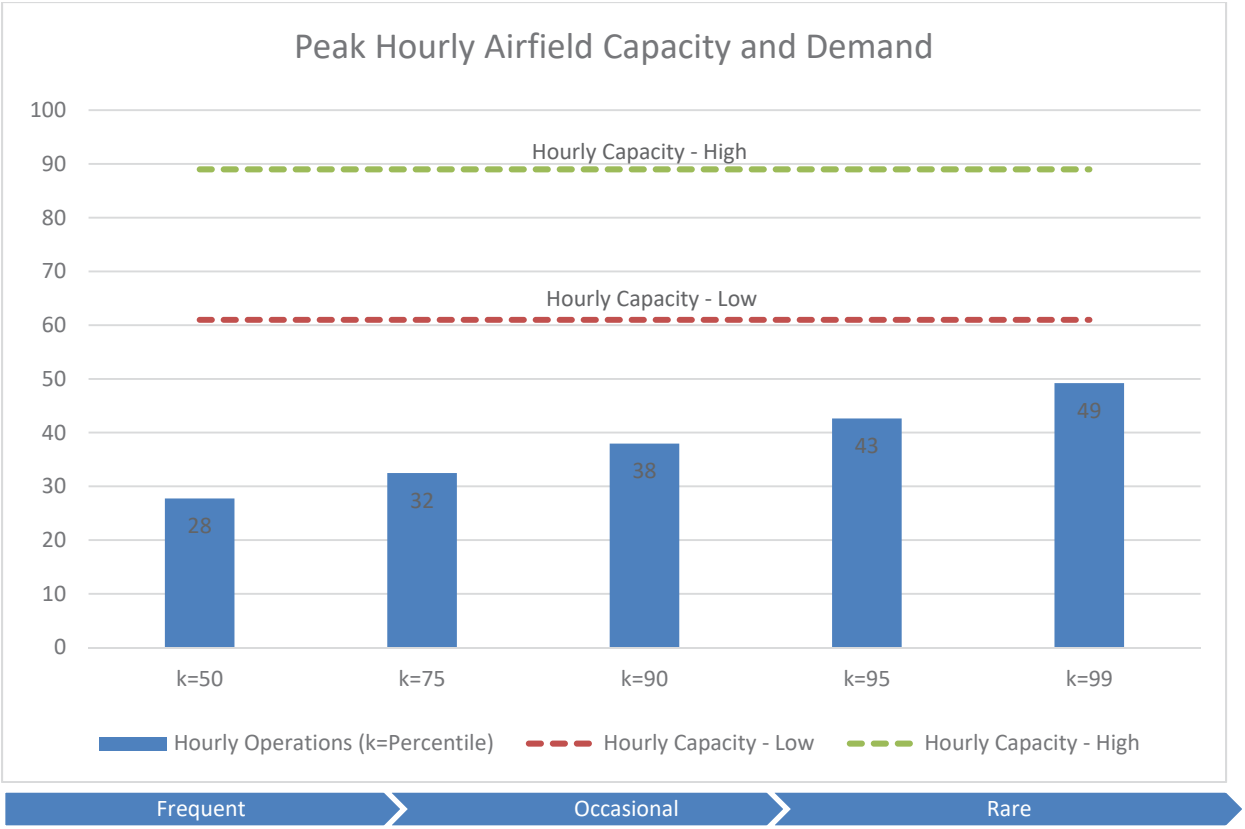
Based on hourly operations data available from MAC's flight tracking system, MACNOMS, and from the ATC observations, current peak-hour operations at Crystal appear to range between 30 and 50 operations.

- Peak hours with 30-39 operations are somewhat frequent (about 200 hours over the last 3 years);
- Peak hours with 40-49 operations occur occasionally (about 30 hours in the last 3 years); and
- Peak hours with 50 or more operations do occur but rarely (about 3 hours in the last 3 years).

Special event days, such as the annual Crystal Airport Fly-In, were excluded from this analysis due to the atypical operational profile of aircraft movements during these events.

The relationship between expected airfield capacity and demonstrated peak hourly demand is shown in the following graphic.

[1] Per ACRP Report 79, *Evaluating Airfield Capacity*



With the gap that remains between demonstrated demand volumes of 30-50 movements per hour and an airfield that can handle approximately 61-89 VFR movements per hour, there does not appear to be an operational need to keep the south parallel runway in service.

Based on this assessment, MAC staff remains confident that the proposed two-runway airfield will be able to accommodate future peak-hour demand levels, which are projected to remain relatively stable over the planning period, and could even accommodate some growth. Specifically, the LTCP high-range forecast acknowledges that aircraft operations could grow to a level that is approximately ten percent above the base case forecast if better-than-expected regional economic conditions materialize. Even if the existing busiest-hour demand levels were increased by ten percent, resulting in a peak of approximately 55 hourly operations, this would still be below the predicted airfield capacity level of approximately 61-89 VFR operations per hour.

Therefore, the Refined Preferred Alternative will continue to show Runway 14R-32L as decommissioned and converted into a parallel taxiway.

3. Support for providing additional useable length on Runway 14L-32R beyond that provided by the Stopway concept recommended in the draft plan

The Draft 2035 LTCP proposed to convert the existing paved blast pads at the ends of primary Runway 14L-32R into stopways. This concept would increase the accelerate-stop distance for Runway 14L-32R from the existing 3,267 feet to approximately 3,760 feet in both directions. However, the published runway length

would not change from the existing condition, nor would increases in takeoff or landing distances be published.

The Draft LTCP also considered an alternative to convert the existing paved blast pads into useable runway, which would result in a published runway length of 4,267 feet. However, this concept was not selected as the Preferred Alternative as it would likely result in regular use by larger aircraft – thus changing the role of Crystal Airport, something that MAC is not seeking to do since nearby Flying Cloud and Anoka County-Blaine Airports are already well-equipped to handle these types of aircraft.

Several airport users, along with some public commenters, encouraged MAC to consider an "in-between" increase in the primary runway length to make Crystal Airport more attractive to some of the more sophisticated business-use aircraft types that occasionally use the facility today, but that would not likely attract larger, heavier aircraft types on a regular basis. Other users suggested that converting the paved overruns to useable runway pavement instead of stopways, would yield safety and operational benefits to all users by increasing takeoff and landing lengths available, and not just the accelerate-stop distance.

Based on this feedback, MAC is evaluating a Refined concept for primary Runway 14-32 that would convert portions of the existing paved blast pads on each end to useable runway. The concept currently being evaluated would result in a published runway length of 3,750 feet, which is close to 500 feet longer than the existing runway and within the FAA's recommended runway length range of 3,300 to 3,900 for the design aircraft family of small propeller-driven aircraft with fewer than 10 passenger seats.

Unlike the Stopway concept proposed in the Draft LTCP, all aircraft users would benefit from having additional useable runway pavement available for takeoff and landing movements (approximately 3,500 feet) in the Refined concept. The full pavement length would be available to accommodate accelerate- stop distance requirements. This would require the use of more complex procedures called "declared distances", meaning that not all of the published pavement would be available for landing and takeoff movements in each direction. Declared distances do add a layer of complexity to the airfield operational environment for pilots, but staff believes this complexity can be overcome through education and awareness efforts.

With the increase in published runway length (from 3,267 feet to 3,750 feet), the number of additional aircraft operations above the base case is estimated to be approximately 314 annually, translating to approximately six additional takeoffs and landings per week. Of the additional operations, the majority are expected to be turboprops (approximately 219 additional annual operations, or 70 percent), with the remaining increase coming from light business jet aircraft (approximately 95 additional annual operations, or 30 percent).

This Refined concept also shifts the entire primary runway approximately 115 feet to the northwest to locate all of the Runway Protection Zones (RPZ) for Runway 32R on MAC property. In the existing condition, and in the original draft LTCP plan, a corner of the Runway 32R RPZ extended beyond the property boundary onto private residential property.

Based on this analysis, the Refined Preferred Alternative incorporates the 3,750-foot runway concept with declared distances, as described above, to further improve safety and operational capabilities without changing the role or character of the airport.

4. Forecasts are not optimistic enough

Several commenters expressed concern that the aviation activity forecasts contained in the Draft LTCP, which predict relative stability in the number of aircraft operations over the 20-year planning period, may not be optimistic enough to account for possible future stimulation of general aviation activity. One possible source of stimulation specific to Crystal Airport identified by commenters is intermodal connections associated with the planned Blue Line Light Rail Transport (LRT) extension and planned station in close proximity to Crystal Airport (at Bass Lake Road).

While it is true that the aviation activity forecast developed for the Draft LTCP does not specifically consider the positive impacts that an adjacent LRT line and station could have on activity levels, it does include a "High Range" forecast to consider the broader impacts of better-then-expected growth in regional income levels. Under the High Range scenario, aircraft operations could increase to over 43,000 annually, an increase of nearly 10 percent over the base case condition. While it is difficult to predict the upside potential of increased multi-modal LRT connectivity at a general aviation airport, it seems reasonable to assume that this activity would be included within the High Range forecast scenario.

5. Support expanding Fixed Base Operator (FBO) apron

The Draft 2035 LTCP indicates that the existing apron serving the Thunderbird Aviation FBO site is small, constrained, and operationally inefficient. The plan proposes an expansion, at the tenant's cost, to improve aircraft circulation patterns for transient aircraft and the number of parking/tie-down locations.

Several commenters during the first round agreed with this position set forth in the draft plan; however, it is important to note that Thunderbird Aviation was not among them due to their concern with closing the south parallel runway.

It is acknowledged that the existing Thunderbird Aviation site is not the only location on the airfield that can support a full-service FBO. However, the Thunderbird site offers several advantages, such as landside visibility and access, that some of the other sites do not. Also, the area to the southeast of the current Thunderbird site is currently leased to individual hangar owners and thus is not currently available for FBO site expansion.

6. Land Use / Future Airport Property Re-Development

Some commenters expressed concern over the type of development that might occur on Airport property no longer needed for aeronautical purposes.

If MAC elects to pursue non-aeronautical development for any Airport land parcels, dialogue will be initiated with the adjacent municipality (or municipalities) to discuss the potential uses and how the municipalities feel the parcels could best be utilized. If a zoning modification is required, MAC will work the appropriate municipality to make the necessary changes. The development of non-aeronautical uses will not only

benefit MAC, but it will also generate a tax base for the municipality in which the parcel lies.

Retaining a portion of Turf Runway 6R-24L will likely affect the suitability of one parcel for non-aeronautical development that was identified in the Original Preferred Alternative. This parcel is located on Lakeland Avenue N immediately adjacent to the Thunderbird Aviation FBO site. However, the small size (approximately 0.8 acre) and proximity to both the aircraft parking apron and fuel tank already limit the development prospects for this parcel regardless of the disposition of the turf runway.

7. Flight Patterns and Aircraft Noise

There were three comments from two separate individuals during the first round related to aircraft noise and flight patterns.

One commenter expressed concern about noise levels experienced in Brooklyn Center off the end of the crosswind runways. As there are no changes being proposed to the paved crosswind Runway 6L-24R, any change to the noise exposure in the neighborhood to the northeast of the airport will be associated with changes to turf Runway 6R-24L, which experiences low usage. The original draft LTCP evaluated closing the turf runway and shifting all crosswind traffic to paved Runway 6L-24R. From a noise exposure perspective, even the outermost noise contour (60 DNL) remained on airport property to the northeast in both the Base Case and Preferred Alternative conditions. Retaining a portion of the turf runway (see Response #1) will have a negligible effect on the future noise contour due to its low usage.

The noise analysis contained in the LTCP is intended to provide a high-level assessment of potential noise impacts. A more thorough noise impact analysis will take place during the subsequent environmental review process.

A voluntary Noise Abatement Plan is in place to promote aircraft operating procedures that help reduce aircraft noise and overflights for residents living near Crystal Airport. Pilots may also reference the pilot guide for easy access to noise abatement information. The details of this noise abatement plan will be revisited during the environmental review process for the proposed airfield improvements.

The Noise Abatement Plan is available at www.macnoise.com/sites/macnoise.com/files/pdf/mic_nap.pdf.

Although the MAC continues to evaluate ways to reduce noise impacts around its Airports, there remain many circumstances when the impacts from the airport simply cannot be abated. Federal grant dollar provisions require that the airport be operated in a manner that is neither discriminatory nor poses an undue burden on interstate commerce. The result is that it is extremely difficult to restrict aircraft operations at an airport to control noise in a manner that complies with federal grant assurances.

8. Support for improved instrument approaches

Several commenters expressed support for the draft plan's recommendation to pursue the establishment of a new non-precision instrument approach to the Runway 32 end, if feasible.

Since the Draft LTCP was published, MAC conducted initial outreach to FAA regarding the feasibility of a non-precision LNAV approach with 1-mile visibility minimums to the Runway 32 end. Preliminary feedback suggests that while challenging from a regional airspace perspective, development of an approach to Runway 32 may be feasible. Based on this outcome, MAC developed a conceptual approach layout and submitted it to FAA for additional consideration, which is still ongoing.

9. Tree Removals

In late 2016, approximately 55 trees were removed from properties in the vicinity of Crystal Airport. These trees were identified as those that penetrated, or nearly penetrated, existing runway airspace obstacle clearance surfaces. These trees were removed at no cost to the property owners, who were also compensated for the assessed value of the removed tree(s). Homeowners are allowed to replace removed trees; however, they are encouraged to plant lower-growth species that will not grow to become airspace obstacle clearance penetrations.

Additional trees and brush were removed on airport property to ensure that airspace surfaces remain clear from vegetation.

Some commenters expressed concern that the tree and brush removals have changed the view shed from their properties, and requested that some of the plant material be replaced with lower-growth types to restore the previous buffer area that existed between their property and the airport.

Under the proposed airfield development plan, it is likely that some additional tree removal will be required to maintain clear runway airspace obstacle clearance surfaces. Specific trees will be identified at the time that the runway improvements are designed based on updated survey data. The following factors will influence the scope of future tree removal programs:

- Runway 32R (southeast end): As a result of the proposed runway configuration, shift to the northwest along its centerline, and recommendation to pursue a non-precision instrument approach to this end, the protected airspace approach surfaces will likely shift to become slightly wider to the southeast of the airport. At a 20:1 slope, this shift should provide an additional 5-6 feet of clearance to the southeast of the airport when compared to the existing condition.
- Runway 14L (northwest end): As a result of the proposed runway configuration and shift to the northwest along its centerline, the airspace obstacle clearance surfaces will likely shift to become slightly lower (approximately 5-6 feet) to the northwest of the airport.
- Turf Runway 6R-24L: The approaches to the retained portion of the turf runway will need to be kept clear of vegetation. However, since the runway length is

proposed to be shortened, the airspace obstacle clearance surfaces will shift accordingly and offer greater clearances than in the existing condition.

Due to the amount of vegetation in the vicinity of Crystal Airport, tree growth is assessed on an ongoing basis and a removal program is needed during a runway improvement project or approximately every ten years.

All written comments received from members of the public are reproduced at the end of this appendix.

RESPONSES TO MUNICIPAL/AGENCY COMMENTS

This section contains responses to comments received from municipalities and agencies about the Draft 2035 LTCP for Crystal Airport.

Commenter	ID	Subject	Response
Comments Received During the First Round Public Comment Period (September 12 – October 26, 2016)			
City of Crystal, Letter dated October 26, 2016	1	City staff supports the Preferred Alternatives Summary on page XI of the LTCP, including decommissioning both the turf (06R-24L) and south parallel (14R-32L) runways and converting the south parallel runway into a parallel taxiway.	Comments acknowledged. MAC appreciates this statement of support from the City of Crystal.
City of Crystal, Letter dated October 26, 2016	2	City staff is interested in the potential for future non-aeronautical development that would benefit the community and Crystal Airport, and looks forward to future discussions with MAC to ensure these uses are compatible with adjacent land uses and neighborhoods.	MAC looks forward to these future discussion as well.
City of Crystal, Letter dated October 26, 2016	3	In regard to the Metropolitan Council's Aviation Land Use Compatibility Guidelines, the city does not intend to adopt new noise provisions in city code, but will work in conjunction with MAC to study any potential noise impacts within the 65 DNL noise contour. The City seeks MAC's concurrence with this position.	Based on follow-up meetings with both the City and Metropolitan Council, MAC is confident that an evaluation process to determine whether the interior noise level of a specific residential structure is high enough to warrant sound insulation treatment, as proposed in Section 7.3.2 of the Draft LTCP, is a prudent approach that will be acceptable to both the City and Metropolitan Council. The MAC intends to conduct this evaluation as a part of the required environmental documentation that will be conducted to implement the LTCP preferred development alternative.
Hennepin County Email dated October 28, 2016	3	Upon any future efforts of the Metropolitan Airports Commission (MAC) to 'right-size' the Crystal Airport, should any underutilized portions of land along county roadway frontage - Bottineau Boulevard (CSAH 81) or Bass Lake Road (CSAH 10) be proposed for development/redevelopment we request that the MAC provide an opportunity for Hennepin County Transportation staff to review and provide comment. Minnesota Statutes 505.02, 505.03, and 462.358, Plats	Comment acknowledged. MAC will coordinate as requested with Hennepin County.

		and Surveys, allow up to 30 days for county review of preliminary plats abutting county roads. Any changes in land use could have impacts to our transportation network. We do not anticipate adding any additional access locations along either section of these county roads that abut the Crystal Airport. Hennepin County staff review of development proposals along the county roadway system has long been common practice for all Hennepin County municipalities. Recently, with the Flying Cloud Airport in Eden Prairie have we begun to see examples of 'right-sizing' efforts from the MAC resulting in leasing out portions of land to be developed along the county roadway system. This opportunity for review and comment allows us greater coordination on access and right-of-way questions in particular, but also allows for opportunity to collaborate on transportation plans including the construction of trails. We hope that through these processes in the future with the Crystal Airport, the MAC will continue to work with Hennepin County in order to optimize a safe and efficient multi-modal transportation network. We do not foresee any other elements from the Crystal Airport 2035 LTCP having any notable impacts on the Hennepin County Transportation system.	

Commenter	ID	Subject	Response
Comments Received During the Second Round Public Comment Period (March 15 – April 14, 2017)			
City of Crystal, Letter dated April 10, 2017	1	City staff is supportive of the following proposed refinements: 1) Conversion of portions of the existing paved blast pads on Runway 14L-32R to usable runway. This increases the published runway length from 3,267' to 3,750' and shifts this entire runway approximately 115' to the northwest to locate all of the runway protection zones (RPZs) onto MAC property rather than on private residential property. 2) Retention of a portion of the existing turf runway but shortening it to reduce runway crossing points and airfield complexity. 3) Taxiway configuration changes to make the airfield more efficient, simple, and safe.	Comments acknowledged. MAC appreciates this statement of support from the City of Crystal.
City of Crystal, Letter dated April 10, 2017	2	In addition, city staff reaffirms the following comments from our October 26, 2016 letter: 1) City staff is interested in the potential for future non-aeronautical development that would benefit the community and Crystal Airport, and looks forward to future discussions with MAC to ensure these uses are compatible with adjacent land uses and neighborhoods. 2) In regard to the Metropolitan Council's Aviation Land Use Compatibility Guidelines, the city does not intend to adopt new noise provisions in city code, but will work in conjunction with MAC to study any potential noise impacts within the 65 DNL noise contour.	Item 1) MAC looks forward to these future discussion as well. Item 2) Based on follow-up meetings with both the City and Metropolitan Council, MAC is confident that an evaluation process to determine whether the interior noise level of a specific residential structure is high enough to warrant sound insulation treatment, as proposed in Section 7.3.2 of the Draft LTCP, is a prudent approach that will be acceptable to both the City and Metropolitan Council. The MAC intends to conduct this evaluation as a part of the required environmental documentation that will be conducted to implement the LTCP preferred development alternative.

MUNICIPAL/AGENCY COMMENTS RECEIVED DURING THE FIRST ROUND PUBLIC COMMENT PERIOD

(SEPTEMBER 12 – OCTOBER 26, 2016)

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CITY of CRYSTAL

4141 Douglas Drive North • Crystal, Minnesota 55422-1696

Tel: (763) 531-1000 • Fax: (763) 531-1188 • www.ci.crystal.mn.us

October 26, 2016

Mr. Neil Ralston
Metropolitan Airports Commission
6040 – 28th Avenue South
Minneapolis, MN 55450

RE: Draft Crystal Airport 2035 Long-Term Comprehensive Plan

Dear Mr. Ralston:

Thank you for the opportunity to provide comments on the draft Crystal Airport Long-Term Comprehensive Plan (LTCP), and for hosting a community open house on September 27, 2016 to inform Crystal residents and property owners of MAC's vision for the Crystal Airport. City staff offers these comments on the plan:

1. City staff supports the Preferred Alternatives Summary on page XI of the LTCP, including decommissioning both the turf (06R-24L) and south parallel (14R-32L) runways and converting the south parallel runway into a parallel taxiway.
2. City staff is interested in the potential for future non-aeronautical development that would benefit the community and the Crystal Airport, and looks forward to future discussions with MAC to ensure these uses are compatible with adjacent land uses and neighborhoods.
3. In regard to the Metropolitan Council's Aviation Land Use Compatibility Guidelines, the city does not intend to adopt new noise provisions in city code, but will work in conjunction with MAC to study any potential noise impacts within the 65 DNL noise contour. The City seeks MAC's concurrence with this position.

If you have any questions about these comments, please contact City Planner Dan Olson at 763-531-1142 or dan.olson@crystalmn.gov

Sincerely,

Anne Norris
City Manager

cc: Mayor and City Council
John Sutter, Community Development Director
Dan Olson, City Planner

From:	Ralston, Neil
To:	Crystal LTCP
Subject:	FW: Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) -- Comment Period Closing October 26
Date:	Friday, October 28, 2016 8:41:27 AM

NEIL RALSTON, A.A.E. | *Airport Planner* | **O:** 612-726-8129 **M:** 651-890-6086 **F:** 612-794-4407 | www.MetroAirports.org
Metropolitan Airports Commission | 6040 28th Avenue South, Minneapolis, MN 55450 facebook twitter

From: Jason D Gottfried [mailto:Jason.Gottfried@hennepin.us]
Sent: Friday, October 28, 2016 8:41 AM
To: Ralston, Neil <Neil.Ralston@mspmac.org>
Cc: Carla J Stueve <Carla.Stueve@hennepin.us>; Robert H. Byers <Robert.Byers@hennepin.us>
Subject: RE: Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) -- Comment Period Closing October 26

Hello Neil,

I apologize for the delayed response.

In conducting a cursory review of the Crystal Airport 2035 Long-Term Comprehensive Plan (LCTP), Hennepin County staff offer the following for your consideration:

Upon any future efforts of the Metropolitan Airports Commission (MAC) to 'right-size' the Crystal Airport, should any underutilized portions of land along county roadway frontage - Bottineau Boulevard (CSAH 81) or Bass Lake Road (CSAH 10) be proposed for development/redevelopment we request that the MAC provide an opportunity for Hennepin County Transportation staff to review and provide comment. Minnesota Statutes 505.02, 505.03, and 462.358, Plats and Surveys, allow up to 30 days for county review of preliminary plats abutting county roads. Any changes in land use could have impacts to our transportation network. We do not anticipate adding any additional access locations along either section of these county roads that abut the Crystal Airport. Hennepin County staff review of development proposals along the county roadway system has long been common practice for all Hennepin County municipalities. Recently, with the Flying Cloud Airport in Eden Prairie have we begun to see examples of 'right-sizing' efforts from the MAC resulting in leasing out portions of land to be developed along the county roadway system. This opportunity for review and comment allows us greater coordination on access and right-of-way questions in particular, but also allows for opportunity to collaborate on transportation plans including the construction of trails. We hope that through these processes in the future with the Crystal Airport, the MAC will continue to work with Hennepin County in order to optimize a safe and efficient multi-modal transportation network.

We do not foresee any other elements from the Crystal Airport 2035 LTCP having any notable impacts on the Hennepin County Transportation system.

Thank for the opportunity to comment on the plan!

Jason

Jason Gottfried
Senior Planning Analyst

Hennepin County
Office: 612-596-0394
Email: Jason.Gottfried@hennepin.us

Hennepin County Public Works
1600 Prairie Drive
Medina, MN 55340-3410

From: Ralston, Neil [mailto:Neil.Ralston@mspmac.org]
Sent: Monday, October 24, 2016 10:10 AM
To: 'Tim Benetti' <tbenetti@ci.brooklyn-center.mn.us>; Jason D Gottfried <Jason.Gottfried@hennepin.us>; Cindy.Sherman@brooklynpark.org; Todd.larson@brooklynpark.org
Subject: RE: Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) -- Comment Period Closing October 26

Municipal Planning Partners:

Good morning. I wanted to send out a quick reminder that the comment period for the Crystal Airport Draft 2035 Long-Term Comprehensive Plan (LTCP) closes this Wednesday, October 26.

I look forward to receiving any comments that your community may have about the draft plan. Or, please let me know if you plan to submit comments but may not have them ready by the 26th.

Thank you.

Neil

NEIL RALSTON, A.A.E. | *Airport Planner* | **O:** 612-726-8129 **M:** 651-890-6086 **F:** 612-794-4407 | www.MetroAirports.org
Metropolitan Airports Commission | 6040 28th Avenue South, Minneapolis, MN 55450 facebook twitter

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From: Ralston, Neil
Sent: Friday, September 23, 2016 4:33 PM
To: 'Dan Olson' <Dan.Olson@crystalmn.gov>; 'Tim Benetti' <tbenetti@ci.brooklyn-center.mn.us>; 'Jason D Gottfried' <Jason.Gottfried@hennepin.us>; 'Cindy Sherman' <Cindy.Sherman@brooklynpark.org>; 'john.sutter@crystalmn.gov' <john.sutter@crystalmn.gov>; 'Todd Larson' <Todd.Larson@brooklynpark.org>
Cc: Rief, Bridget <Bridget.Rief@mspmac.org>; Schmidt, Gary <Gary.Schmidt@mspmac.org>; Scovronski, Melissa <Melissa.Scovronski@mspmac.org>; Kilian, Mitch <Mitch.Kilian@mspmac.org>; Wilson, Mike <Mike.Wilson@mspmac.org>; Nelson, Dana <Dana.Nelson@mspmac.org>; Gerads, Kelly <Kelly.Gerads@mspmac.org>; Lebedoff Peilen, Lisa <peill@aol.com>; 'brucewiley@wileyproperties.com' <brucewiley@wileyproperties.com>; 'John Krack' <av8r00@gmail.com>; 'Gina.Mitchell@faa.gov' <Gina.Mitchell@faa.gov>; 'Juran, Rylan (DOT)' <Rylan.Juran@state.mn.us>; 'Gaug, Ryan (DOT)' <ryan.gaug@state.mn.us>; 'Russ Owen (Russell.Owen@metc.state.mn.us)' <Russell.Owen@metc.state.mn.us>
Subject: Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) -- Public Informational Meeting Reminder

Municipal Planning Partners:

Good afternoon.

I wanted to send out a quick reminder that we will be holding our two public informational meetings for the Crystal Airport Draft 2035 Long-Term Comprehensive Plan (LTCP) next week.

Details are presented below:

We have also prepared a summary handout to distribute at the information meetings. A copy of the handout has been posted to our website and can be accessed via the link below:

https://metroairports.org/General-Aviation/General-Aviation-Documents/Crystal-OpenHouse-PDF.aspx

Thank you again for your continued engagement and assistance throughout this planning process.

Neil

NEIL RALSTON, A.A.E. | *Airport Planner* | **O:** 612-726-8129 **M:** 651-890-6086 **F:** 612-794-4407 | www.MetroAirports.org
Metropolitan Airports Commission | 6040 28th Avenue South, Minneapolis, MN 55450 facebook twitter

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From: Ralston, Neil
Sent: Friday, September 09, 2016 1:21 PM
To: 'Dan Olson' <Dan.Olson@crystalmn.gov>; 'Tim Benetti' <tbenetti@ci.brooklyn-center.mn.us>; 'Jason D Gottfried' <Jason.Gottfried@hennepin.us>; 'Cindy Sherman' <Cindy.Sherman@brooklynpark.org>;

'john.sutter@crystalmn.gov' <john.sutter@crystalmn.gov>; 'Todd Larson' <Todd.Larson@brooklynpark.org>
Cc: Rief, Bridget <Bridget.Rief@mspmac.org>; Schmidt, Gary <Gary.Schmidt@mspmac.org>; Scovronski, Melissa <Melissa.Scovronski@mspmac.org>; Kilian, Mitch <Mitch.Kilian@mspmac.org>; Wilson, Mike <Mike.Wilson@mspmac.org>; Nelson, Dana <Dana.Nelson@mspmac.org>; Gerads, Kelly <Kelly.Gerads@mspmac.org>; Lebedoff Peilen, Lisa <peill@aol.com>; 'brucewiley@wileyproperties.com' <brucewiley@wileyproperties.com>; 'John Krack' <av8r00@gmail.com>; Gina.Mitchell@faa.gov; 'Juran, Rylan (DOT)' <Rylan.Juran@state.mn.us>; Gaug, Ryan (DOT) <ryan.gaug@state.mn.us>; Russ Owen (Russell.Owen@metc.state.mn.us) <Russell.Owen@metc.state.mn.us>
Subject: Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) -- Public Comment Period

Municipal Planning Partners:

Good afternoon.

As previously indicated, the public comment period for the Draft Crystal Airport 2035 Long-Term Comprehensive Plan (LTCP) will open next Monday, September 12.

The following link provides access to the Crystal Airport page of the MAC website, where we have posted information about the planning process:
https://metroairports.org/General-Aviation/Airports/Crystal.aspx

From this page, you can view the Draft 2035 LTCP Report, along with the Public Notice that provides information about the upcoming public meetings and methods to submit comments about the plan. The notice was also published in the September 8 edition of the Sun Post.

We would very much appreciate it if you would be willing to help us get the word out by posting information about the public comment period and upcoming information meetings to your respective websites and community calendars. Please let me know if I can provide you with any additional materials to assist in this effort.

Thank you for your continued engagement as we update the LTCP for Crystal Airport!

Neil

NEIL RALSTON, A.A.E. | *Airport Planner* | **O:** 612-726-8129 **M:** 651-890-6086 **F:** 612-794-4407 |
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MUNICIPAL/AGENCY COMMENTS RECEIVED DURING THE SECOND ROUND PUBLIC COMMENT PERIOD

(MARCH 15 – APRIL 14, 2017)

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CITY of CRYSTAL

4141 Douglas Drive North • Crystal, Minnesota 55422-1696

Tel: (763) 531-1000 • Fax: (763) 531-1188 • www.ci.crystal.mn.us

April 10, 2017

Mr. Neil Ralston
Metropolitan Airports Commission
6040 – 28th Avenue South
Minneapolis, MN 55450

RE: Refined Draft of the Crystal Airport 2035 Long-Term Comprehensive Plan

Dear Mr. Ralston:

Thank you for the opportunity to provide comments on the refined draft of the Crystal Airport Long-Term Comprehensive Plan (LTCP), and for hosting a community open house on March 30, 2017 to inform Crystal residents and property owners of the proposed refinements to the plan. City staff is supportive of the following proposed refinements:

1. Conversion of portions of the existing paved blast pads on Runway 14L-32R to usable runway. This increases the published runway length from 3,267' to 3,750' and shifts this entire runway approximately 115' to the northwest to locate all of the runway protection zones (RPZs) onto MAC property rather than on private residential property.
2. Retention of a portion of the existing turf runway but shortening it to reduce runway crossing points and airfield complexity.
3. Taxiway configuration changes to make the airfield more efficient, simple and safe.

In addition, city staff reaffirms the following comments from our October 26, 2016 letter:

1. City staff is interested in the potential for future non-aeronautical development that would benefit the community and the Crystal Airport, and looks forward to future discussions with MAC to ensure these uses are compatible with adjacent land uses and neighborhoods.
2. In regard to the Metropolitan Council's Aviation Land Use Compatibility Guidelines, the city does not intend to adopt new noise provisions in city code, but will work in conjunction with MAC to study any potential noise impacts within the 65 DNL noise contour.

If you have any questions about these comments, please contact City Planner Dan Olson at 763-531-1142 or dan.olson@crystalmn.gov

Sincerely,

Anne Norris
City Manager

cc: Mayor and City Council
John Sutter, Community Development Director
Dan Olson, City Planner

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WRITTEN PUBLIC COMMENTS RECEIVED DURING THE FIRST ROUND PUBLIC COMMENT PERIOD

(SEPTEMBER 12 – OCTOBER 26, 2016)

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-------- Original message --------
From: Eli Wolter
Date:09/10/2016 8:34 AM (GMT-06:00)
To: "Ralston, Neil"
Subject: Runways at Crystal airport

Hello Neil -

I wanted to contact you regarding the July 22 draft comprehensive plan action document.

I am a Crystal based pilot and resident of Maple Grove.

I would like to request that you take a second look at a few items in this draft plan. Some adjustments would better serve Twin Cities residents, the surrounding communities of the Crystal Airport, pilots, air traffic controllers, and users of MAC's other airports (commercial passengers, pilots, and airlines).

There are some good improvements contained in the plan. There are some ideas in the plan that should not be implemented, especially the decommissioning of runway 14R / 32L.

Stopways

I do think that the stopways would be a good improvement and I am happy to see these in the draft report.

Declared Distances

Declared distances would be an even better idea. I know pilots who prefer not to use the airport due to the current runway length, and I am confident more of the 4 and 6 seat planes would use the airport with these declared distances. This would also increase safety for takeoff and landing. From the draft report, it appears that the primary reason to not use declared distance is the concern that there would be too many aircraft over 12,500 lbs using the airport with lengthened runways. I do not think this is a good reason to rule this option out. The 4,267 runway length would only marginally increase the number of aircraft able to take advantage of the runways, and only slightly increase the number of over 12,500 lbs pilots who would be comfortable using the airport. Flying Cloud, Anoka, and Saint Paul with precision approaches and 5000 - 6500 foot runways would still be the preference. This increase would likely draw more under 12,500 pound aircraft away from Anoka, St. Paul, Flying Cloud, and non-MAC airports such as Buffalo.

Thunderbird Expansion

I do believe Thunderbird has outgrown it's current ramp and building space, so a plan that allows Thunderbird to acquire additional space is a good idea. I do question why Thunderbird could not be expanded using hangar space that currently does not have aeronautical use and / or other FBO appropriate sites at the airport (I have seen listings

where it appears Wentworth is interested in selling the Crystal Shamrock site).

14R / 32L decommissioning

The decommissioning of runway 14R / 32L does not make sense to me. Safety, capacity, and pollution (noise / flight efficiency) seem to be greatly improved thanks to this parallel runway. I frequently arrive and depart the airport at busy times (weekday evenings, Sunday evenings, Monday mornings, and all day Saturday) and Air Traffic Control is utilizing the parallel runway to prevent long traffic sequences, prevent extensive traffic holding, and provide separation of faster and slower approaching aircraft without causing long delays for arriving and departing traffic. Being the 3rd busiest airport in the state, the parallel runway is justified for these reasons.

During winter there are also many times where one parallel runway is open while the other one is being plowed.

I have personally observed several occasions where there is debris or an obstruction on the runway and the other runway can be used. (On my own first solo flight, an amphibious plane dropped an oar on 14L right after I took off on 14R, but I was able to continue to land on 14R. It took 20 minutes to have a truck remove the oar and do a runway inspection, the wind was too great to land on 24/6 so I would have needed to divert or hold if a parallel runway was not available).

Decommissioning of this runway will lead to longer traffic patterns / sequencing and holding over nearby neighborhoods and more fuel burn. This will also decrease ability to have traffic continue to land when the runway needs to be closed (especially if difficult wind conditions make use of the crosswind runway unsafe or impossible). The statement that the taxiways are too complex and unsafe at Crystal and this justifies the runway closure does not make sense to me. Crystal has one of the more straightforward configurations I have seen at a busier airport, and there is excellent visibility of the runway environment and great signs and taxiway / runway markings as well as great FAA ground controllers. While fewer runways do mean fewer runway crossings and less possibilities to have an incursion, we are talking about eliminating parallel runways (you only cross one of these runways when you are also crossing it's parallel or going to it's parallel, as a result I would think most who would cause a runway incursion would simply incur the still intact runway (and this would make it more likely there would be landing or departing traffic on that runway actually decreasing safety)).

Turf runway

I do realize that the turf runway is the least used runway at the airport. I also have become somewhat of a Minnesota airport history buff and from this I know that many airports have paved over their turf runways or decommissioned the turf runway when it has a paved runway parallel to it. As a result, I am not surprised to see this as part of the proposal to close the turf runway now as well as in 2008. I would like to be sure some points are considered:

- The turf runway at Crystal is used primarily for training and maintaining proficiency in soft field landings. Flight training as well as insurance check out in a new type of aircraft requires soft field instruction and practice and many pilots who use soft fields at other airports like to maintain this proficiency by doing occasional soft field landings. I have really appreciated having the turf runway at Crystal for these reasons and 1 - 2 times per month depart or arrive on this runway.
- If this runway is decommissioned and Forest Lake is paved over (as proposed to occur this month), pilots will need to go to Winstead or Milaca for actual soft field experience. This longer journey will likely decrease metro area pilots proficiency.
- From the 2008 report, and analysis done by other cities with turf runways, I

understand the maintenance cost for a turf runway to be very similar to the cost of maintaining a zone next to an active runway. As a result, closing this runway likely does not save MAC much as far as maintenance is concerned.
- The average usage per day taken in June through August likely would be higher in months with more flight training (April, May, September, October).

Pilot / public input

I am subscribed to the MAC email updates and closely watch local news sources for MAC related news. I did not hear about this draft report until after the meetings had occurred thanks to an article in the Brooklyn Center Sun Post that a Brooklyn Center resident shared with me. I have asked around at the airport and have only encountered one person who was aware of the report or the meetings. I know it is difficult to contact local pilots and residents, so the lack of awareness may not be the fault of the MAC, but I am concerned that the analysis may not include good information and ideas from local pilots, air traffic controllers, and nearby businesses and residents.

Thank you for taking the time to read these comments. I would be happy to discuss further with you by email, phone, or in person.

- Eli Wolter

From:	Brandon Scherber
To:	Crystal LTCP
Subject:	Crystal Airport 2035 LTCP Question
Date:	Tuesday, September 13, 2016 9:19:55 AM
Attachments:	image001.png

Good Morning,

I just reviewed the Crystal Airport 2035 LTCP and was wondering if you could share who may be working on the preliminary "***sufficiently detailed plan"*** drawings prior to the environmental review and also who may be working the "***final project engineering and design*****?"**

Thank you.

> **Page xvii -** *An environmental review process cannot begin until there is a* ***sufficiently detailed plan*** *available to evaluate. MAC envisions initiating the environmental review for the proposed Crystal Airport improvements soon after the plan is reviewed by the Metropolitan Council and formally adopted by the MAC Board. A full study of these environmental impact items at this time falls outside the scope of this long-term planning document.*
>
> **Page xxii -** *Before any construction can begin, the project(s) must first be depicted on an FAA-approved Airport Layout Plan (ALP), evaluated via an environmental review process, and then compete for funding through FAA and/or State grant programs. Once funding is secured,* ***final project engineering and design*** *will take approximately one year to complete with contractor bidding and construction following thereafter.*

Brandon Scherber
Sales Engineer
TrueNorth Steel
701-373-7707 Direct
763-238-1444 Mobile
www.truenorthsteel.com

TrueNorth Steel

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Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan

Public Information Meetings:
Crystal Community Center, September 27, 2016 (5-7pm)
Brooklyn Park City Hall, Council Chambers, September 29, 2016 (5-7pm)

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1] On this form and left in the comment boxes at either public meeting;
2] Via email to the following address: Crystal-Airport-LTCP-Comments@mspmac.org, or;
3] Via mail to: Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Written comments will be accepted until Wednesday, October 26 at 5:00 PM. All written comments received will become part of the project record.

Name: Bill Gustafson

Address: 5300 62 Ave N. B. Center 55429

The runways go right over my home. The noise is unbearing to say the least. I've had many, too many, TV programs interrupted by their presence.

The deer problem is another topic. When guests comment to me on how I can attract it, I gladly reply to check the skid marks on my road. That shuts them up.

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

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Name: Ben Gustafson

Address: 5300 / 62 Ave N.

If you closed the solid runway the planes would use the sod runway & they wouldn't fly over my house.

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

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Name: Roger McGowen

Address: 6264 Edgewood, Brooklyn Park 6

Have noise enforcements on aircraft

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Name: DeLores Dimpson

Address: 5624 Regent Ave N.

May I suggest the next meeting you have a microphone for both speaker and those in audience. Those around me agreed they could not hear half of what was said / commented on.

The question of trees being removed or topped was not addressed & those around me who tried to speak to others did not feel they got a good answer -

Please use the back side of this form for additional comments.

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Name: Tom Van Hansen FAIA 763-999-6130

Address: 6327 45th PLACE N
CRYSTAL, MN 55428

Having reviewed the "Book" prior to visitation program at the Crystal Community Center I was impressed with the long term Comprehensive Plan for the revision proposed for the Crystal Airport & vicinity. I also agree with proposals for staging its growth & benefits to the communities involved —

T.V.H.

9/27/16

Ref. MAC owns the property — most abutting property — People in the audience were anti growth of a staggering center on adjacent public land or green space. Why not head off a zoning controversy later & have MAC suggest a non growth policy on adjacent land — ? Be pro-active in the planning & Zoning issues yet to come —

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

From: Ralston, Neil
To: Crystal LTCP
Subject: FW: aircraft sales/use tax
Date: Wednesday, September 28, 2016 8:25:41 AM

NEIL RALSTON, A.A.E. | Airport Planner | O: 612-726-8129 M: 651-890-6086 F: 612-794-4407 | www.MetroAirports.org
Metropolitan Airports Commission | 6040 28th Avenue South, Minneapolis, MN 55450 facebook twitter

-----Original Message-----
From: Warren [mailto:warrenbatzlaff@gmail.com]
Sent: Wednesday, September 28, 2016 5:00 AM
To: Ralston, Neil <Neil.Ralston@mspmac.org>
Subject: Re: aircraft sales/use tax

Hello Neil,
I spoke with you last evening. See MS 297A.82. Sub4a.
All of the Mn use tax 6.875% goes into the Mn Airport Fund according to state law.
I paid an additional 0.25% tax to the 5 County Transit Improvements
I paid an additional 0.15% tax to Hennepin county local sales and use tax.

Total tax paid on aircraft purchase $7929.75!!!

That is a lot of money that could have gone to buying aviation fuel and flying.
Add that into the "hourly" cost of operating a general aviation aircraft and it should be clear how over taxation and costs of additional regulations are killing general aviation.

It costs a lot of money to maintain, register, ongoing training and operate a general aviation aircraft. I bought a hangar and lease the land from Mac and pay significant lease and property taxes on those properties.

Grass runways are really quite inexpensive to operate and maintain over time. No asphalt or concrete to repair or tear up and replace periodically. I advocate for keeping the grass runway at KMIC airport.

Thanks in advance,
Warren Batzlaff
Sent from my iPad

Public Comment Form

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Name: TIMOTHY STANLEY

Address: 5708 ADAIR AVE N CRYSTAL, MN.

THE ~~ECONOMIK~~ ECONOMIC IMPACT OF EXTENDING THE ~~THE~~ RUNWAY 14-32 NEEDS TO BE EXAMINED IF THE PARALELL IS TO BE LOST. IT DOESN'T MAKE SENSE TO ELIMINATE A RUNWAY WITHOUT GAINING ~~GG~~ THE UTILITY OF A MUCH LONGER RUNWAY.

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

From:	Warren Batzlaff
To:	Crystal LTCP
Cc:	Ralston, Neil
Subject:	re:KMIC turf runway
Date:	Monday, October 03, 2016 8:57:15 AM

hello,

I have some additional points to make for keeping the only grass runway that MAC operates in the metropolitan area.

Soft field takeoffs and landings are still part of the training and testing process for pilots. No more access at KMIC training facility. (Forest Lake is now paved over).

Paved runways are prepared and maintained to maximize friction, this can be hazardous with gusty crosswinds 40-50 degrees off the runway heading. (ie: gusty winds of 180 to 200 degrees, or the inverse, vs runways 14/32 & 6/24.) Hazardous for both types of GA aircraft.

Turf runway 6R/24L, is twice as wide as the paved runways, has less friction than pavement, is inherently safer for landing a conventional (taildragger) aircraft, as well as a tricycle (training wheel) aircraft during gusty crosswind operations.

Virtually no tire wear, and less wear and tear on landing gear on turf, versus tires scrubbed off when landing on pavement. The effects of sideways drift/side loading, are decreased when landing on turf, versus pavement designed to maximize friction.

Because turf runways are 2-3 times wider than paved runways (150-250 feet wide) vs. 75 feet, much of the gusty, crosswind operations can be made much safer by taking off degrees of crosswind by landing at a 20-30 degree angle of centerline of turf runway.

Additionally landing more "into the wind" decreases landing roll and landing distances substantially, as well as increasing safety for both types of aircraft at this GA airport.

Reducing training opportunities and safety of GA aircraft should not be a goal of the FAA, or of MAC, at KMIC, Crystal.

Thunderbird's ramp could be expanded to where their dilapidated hangars are now located. Grants could be written and received to move other tenants to other locations, or open hangars with cars, boats, and lawn services operating or being stored there. That ramp location would be inherently safer for aircraft on a ramp, out of direct winds from SW to North, which could have significant hail, foreign object damage caused by being more exposed in the area proposed for closing 24L sod runway.

thanks in advance,
Warren Batzlaff

From: Wilson, Mike
To: Crystal LTCP
Cc: richielj40@msn.com
Subject: FW: MAC plans for KMIC
Date: Tuesday, October 04, 2016 9:48:44 AM

Mr. Johnson,

I am forwarding this to our email address so your comment is recorded.

Thank you,

Mike Wilson

From: RICHARD L JOHNSON [mailto:richielj40@msn.com]
Sent: Monday, October 3, 2016 6:53 AM
To: Wilson, Mike <Mike.Wilson@mspmac.org>
Subject: MAC plans for KMIC

Mike I believe you have now inherited the additional duties back at MIC of managing the airport.

I would like to "weigh in" with my comments for the hearing to consider the closing of two runways at MIC.

The grass runway is unique and those who fly "tail draggers" prefer such a runway, but it is probably the most underutilized runway and closing it might not make much difference..

However, 32L-14R does get quite a bit of use and serves the West side of the airport best. I have been flying out of MIC now since 1966 and have seen the airport in its busy years when there were five flight schools operating there. I remember when 32L-14R was a grass strip and then got paved with the additional traffic. My concern now is MIC could easily support another flight school with the increased demand for pilots. I know of one school that strongly considered such a move to MIC. If that were to happen, the extra parallel runway would be advantageous to handle increased training traffic. It might never get to the point of traffic counts in the late '60's, but once you have the additional parallel runway, why not keep it at least to see what happens as the market place spools up to meet the increased demand of training pilots. Maybe another year or two reprieve for that runway might be appropriate.

Dick Johnson
MIC Pilot and Tenant
Plymouth, MN

Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan

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Written comments will be accepted until Wednesday, October 26 at 5:00 PM. All written comments received will become part of the project record.

Name: Mrs Joanne E. Spencer (widow) since 1999

Address: 6101 Quail Ave No - Brklyn Ctr

The runway over my house is okay. I am happy to know you are improving. I realize the woods across the street help planes to know take-off, the woods are a fire hazard, & have lived here since Sept 1958. We need your airport, please clear the acreage.

We use to have one families homes + Orchard Lane School upto 6th grade + now, since 1999 there is three families in one house + the hse is not kept up + they don't know how it has to be kept up. The people in the homes on 61-~~st~~ first have fences around the backyards + the fire department can't get back there. I wish there was a law to keep that open + no fences.

Thankyou Mr Ralston

Joanne E Spencer

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

From:	Joe Shallbetter
To:	Crystal LTCP
Subject:	Crystal Airport (LTCP)
Date:	Wednesday, October 12, 2016 2:06:15 PM

On September 6th 2016 the Metropolitan Airport Commission (MAC) held a Tennant briefing which include a handout with several Long Terms Comprehensive Plan (LTCP) that were considered by MAC.

I **do not** support the preferred alternative (LTCP), however I would support an LTCP (shown on page 6 of the handout) which converts the existing Overruns to Runway (displaced threshold).

The Statement in the handout " Increases community noise exposure by moving takeoffs closer to homes" I believe is an incorrect statement. Yes it would move the aircraft takeoff noise (Runway 32) closer to homes on the Southeast side of the airport, however it would actually move the noise farther away from the homes on the Southwest side of the airport.

From the Tennant briefing it appeared that MAC had not considered the **additional safety** feature this LTCP would bring to the airport for those aircraft currently based at Crystal, but only mentioned the possibility of this LTCP attracting slightly larger aircraft. **Our family has been a Crystal tenant since the 1950's.** We currently operate an A36 Beechcraft Bonanza (single engine 6 seat). Looking at the performance charts for my aircraft at a gross weight takeoff:

Takeoff weight: 3650lbs
Flaps approach setting
Pressure Alt 1000'
Headwind 10 kts

From the performance charts for this aircraft the takeoff roll is approximately 1200', the distance to clear a 50' obstacle is 2350'. If approach flaps are not used these distances increase by over 35%. With more runway available for takeoff from the above example my aircraft will be higher at the other end of the airport and would allow me to reduce power to a climb setting sooner reducing the noise level of my departure over the homes on the departure end of the runway. Additionally with more runway available if a takeoff should have to be aborted then more would be available for stopping.

This LTCP also mentions "Potential to attract Larger aircraft" I would agree with this statement, however again when we look at performance figures for larger aircraft such as:

Pilatus PC-12 (single engine turboprop) the published 50' obstacle clearance is 2,600' less than 10% more than my aircraft.
King Air 250 at MTOW is 2,111'

- **Again I believe these examples show what added safety margin would be added to this airport with the LTCP that converted the existing overruns to Runway for those aircraft currently based at Crystal.**

- **I also attended the City of Crystal working session on September 8th that specific council members supported this LTCP and not the one being proposed.**

Other things that should be considered In the LTCP:

- Move the run up areas away from homes
- Minimum hanger exterior appearance requirements (don't renew leases if this policy cannot be met)
- MAC to build and either lease or sell new hangers
- The need for more ramp space for transient aircraft

As pilots we all have to take into consideration those who live around airports. If we can educate our airport neighbors about the types of aircraft that can operate out of certain airports and what airports can bring to their communities (for example: green space, revenue for local business and even jobs located at the airport) the better neighbor we will be.

This is an excellent time with members of the Crystal city council support to consider the LTCP which converts the overruns to Runway.

Respectfully

Joe Shallbetter

From:	Julie Deshler
To:	Crystal LTCP
Subject:	Crystal Airport Comments
Date:	Monday, October 17, 2016 4:45:34 PM

Greetings,

Just wanted to touch base before the comment period is over and give you input from my vantage point. I would like to see the Airport runway extended a bit in order to attract a little larger "corporate" plane. Maybe 10-12 passenger size. With the Blue Line Extension line transit station withing walking distance of the Airport, I would think allowing larger planes could go a long way towards bringing in people to our Community who might spend money in our surrounding retail areas. I would also like to see some development around the perimeter area of the Crystal Airport. Possibly a restaurant, pilot training school, aviation museum, etc.

As far as removing the turf runway, I've talked with several pilots who fly in and fly out of the Crystal Airport and they really do not want to see the turf runway removed. I'm not a pilot and not sure I understand completely why its so important to them to keep it, but since one or two live in the area I represent as a council member, I am just passing along there wishes. If it doesn't cost money to maintain and some pilots like it, why the push to remove it?

Basically, I love the Crystal Airport. It gives our Community something unique that other Communities don't have and I want to see the Airport updated and successful. The residents who live around the Airport (or those that I've spoke to) love the airport too and I have never heard any of them say, they want it closed. Most say they would like to see a little more air traffic. They enjoy watching the planes take off and land, otherwise they would not have purchased a home there.

Personally, and I could be wrong, but I don't think there would be a lot of negative push back from the local residents or the current council members if you do decide to lengthen the runway a little. I'm happy to help you rally the Ward 4 residents surrounding the Airport if you chose to move in that direction.

As always, feel free to contact me if you have any additional questions or comments. My cell phone is 612-306-5808.

Julie Deshler
Council Member-Ward 4

From: Olga Parsons
To: Crystal LTCP
Subject: Airport
Date: Thursday, October 20, 2016 6:52:01 PM

To Whom It May Concern,

I like the idea of having larger planes landing in Crystal.

Thanks!

olga

From: Chris Glaeser
To: Crystal LTCP
Subject: Comments on Crystal Airport LTCP
Date: Friday, October 21, 2016 8:31:20 PM
Attachments: 2035 LTCP.pdf

Please note my attached comments; I appreciate the opportunity to comment!
Chris Glaeser

6140 Cheshire Lane N
Plymouth, MN 55446-4002
Ph 1-952-239-4081

Oct 15, 2016

Comments on 2035 Long Term Comprehensive Plan (LTCP) for Crystal Airport

To: Crystal-Airport-LTCP-Comments@mspmac.org

Mr. Neil Ralston
MAC Airport Development
6040 28th Avenue South
Minneapolis, MN 55450

Dear Mr. Ralston;

I have just finished reviewing the very comprehensive 2035 Long Term Comprehensive Plan (LTCP) for Crystal Airport (MIC), and am very impressed with the scope and effort that went into this plan. As a very active pilot flying out of Crystal in 3 different types of aircraft, I would like to make these recommendations for MAC consideration. I am providing these recommendations in the interest of promoting local aviation and long-term Crystal Airport development and have no financial interests in the airport.

1. Effect of the Blue Line Light Rail Expansion

The western expansion of the Blue Line Light Rail is scheduled to start operations in 2021, with two stations in close proximity to Crystal Airport. The planned station at Bass Lake Road in the city of Crystal will be especially convenient to the airport.

The connection of a major airport (MSP) to a reliever airport (MIC) via light rail is very significant and extremely rare in the USA. Additionally, no train change will be required between Crystal and both terminals of the MSP airport; a direct connection! The light rail will also directly connect Crystal Airport to downtown Minneapolis and a large number of popular sporting and entertainment venues such as the Target Center, new Vikings Stadium, the Target Center, and the Mall of America. Connecting Crystal Airport to the light rail system will allow many new uses of Crystal Airport, and this new connection needs to be highlighted in the 2035 LTCP and supported with the implementation of the recommendations below.

Connecting the light rail station to transient aircraft parking at the airport could be supported by a new FBO shuttle, Uber, Lyft, or conventional taxi services. This connection should be highlighted in all Minnesota state aviation documents.

A few examples of the myriad potential uses of these newly integrated transportation modes:

- Minnesota congressional legislators will be able to fly into Crystal and take the Blue/Green lines to the capital
- Visitors to the Target Corporation headquarters will be able to fly into Crystal and take the light rail to Target headquarters. This may also encourage other major companies to locate new facilities in the city of Crystal, noting the new connection to MSP airport
- Pilots will be able to fly into Crystal from Detroit Lakes, Brainerd, Alexandria, Hayward Lakes, etc., and attend a sporting event. Return to their home airport could occur the same day or the next morning, stimulating business at hotels convenient to the new Blue Line
- Pilots from outstate Minnesota will be able to fly to Crystal Airport, shop or have business appointments in downtown Minneapolis, and then fly out of Crystal.
- Passengers flying major airlines will be able to fly into MSP, take the Blue Line directly to Crystal Airport, and then complete their trip by light aircraft to the western and northern regions of Minnesota.

Recommendation: the planned Blue Line station at “Bass Lake Road” should be renamed “**Crystal Airport/Bass Lake Road**”. This will highlight the proximity to Crystal Airport and the city of Crystal location, and ensure that transient pilots can easily identify the proper light rail station.

If the light rail station stimulates transient aircraft utilization as anticipated, parking and hangar space for transient aircraft will be grossly inadequate. However, the planned closing of runway 6R allows for considerable expansion of parking.

As noted on page 2-18 of the LTCP:

"Thunderbird Aviation offers aircraft parking and storage as one of its services with both indoor storage and outdoor apron/tie-down parking available. Outdoor apron storage typically accommodates short-term parking for visiting aircraft or for parking of planes awaiting maintenance or other services. It can also be used for long-term storage of aircraft. The existing FBO apron is relatively small and is often congested due to its configuration.

The capacity of the apron is limited to six single or small twin-engine aircraft simultaneously, and fewer if a larger twin-engine piston or turboprop is parked."

Recommendations:

The LTCP should consider the following impacts of increased daily and overnight transient aircraft to include the following anticipated requirements:

- A need for greatly increased outdoor ramp space with permanent aircraft tie-downs
- A need for greatly increased indoor hangar space (10-20 aircraft) to encourage overnight and longer term transient use; a potential revenue increase for Crystal Airport
- Potential 24 hour pilot access to the transient parking area (perhaps with a coded pedestrian gate)
- Signage from the light rail station to the transient ramp to facilitate taxi service and ride sharing service users

2. Existing Requirement for a Significant Safety and Operational Improvement

There is currently no straight-in GPS approach to runway 32R. This reduces the current level of safety at Crystal Airport and should be a high priority, immediate improvement.

As noted briefly in the 2035 LTCP (pg viii):

"Development of a new, non-precision GPS-type instrument approach procedure for the existing Runway 32R end would enhance the operational capabilities of the airport.

Planning for the establishment of this non-precision approaches is recommended for consideration, if feasible."

I would strongly recommend that the MAC immediately request the FAA to create a straight-in GPS approach to runway 32R with the lowest possible weather minimums (LPV) if possible. There is a need for this approach today, and the wording in this section of the LTCP should acknowledge this existing need. The FAA can accomplish the creation of this approach at essentially no cost to the MAC. This would provide many immediate benefits to Crystal pilots including:

- Improved safety during lower weather operations
- Additional local instrument training opportunities for pilots at all MAC airports
- Increased operations at Crystal when winds are northerly

3. Run-up and departure delay parking areas

If any of the paved runways are closed, I would recommend a review of the "engine run-up" areas on each side of each runway end. A normal engine sunup and preflight checklist can take 5+ minutes, and an inadequate run-up parking area can result in excessive departure delays. As a planning suggestion, there should be room for at least 3-4 aircraft to perform run-up's or park (while awaiting clearance, loading flight plans, etc) allowing another standard size light aircraft to pass and takeoff. The existing run-up area to the west of runway 32L is a good example of a properly sized area, while the existing run-up area to the east of runway 32R is clearly inadequate.

I sincerely appreciate the opportunity to submit my comments to this very comprehensive report and am available for further discussions at your discretion.

Sincerely yours,

<signed>

Chris Glaeser

Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan

Public Information Meetings:
Crystal Community Center, September 27, 2016 (5-7pm)
Brooklyn Park City Hall, Council Chambers, September 29, 2016 (5-7pm)

The Metropolitan Airports Commission (MAC) is seeking public input about the Draft 2035 Long-Term Comprehensive Development Plan (LTCP) for the Crystal Airport.

Written comments can be provided:
1) On this form and left in the comment boxes at either public meeting;
2) Via email to the following address: Crystal-Airport-LTCP-Comments@mspmac.org; or;
3) Via mail to: Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450

Written comments will be accepted until Wednesday, October 26 at 5:00 PM. All written comments received will become part of the project record.

Name: JANICE TROVER Janice Trover

Address: 8200 67th Ave N Brooklyn PK Mn 55428

Public information meetings I attended (1) Crystal com Ctr (2) Brooklyn PK city Hall (3) meeting in 2008 or 2010 with 4 sets of presented plans.

New Development Benefit and Aviation @ MIC (1) 610 Increase in Business growth & Aviation traffic (2) Maple Grove NEW business growth & Aviation traffic (3) Useful Transportation in growing community

Light rail corridor & Crystal Airport (1) sports arena and transportation future use (2) Maple Grove & NW suburb future use

4 Runways and Crystal Airport (1) Air traffic controllers prefer option to move planes to Runway of Choice (2) Avoid long lines waiting to land (3) grass runway benefit to tail wheel flyers (4) Safety of everyone with more options

Non Aviation Business and Crystal Airport (1) Lack of commitment to aviation privilage on aviation land.

Paradigm shift & Crystal Airport (1) Technology and conditions changing aviation possibilities now and the future

My Aviation interest (1) MN CHAPTER 99's International Woman Pilots (2) EAA 10 year volunteer flight line WARBIRDS (3) I was taught to fly at MIC & gained license at MIC

Please use the back side of this form for additional comments.

More information about the plan can be found at: http://metroairports.org/General-Aviation/Airports/Crystal.aspx

From: Drew Johnson
To: Crystal LTCP
Subject: Do not close the sod
Date: Wednesday, October 26, 2016 12:54:28 PM

As a taildragger pilot that is based at KMIC, I frequently use the sod both for safety reasons and training reasons. As the only remaining grass runway at the MAC reliever airports, and in the context of the entire system, it does not seem unreasonable to keep this runway open.

-Drew

Drew Johnson
Oppidan Investment Company
400 Water Street, Suite 200
Excelsior, MN 55331
D: 952-540-4180
C: 612-554-1897
F: 952-294-0151

From:	Jacob Teske
To:	Crystal LTCP
Cc:	Jacob Teske
Subject:	Thunderbird Aviation Response to 2035 LTCP
Date:	Wednesday, October 26, 2016 3:33:01 PM
Attachments:	MAC 2035 LTCP Thunderbird Aviation Response.pdf

Hello,

Please find Thunderbird Aviation's response to 2035 LTCP attached.

Thank you,

Jacob Teske
Operations Manager
Thunderbird Aviation, Inc.
Phone: 763.533.4162 | Fax: 763.971.0116
5800 Crystal Airport Road | Crystal MN 55429
jteske@thunderbirdaviation.com

Email and tell us about your experience at Thunderbird Aviation!

Metropolitan Airports Commission

RE: Crystal Airport Draft 2035 Long-Term Comprehensive Plan

Dear Mr. Neil Ralston:

I am writing in response to the Metropolitan Airports Commission's Crystal Airport Draft 2035 LTCP on behalf of Thunderbird Aviation, Inc.

It is Thunderbird Aviation's contention that the proposed decommissioning of runway 14R-32L would have a negative effect on Crystal Airport's ability to efficiently handle air traffic and, thusly, on Thunderbird Aviation's operations. The proposed decommissioning of runway 14R-32L fails to take into account the expected growth of Thunderbird Aviation's operations, and in particular, it's growing flight training program.

It is also Thunderbird Aviation's contention that the closing of Crystal's turf runway (6R-24L) would have a negative effect on our flight training program. Crystal Airport serves as the only soft-field strip in the metro area and its loss would severely limit our ability to conduct soft-field training.

Thunderbird Aviation does not believe that the conversion of overruns to stopways will effectively increase operations at KMIC. We do not believe this is a viable means of drawing transient traffic to the field.

Due to the above listed reasons, Thunderbird Aviation is opposed to MAC's 2035 LTCP. We hope you will take the concerns above into serious consideration before moving forward with your drafted plans.

Sincerely,

Jake Teske

Operations Manager – Thunderbird Aviation

From: Patrick Fox
To: Crystal LTCP
Subject: Comments About MIC Changes
Date: Wednesday, October 26, 2016 4:00:36 PM

I am disappointed with one of the proposed changes at the Crystal Airport. The grass runway is currently the only grass asset in the MAC system. During the presentation from the MAC to the Airport tenants, it was clear that no consideration was
given to finding an alternate to closing the grass. I proposed the idea of combining the crosswind asphalt and the grass into one runway, the pilot having the option to land on either side. It would be one runway, just wider. The hosts stipulated that the cost of maintaining the grass was minimal.

One reason given to close the sod was to give Thunderbird a potential expansion area that they have not asked for. With the other 4 FBO's closed it seems to me that there is plenty of area for FBO expansion without encroaching into an existing runway.

For the many taildragger pilots at Crystal, the sod provides a significant safety margin. Typically when it is windy, the winds are out of the Southwest, which is the way the crosswind runway is orientated. Taildragger airplanes have significant advantages with landing on grass.

When I learned to fly taildraggers and got checked out in my current airplane, initial instruction on the sod was important. I understand the need to "right size" Crystal, but by closing the grass, you will be eliminating one more important option for general aviation. While that may seem insignificant to some, it is very important to others.

At the meeting presentation by the MAC officials, it was clear that groups were consulted about the changes before this proposal was written. Two groups that were not consulted were the tenants and pilots who use Crystal. I question the understanding that the writers of the proposal have of general aviation. One of their taking points, meant to be a positive for the pilots at the meeting was to ask the FAA for a new RNAV approach to the new combined 32. Anyone that had a basic understanding of the airspace around MSP would understand that could never happen. The fixes for such an approach would put it well within the MSP Class B airspace and would conflict with MSP traffic.

Respectfully,

—Patrick Fox

From:	Jeff Dinsmore
To:	Crystal LTCP
Subject:	Comments re: Crystal Airport LTCP
Date:	Wednesday, October 26, 2016 4:43:02 PM

Jeff Dinsmore

5805 Minnetonka Dr.

Shorewood, MN 55331

612-720-9084

jdinsmore@borealflight.com

October 26, 2016

To: Crystal-Airport-LTCP-Comments@mspmac.org

Comments on 2035 Long Term Comprehensive Plan (LTCP) for Crystal Airport

Mr. Neil Ralston

MAC Airport Development

6040 28th Avenue South

Minneapolis, MN 55450

Dear Mr. Ralston

Thank you for all your efforts in the preparation of the Long Term Comprehensive Plan (LTCP) for Crystal Airport. The plan is very comprehensive and I am impressed with the variety of factors included.

I am a pilot, flight instructor, and 30+ year user of Crystal Airport. I also have long term experience flying out Flying Cloud Airport, fly a variety of piston aircraft, and very familiar with General Aviation operations.

Upon review of the Long Term Comprehensive Plan (LTCP) for Crystal Airport, I have these comments:

1. I am not in favor of the closure of Runway 14R/32L.

- A single primary runway will concentrate traffic, increase pilot and tower personnel workload, and lead to diminished safety,

- A single primary runway will detract from usability of transient, business aircraft and reduce airport desirability and usage,

- Having both left and right traffic patterns will increase tower workload and extend traffic patterns,

- Extended traffic patterns will not be practical when Target Field TFR's are in effect, and

- The current runway arrangement provides traffic relief for arrivals and departures for 14L/32R. Ease of use will promote transient aircraft use of Crystal Airport

2. Converting Runway 14L/32R overruns to stopways is a positive change leading to increased usage including turboprop aircraft.

3. If taxiways are extended for 14L/32R to take advantage of stopways, more attention to run-up areas will need attention. Current areas for performing run-ups and pre-takeoff procedures are small particularly for Runway 32R.

4. In general the plan may make the airport more difficult to use leading to less usage by transients and even tenants.

5. Forecast airport usage appears pessimistic as well as inconsistent with projected population growth for the region. While Crystal Airport has seen decline in recent years, my experience over the last 6 to 12 months is activity is steady to slightly increasing. The usage data presented ends in mid 2015. Assuming the economy stays flat or even improves marginally, I believe airport activity will stay flat or increase.

6. The forecast airport usage does not reflect aviation industry training requirements. With the potential of increased training needs, airport activity will be affected.

7. The overall plan I believe negatively impacts desirability and, therefore, will lead to less usage of the airport. If the airport is more desirable, then the possibility of supporting future, additional operators, is greater.

<u>Recommendations:</u>

1. Retain Runway 14R/32L in the current configuration for daylight use.

2. Consider enhancements to runup areas to add surface area and promote ease of use.

3. Revise airport usage information to include data to the most present time and include aviation industry projections.

Thank you for your consideration.

Respectfully,

Jeff Dinsmore

ATP, CFI

Safety and Education Officer, Yankee Flying Club

From: Barb Wiley
To: Crystal LTCP
Subject: Crystal Airport Proposal
Date: Wednesday, October 26, 2016 4:50:05 PM
Attachments: CRYSTAL AIRPORT RUNWAY 32l CLOSURE PROPOSAL.docx

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Thank you for giving us the opportunity to respond to the proposal.

CRYSTAL AIRPORT RUNWAY 32l CLOSURE PROPOSAL

October 26, 2016

We attended a meeting in Brooklyn Park a couple of weeks ago sponsored by the Metropolitan Airports Commission to discuss the closure of runway 32L and 24L at Crystal Airport. We were encouraged to submit in writing our concerns about these proposed runway closures. Additionally, we recently received an email requesting input.

First of all, we are in favor lengthening runway 32R. Our major concern is the removal of an asset that has proven to be invaluable when traffic volume warrants the use of the parallel runways. Frequently you will hear controllers issue instructions for a pilot to change from 32R to the 32L parallel in order to expedite traffic or to provide a safer traffic environment. In addition, the location of downtown Minneapolis and the Twins Ball Park prohibits aviation traffic from routinely extending the pattern to the southeast of Crystal Airport. The purpose of the reliever airport concept, of which Crystal Airport is an important element, is to encourage smaller aircraft to use the reliever system instead of flying into Minneapolis St.Paul International Airport. Historically Crystal has been a heavy training facility. Removal of a runway would seriously jeopardize its primary function as a Twin Cities Reliever Airport and training facility. In accordance with the October, 2016 Airline Pilot Association monthly magazine, the major air carriers including Delta Airlines will require 2.000 pilots in the next year and that number will substantially increase to 23,000 per year in the year 2025 due to mandatory retirements in the airline industry. This applies to the majors only and does not include the regionals. Additionally, this does not include early mandatory medical retirements. Pilots historically prefer to fly out of their home base close to where they grew up. Delta has a base in the Twin Cities and will need multiple twin cities pilots trained at our local facility. If the parallel runway at Crystal is removed, the ability to provide efficient training when the airlines are in desperate need of qualified pilots will be sacrificed.

In addition, the Minneapolis Northwest Corridor Light Rail is projected and funded to pass right by Crystal Airport and will provide transportation to the numerous events and attractions that occur throughout the year in Minneapolis, St.Paul and suburbs. Crystal Airport would be the only reliever airport located next to the popular light rail transportation.

The aviation traffic volume may not be comparable to the volumes during the 1960's – 1970 heydays. However to remove a perfectly functional runway prematurely would certainly indicate the Metropolitan Airports Commission is guilty of using extremely poor judgement.

Sincerely,

WILEY ENTERPRISES, INC.

Bruce Wiley, Crystal RACC and pilot

Barb Wiley, retired Northwest Airlines captain.

Alan Lindquist, retired air traffic controller and former Crystal Tower Manager.

From:	John Krack
To:	Crystal LTCP
Cc:	Bruce Wiley; Glenn Weibel; Schmidt, Gary; Gerads, Kelly; donrosacker; John Renwick; Moynihan,Pat; Peter Dahl; PJMoynihan@msn.com; pksa@mchsi.com; Lebedoff Peilen, Lisa; Wilson, Mike; Harris, Joe; Ralston, Neil; Fuhrmann, Roy
Subject:	Comments on the Crystal Airport LTCP Draft
Date:	Wednesday, October 26, 2016 7:34:39 PM

After listening to comments at several meetings and reviewing the Crystal Airport Long Term Comprehensive Plan, I suggest that MAC seriously consider two changes:

1. Maintain a grass strip in some form

2. Turn the overrun pads at the ends of runway 14L/32R into usable runway with displaced thresholds rather than stopways

Background:

I think we all agree that a major objective is to make the Crystal airport more attractive to potential tenants/subtenants and to transients. For a number of reasons, it has experienced a dramatic decline in based aircraft and operations over the last decade or so, and many of us would like to see that trend reversed and the airport grow. With its close proximity to downtown Minneapolis, its amenities such as the control tower and crosswind runway, and its past activity, it clearly has the potential. A more robust airport would offer economic benefits to the local communities, and additional revenue to the MAC to help support the GA system.

The most economic benefit comes from the higher end of the design spectrum (piston twins, turboprops, and light jets) as these operators would typically use their aircraft for business, and would buy more fuel and patronize local businesses more than would the lower-end recreational operators. However, if the airport were made more attractive to recreational operators, we could expect to see more aircraft base there and add to the operations counts. In addition, more activity would add to the "ambiance" of the airport, and could entice another FBO to set up shop, bringing more services and competition to the airport.

My suggestions are offered with the above commentary in mind.

Grass Strip

I've talked to several tailwheel operators who are passionate about using grass runways whenever possible. They say that landings are easier, particularly in crosswinds, and that the grass is much easier on their tires, particularly the large "tundra" tires. MAC staff says that the usage of the Crystal grass strip has been

low, about 60 operations per month during the months the grass runway is open, but they also acknowledge that the grass runway is very inexpensive to maintain. So why not keep it? The strongest arguments for closing it seem to be to open up space for Thunderbird to expand their ramp, and to reduce potential "hotspots." I see two possibilities to address these objectives:

1. Shorten the runway to, say, 1500 feet, and/or narrow it to, say, 50 feet, which should accommodate most smaller tailwheel aircraft.
2. Move the grass runway to be adjacent (or close) to 6L/24R, and impose a registration requirement for its use. This concept is used in Naples, FL, and requires operators wanting to use the grass to register their aircraft in advance so they can be briefed on the appropriate procedures.

With Forest Lake paving their runway, there might be an incentive for some Forest Lake operators to move to Crystal. In any case, offering a grass runway option would send a "you're welcome here" message to tailwheel operators, and if it can be done at a reasonable cost, it should be.

Runway 14L/32R

Several people have commented at the LTCP meetings that the airport usability and safety would be significantly increased if the 500' overrun pads at each end of runway 14L/32R were converted to usable runway with displaced thresholds for landing to keep aircraft higher over the surrounding neighborhoods. We heard Bruce Wiley note that taking off in his 172 on amphib floats can get dicey on hot days in low headwind conditions. MAC's concerns about inviting larger than intended aircraft are acknowledged, but how significant is this risk compared to the advantages to larger aircraft in the design class (which we want to attract), such as the Cessna 400-series aircraft, of having the additional runway length? The concern that starting the takeoff roll 500 feet closer to houses may be valid, but there's still about 850 feet between the departing aircraft and the adjacent houses. Pre-takeoff runup might be a bigger problem since the noise would be longer in duration, but that could be addressed by encouraging runups prior to the departure end of the runway for larger aircraft.

Further, Table 4-4 (Takeoff Length Requirements) and the subsequent paragraph indicate that 3,600 feet would be the preferred runway length to accommodate all takeoff and landing distance categories, while the recommended option only supports the accelerate-stop distance. Supporting all categories, I would suggest, makes the airport more attractive to more aircraft within the design class, and significantly enhances safety for all users.

If the concerns cited above are deemed to be serious enough to not proceed with opening the full length of the runway, perhaps we could "split the difference" and

use 250 feet at each end for usable runway, with the additional 250 feet as stopway, resulting in a usable runway length of 3768 feet, a major improvement for aircraft in the higher end of the design range, and well above the desired 3600-foot minimum length. In any case, the concept should be included in the Plan as a potential future option should sufficient interest/need arise to justify it.

Finally, there's the concern about the public's possible reaction to the potential of larger aircraft and more noise from a longer runway. I attended both the Crystal and Brooklyn Park public meetings, and heard no concern about this issue. I also heard anecdotally that at a meeting with the Crystal city council, at least three members seemed to support a longer runway. This may be because the right people weren't there, or because the extension wasn't considered an option, but I would suggest it be recommended in the Plan and see what kind of feedback ensues. If a strong enough case is made against it, it can always be removed, but at least we'll have vetted the subject.

Certainly cost is a factor, but in my opinion, reasonable investment in infrastructure to encourage the future growth of the airport sends a strong message to the aviation community that MAC is behind this airport and is serious about facilitating its growth. I believe that supporting these two changes to the LTCP would go a long way to encouraging more operators to use this airport, and to demonstrate MAC's proactive support.

I hope you'll give these suggestions some serious thought, and look forward to the next version of the Crystal LTCP.

Thanks and Regards,

John Krack
Chair, Reliever Airports Advisory Council

From: Bryan Sieve
To: Crystal LTCP
Subject: Crystal Airport 2035 Long Term LTCP
Date: Wednesday, October 26, 2016 7:37:12 PM

I attended the Crystal Airport 2035 Long Term Comprehensive Plan (LTCP) public informational meeting held on 9/29/16 at the Brooklyn Park with great interest.

As background, I am responding on behalf of Odyssey Entertainment, Inc. a Maple Grove based business that owns a larger hanger near Thunderbird Aviation on the east side of the filed that supports its well equipped Cessna turbo Cardinal RG aircraft. Odyssey's business model requires it to travel frequently to many small cities spanning from West Virginia to Western North Dakota and many points in between not served by scheduled air carriers, often on short notice. Odyssey's growing business requires a larger hanger to handle aircraft and employees and in 2014 after a long search was successful in acquiring a hanger that met its needs.

While Crystal Airport is convenient and has good access from our Maple Grove offices, the airport is sufficiently lacking in several areas that we believe constrains its highest and best usefulness as a reliever airport supporting GA operations. Those deficiencies include:

- Short Runways to safely support higher performance longer range aircraft that businesses such as ours often use;
- Lack of instrument approach options to support reliable arrival dependency:
  - NO instrument approach to Runway 32. Not even a non-precision GPS approach;
  - Lack of precision approaches. WAAS LPV for both Rwys 14 and Rwys 32 would be extremely useful especially in the darker and cloudier late fall / winter / early spring months that often require arrival instrument approaches;
- Embarrassingly, marginal, deficient and limited ground support services and facilities available:
  - Only one monopolistic FBO on the field;
  - Marginal aircraft, guest and pilot services;
- Limited ramp space for larger aircraft. The small ramp in front of the only FBO quickly becomes congested with larger aircraft which then backs up aircraft into the taxiways in and round the FBO and often in between the taxi hangers including ours;
  - Limited fuel Options:
    - NO self serve fuel currently offered on the filed. Fuel only available during regular business hours;
    - There is only option for fuel on the field with means mean lack of competition for availability and high prices. Not surprisingly, average fuel prices are some of the most expensive in the MAC reliever airport system. Many aircraft avoid the field for this fact alone.

What Crystal Airport has going for it is it's the most convenient airport to DT Minneapolis and is next door to many prominent west Metro businesses that would likely use the airport if the deficiencies identified above were addressed. Also, inbound transient business aircraft would increase use of the Crystal Airport too. Case in point late last week we met a small business owner from Atlanta GA who flew in for a business meeting and ended up needing some assistance after hours. This gentleman

arrived earlier that day in his Twin Rockwell Commander (N680RR) to meet with his client Artic Cat corporate in DT Minneapolis. When I asked him why he chose Crystal Airport he replied due to its close proximity to DT Minneapolis and the fact it was a VFR arrival that day. I asked him if he had ever been to Crystal Airport before and he said no. I then asked him what he thought of the airport and if it met his needs. He responded how surprised he was how marginal the services available were for a busy metro airport. I then asked if he'd ever return and he said unlikely, and definitely not in IFR conditions since the runway was "a little short" for his Twin Commanders' 8,000lb weight and his taste.

For our purposes, at some point we would like to upgrade to a higher performance turboprop aircraft that offers better all weather capabilities and performance but are hesitant to do so due for the following reasons:

- Crystal's marginal runway length. These aircraft cross the threshold a some 20kts faster than our current aircraft which lowers the margin for error, especially in instrument arrival conditions and low traction conditions such as in the winter;
- Lack of and instrument approach to Runway 32. Rwy 32 is often the prevailing wind option during the darker and cloudier winter months and has no published instrument approach of its own. The only access to Rwy 32 in instrument conditions is to use a non-precision Rwy 14 approach and circle to land on Runway 32. This is a risky and dangerous approach especially at night which is why many pilots won't fly them and most commercial flight operations prohibit them. This limits arrival dependability to the airport;
- Limited FBO support for these types of aircraft.

In conclusion, we believe the Crystal Airport has basic merits to be an attractive reliever airport if the deficiencies identified above are addressed. We believe many of the recommendations identified in the LTCP would go along way in reducing or eliminating the problems currently plaguing the Airport. Crystal has an excellent location, one of the best and most accessible in the metro area especially for Northwest Metro based businesses like ours that depends on GA aircraft to support its businesses. If the recommendations identified above are adopted we believe the airport can better and safely support higher performance aircraft that will in turn attract more transient aircraft, business aircraft and base aircraft to the field. As activity increases (reversing the current negative trend) then so will demand for aircraft and business support services which will likely have the beneficial causal effect of attracting additional badly needed, aircraft support businesses and jobs.

Sincerely,
Bryan Sieve
VP Finance & Business Development
Odyssey Entertainment, Inc.
Maple Grove, MN
ph. 763-746-0228 ext. 443
email: bsieve@odysseytheatres.com

From: Keith Ulstad
To: Crystal LTCP
Subject: Comment on Crystal Airport Long Term Capital Plan
Date: Wednesday, October 26, 2016 9:00:12 PM

Please reconsider the decision to close the last grass runway in the MAC system. It will be a loss for Crystal airport, a loss for the MAC and a big loss for tailwheel pilots based there or transiting through.

> Crystal airport contains the ONLY grass runway left in the MAC Reliever system. The current MAC Long Term Capital Plan proposal is to close it. The main argument to do so is to eliminate incursion "hot-spots" and to provide expansion room for the one remaining FBO on the field.

I'm not sure how Thunderbird (the one remaining operator at KMIC) feels about the need for expansion space, but with four closed former FBOs on the field, that type of real estate is hardly at a premium.

> As for eliminating incursion friction points, tail-wheel pilots cherish the grass runway, both to learn their technique when transitioning to "conventional gear" , and to use as a "safe-harbor" when the winds are strong and/or gusty, no matter how experienced they are. When the wind make the grass runway an option, every tail-dragger pilot I know that is based on the field will opt for it every time. I can't quote statistics to back this claim, but I suspect that today's tail-wheel pilot population is generally more experienced, higher-time, and more situationally aware than the average. I'm sure that they (we) can still cause runway incursions, but with a tower and ground control on the field, the exposure is manageable. I hope this issue can be explored more fully, and all options considered before an irreversible decision is made.

Thank you
Keith Ulstad.

Sent from my iPhone

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WRITTEN PUBLIC COMMENTS RECEIVED DURING THE SECOND ROUND PUBLIC COMMENT PERIOD

(MARCH 15 – APRIL 14, 2017)

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From: john roder [mailto:johnroder1@yahoo.com]
Sent: Wednesday, March 15, 2017 11:58 AM
To: Ralston, Neil <Neil.Ralston@mspmac.org>
Subject: Re: Follow-Up from Crystal Airport Long-Term Comprehensive Plan (LTCP) Briefing (3/15/17 Update)

Neil:

It's a little late for my comment, but it's perhaps a small change. I think that alignment from the area near the MAC north airport maintenance building that's proposed should be looked at. Persons unfamiliar with the airport can, and often do, drive down taxiways. My concern is that the transition from Zane Avenue to the beginning of the runway is basically a straight shot with just one 45 turn in there and a couple small signs to get a driver to realize they should not be driving there. I think there needs to be some break in there so, even if someone does drive to the wrong place, they aren't apt to drive into the landing zone.

Hope it helps!

John Roder
6200 Zane Avenue North
Minneapolis, MN 55429

612-325-2500 main
612-326-4374 (desk)
612-805-5747 (cell) - best way to reach me.

Cambridge, Shelly

From: Warren <warrenbatzlaff@gmail.com>
Sent: Sunday, March 19, 2017 2:47 PM
To: Crystal LTCP
Subject: Kmic- ltcp

Follow Up Flag: Follow up
Flag Status: Completed

I support the refined airport plan. It increases safety by providing for more takeoff run. It maintains the grass runway for safer operations of conventional (tail wheel) aircraft. Maintaining the airport for operations that already exist, are important for general aviation.
Sent from my iPad

From: RICHARD L JOHNSON [mailto:richielj40@msn.com]
Sent: Wednesday, March 29, 2017 10:58 AM
To: Ralston, Neil <Neil.Ralston@mspmac.org>
Subject: Re: Follow-Up from Crystal Airport Long-Term Comprehensive Plan (LTCP) Briefing (3/29/17 Update)

Good morning Neil.

Just received your email notice. A question that has been in the back of my mind to ask either you or Mike Wilson is regarding this Long term Project for Crystal Airport. While it is billed as the "long term project", it does have some specific near term recommendations for the airport: Namely closing 32 L runway, shortening the sod 6R runway, and lengthening 32R runway.

Projects like this have to have a beginning, and I am wondering how or where the beginning of this project originated. Was it one person--a director and I would imagine if so it started fairly high up the chain of command, or was it some mandate, was it a budgeting restriction--but if this reduces costs then it is hard to imagine the cost necessary to close the runway and extend the other one. Just asking as it has been pressing on my mind as to how or who started this ball rolling down hill.

I happen to own an in ground pool in my back yard. It was built in 1984 when my kids were young. They now have families of their own and grand kids come over to enjoy the pool. A pilot friend of mine who is in real estate said to me once I should close down my pool and fill in the hole with a bulldozer. That might sound like a good idea except for when I inquired about the cost, which would be as much as I paid for the pool initially. To keep it open costs a few dollars each year but it is a fraction of one percent of the cost of getting rid of the pool.

This analogy strikes me in the same way as closing the one runway at Crystal. Oh sure we have heard the concerns about safety from the FAA, but as many have said we have operated safely in that environment when traffic at KMIC was triple what it is now.

Dick Johnson
Tenant
763-473-2939H
612-859-8458C
richielj40@msn.com

Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan
Refined Preferred Alternative

Supplemental Public Information Meeting:
Odyssey Academy, Brooklyn Center, Thursday, March 30, 2017 (5-7pm)

The Metropolitan Airports Commission (MAC) is seeking public input about its Refined Preferred Alternative for the Draft 2035 Long-Term Comprehensive Plan (LTCP) for the Crystal Airport.

Written comments can be provided:
1] On this form and left in the comment boxes at the public meeting;
2] Via email to the following address: Crystal-Airport-LTCP-Comments@mspmac.org or;
3] Via mail to: Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Written comments will be accepted until Friday, April 14th at 5:00 pm. All written comments received will become part of the project record.

Name: UNKNOWN

Address:

SHRUB CUTTING IN NE CORNER REDUCED BUFFER AND RESULTED IN CLEAR VIEW OF AIRPORT – CAN ANYTHING BE DONE TO REPLACE THE SHRUBBERY

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan
Refined Preferred Alternative

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3] Via mail to: Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Written comments will be accepted until Friday, April 14th at 5:00 pm. All written comments received will become part of the project record.

Name: Dean Schwarz

Address: 5656 Kyles Avenue North

Good Plan, good compromise, good Logic

We like the airport and want it to stay.

Please use the back side of this form for additional comments.

More information about the plan can be found at: http://metroairports.org/General-Aviation/Airports/Crystal.aspx

Public Comment Form

DRAFT Crystal Airport 2035 Long-Term Comprehensive Plan
Refined Preferred Alternative

Supplemental Public Information Meeting:
Odyssey Academy, Brooklyn Center, Thursday, March 30, 2017 (5-7pm)

The Metropolitan Airports Commission (MAC) is seeking public input about its Refined Preferred Alternative for the Draft 2035 Long-Term Comprehensive Plan (LTCP) for the Crystal Airport.

Written comments can be provided:
1] On this form and left in the comment boxes at the public meeting;
2] Via email to the following address: Crystal-Airport-LTCP-Comments@mspmac.org or;
3] Via mail to: Neil Ralston, MAC Airport Development, 6040 28th Avenue South, Minneapolis MN 55450.

Written comments will be accepted until Friday, April 14th at 5:00 pm. All written comments received will become part of the project record.

Name: Dan B.

Address: 5300 62 Ave N.

Why does the airport resemble a war zone?

Please use the back side of this form for additional comments.

More information about the plan can be found at: http:/metroairports.org/General-Aviation/Airports/Crystal.aspx

Cambridge, Shelly

From: Eli Wolter <eli@wolterweb.com>
Sent: Thursday, March 30, 2017 8:47 PM
To: Crystal LTCP
Subject: Crystal Airport LTCP Revision

Follow Up Flag: Follow up
Flag Status: Completed

I am a northwest metro resident and Crystal based pilot.

I wanted to share comments regarding the updated Crystal Airport Draft LTCP.

Over the past several months, it has been apparent that MAC staff has undertaken considerable effort to collect feedback about the LCTP from airport users and the community.

The information contained in the revised LTCP draft demonstrates that the MAC has made an effort to respond to collected feedback and revise the plan to better reflect the best interests of airport users and the surrounding communities.

I believe that all of the changes to the draft LTCP are positive and will improve the airport. The lengthening of the primary runway will increase safety, a RNAV approach to 32 will improve safety as well as utility of the airport, retaining the only turf runway in the metro area will be a nice feature for flight training as well as taildragger operations, and the changes to taxiway configuration to meet FAA standards will also likely increase safety.

The south parallel runway is a benefit to the airport for peak capacity, keeping the airport open during snow removal operations, keeping the airport open during runway maintenance, and traffic pattern safety. This runway would also be of significant future benefit should the average daily operations of the airport increase. I also understand that based on study, the current number of average daily operations can be served without the parallel, and do understand that continuing to maintain the south parallel runway may not be the best use of MAC funds, especially when there are other initiatives at Crystal Airport that likely could be funded.

Thank you for the informational meetings, materials, your willingness to listen and respond to comments as well as to modify the draft LCTP to reflect positive changes for the airport.

Thank you,
- Eli WOlter

Cambridge, Shelly

From: Warren <warrenbatzlaff@gmail.com>
Sent: Friday, April 07, 2017 7:15 AM
To: Crystal LTCP
Subject: Kmic ltcp

Follow Up Flag: Follow up
Flag Status: Completed

I support the refinements to the Kmic plan. Single engine aircraft cost to run and contribution to the economy is about $300.00 to $500.00 per hour of operation. Twin engine is significantly higher.
Training,insurance,taxes,storage,maintenance,overhaul,routine engine and airframe upgrades, avionics and radio maintenance and upgrades all contribute to these hourly operation costs. There are a significant number of conventional aircraft (taildraggers),about 29 based at Kmic. Grass runways afford greater safety for these types of aircraft: antique, WWII,cubs,Supercubs,Stinson,citrabria,T6 Texans,decathalon, husky,aerobatic aircraft. The wider footprint of the grass runway affords greater safety in mitigating crosswind landings by having the option of landing at a slight angle to decrease a 50 degree crosswind, to something less than that, which affords more safety when the wind direction favors neither runway.
GA therefore has a significant impact on the economy.
The mission of the airport should be to continue to support the types of aircraft that are already based there.
Thank you.
Sent from my iPad

Cambridge, Shelly

From: Bob and Linda MEISCH <themeischs1@msn.com>
Sent: Tuesday, April 11, 2017 7:22 PM
To: Crystal LTCP
Subject: The refined KMIC plan

Follow Up Flag: Follow up
Flag Status: Completed

Dear MAC,
Thank you for considering the suggestions of the Crystal Airport tenants and pilots. The plan which eliminates runways 14R-32L can be justified from a federal funding position, although it will be an expensive inconvenience for us users. That has been repeatedly discussed and appears to be a closed topic. However the shortening of the grass runway to reduce hotspots is still arguable. There have been no accidents at MIC due to runway incursions. Adding more runways at MSP certainly has increased the mathematical likelihood of a collision but that did not prevent the runways from being built.

At the meeting at MSP in February it appeared that about a half a billion dollars will be spent on many things that mostly consider people comfort and revenue generating. At Crystal Airport the only thing that seems to get reported is what was removed. Lots of money was spent removing the massive Shamrock ramp and the helicopter flight hanger. As of today there is no self service gas, no windsock, and of course no bathroom on the west side. The earth is getting pretty yellow between the hangers.
I see no justifiable reason a few comparable dollars can't be spent on the basic necessities of a metropolitan tower controlled Airport. If you are really serious about keeping MIC viable it needs to be more than just an overflow storage lot in the MAC system. Please do something to promote Crystal Airport to attract some revenue generating tenants.

Sincerely,
Bob Meisch
Tenant and 50 pilot

Sent from my iPad

Cambridge, Shelly

From: John Breitinger <john@headwaters-aero.com>
Sent: Thursday, April 13, 2017 1:59 PM
To: Crystal LTCP
Subject: Comments re: Crystal Airport LTCP

Follow Up Flag: Follow up
Flag Status: Completed

I am a 20 year tenant of the airport. My partners and I operate tailwheel airplanes and one of the reasons we use KMIC is the sod runway. It is a valuable training ground for tailwheel proficiency and it is much easier on the tundra tires that we use than the asphalt. It is one of the very few remaining grass strips in the metro area and is an asset to the field. Please keep it open.

John Breitinger
john@headwaters-aero.com
(612) 867-2512

Cambridge, Shelly

From: kaulstad@gmail.com
Sent: Thursday, April 13, 2017 6:24 PM
To: Crystal LTCP
Subject: Comments re: Crystal Airport LTCP

Follow Up Flag: Follow up
Flag Status: Completed

Hello-
My name is Keith Ulstad. I am a private pilot based out of Crystal airport (KMIC). I have been based there for 20 years, and have, in that time owned and flown many different aircraft out of that field, including several "tail-draggers". I currently own a Cessna 180 (tailwheel).
I use the sod runway whenever conditions (ground and wind direction) will allow it. It adds a margin of safety and a BIG margin of comfort when the winds are strong, gusty and/or varying in direction.
I and many others in the tailwheel fraternity sincerely appreciate the efforts that MAC Planners have made to keep the sod open (albeit shortened). It's importance as a :

- Safety aid
- Training/transitioning tool
- Fun and (sadly) increasingly unique experience

should not be underestimated. Forest Lake is now paved, Winsted is on the docket to be paved, and soon there will be no grass runways left within reasonable flying distance of the metro area for pilots to learn and hone those skills.

Thanks again for your efforts. I sincerely hope that you are successful in maintaining a grass runway at Crystal Airport.

Keith Ulstad
612.325-8486

Sent from Mail for Windows 10

Cambridge, Shelly

From: Jacob Teske <jteske@thunderbirdaviation.com>
Sent: Friday, April 14, 2017 9:12 AM
To: Crystal LTCP
Cc: Wilson, Mike; Ralston, Neil
Subject: [Potential spam] Comments re: Crystal Airport LTCP
Attachments: MIC MAC LTCP Addendum TBA Response.docx

Please find Thunderbird Aviation's response attached.

Jacob Teske
Operations Manager
Thunderbird Aviation, Inc.
Phone: 763.533.4162 | Fax: 763.971.0116
5800 Crystal Airport Road | Crystal MN 55429
jteske@thunderbirdaviation.com

Metropolitan Airports Commission

RE: Crystal Airport Draft 2035 Long-Term Comprehensive Plan (Refined Preferred Alternative Addendum March 15, 2017)

Dear Mr. Neil Ralston:

I am writing in response to your latest revision of the Metropolitan Airports Commission's Crystal Airport Draft 2035 LTCP on behalf of Thunderbird Aviation, Inc.

It is our belief that the extension of runway 14R-32L will accommodate and entice a more diverse group of transient aircraft and more frequent transient operations, while maintaining a suitable and safe environment for our flight training program.

The retention of runway 6R-24L will allow Thunderbird Aviation to continue with its soft-field training in the metro area, making it a valuable asset for our flight school.

We believe it would be beneficial to introduce service roads to your future plans, considerably reducing tower and GSE work load, and runway incursions.

Provided serious consideration is taken into the addition of service roads, the latest addendum to the LTCP adequately takes into account the current and future operations at Thunderbird Aviation and Crystal Airport's operations as a whole.

For the above reasons, Thunderbird Aviation approves of the current changes proposed in the Refined Preferred Alternative Addendum for Crystal Airport.

Sincerely,

Jake Teske

Operations Manager – Thunderbird Aviation

Cambridge, Shelly

From: Drew Johnson <Drew@oppidan.com>
Sent: Friday, April 14, 2017 10:52 AM
To: Crystal LTCP
Subject: Comments re: Crystal Airport LTCP

Follow Up Flag: Follow up
Flag Status: Completed

I am pilot and hanger owner at KMIC. This email is to respond to the updated comments from the Draft 2035 long-term plan for KMIC.

I am strongly voicing my support for the sod runway to remain open in its present condition at KMIC.

With the recent paving of Forest Lake, the metro area is losing sod options that are important for training and maintaining tailwheel proficiency.

Sincrerely,
-Drew

Drew Johnson
Oppidan Investment Company
400 Water Street, Suite 200
Excelsior, MN 55331
D: 952-540-4180
C: 612-554-1897
F: 952-294-0151

Cambridge, Shelly

From: Patrick Fox <patrick@patrickfox.com>
Sent: Friday, April 14, 2017 3:27 PM
To: Crystal LTCP
Subject: Comments re: Crystal Airport LTCP

Follow Up Flag: Follow up
Flag Status: Completed

I think that it is very important to keep the sod runway open at the Crystal Airport. It is the only grass asset in the MAC system and is very

important for safety with the tail dragger community and for training student pilots. I use it often and the existence was one reason that I chose to purchase a hangar at Crystal.

Respectfully,

—Patrick Fox

PATRICK
FOX
www.patrickfox.com | STUDIO: 612.840.0234 | CELL: 612.810.2060

Cambridge, Shelly

From: Chris Glaeser <chris.glaeser@gmail.com>
Sent: Friday, April 14, 2017 6:09 PM
To: Crystal LTCP
Subject: Comments re: Crystal Airport LTCP

Follow Up Flag: Follow up
Flag Status: Completed

I would like to first commend Neil Ralston, Mike Wilson, and their entire team for their very responsive and through public coordination in a very open process discussing the Crystal Airport 2035 Long Term Comprehensive Plan.

Overall, the plan is well conceived and I strongly support the shifting and lengthening of runway 32R. I would like to make a few recommendations:

1. I understand a request has been made to the FAA to implement a RNAV (GPS) approach to 32R. This is the #1 most important safety and operational improvement that can be made to Crystal Airport for a number of reasons, and must be considered an immediate priority. These safety improvements include:

a. It will eliminate the need to circle from current approaches to 14R. Circling is well known to be a high risk maneuver, especially with low ceilings and poor visibility (including at night). This also reduces the risk to the neighbors living near Crystal Airport.

b. It will eliminate a lot of low altitude maneuvering over the residential neighborhoods surrounding Crystal Airport, enhancing the quality of life for the airport's neighbors.

c. During the winter of 2016-2017, there were many NOTAMs posted prohibiting circling to runway 32R at night. This made it impossible to arrive after dark when the weather was below or near VFR minimums, aggravated by the early sunsets during the winter.

d. Crystal Airport supports many instrument training flights. When the winds are out of the north, the lack of a published instrument approach forces local aircraft to fly to other airports.

e. The implementation of this RNAV (GPS) approach may be made at little or no cost to the MAC.

f. Circling allows pilots considerable variability in maneuvering, and is a very challenging maneuver. Eliminating the need to circle will provide greater predictability for air traffic control purposes.

g. This RNAV (GPS) approach is the biggest potential improvement in operational safety at Crystal Airport. Therefore, the MAC should aggressively pursue the implementation of this approach to the lowest possible minimums in the near future.

2. The latest plan shows enlarged runup areas runup areas at the North and South taxiways on the Northeast side of the shifted runway 32(R). This is a good improvement and an important addition that will allow enhanced access to the single runway 32(R). The MAC should ensure that these runway areas are designed so that 2-3 aircraft can simultaneously use these areas, while allowing another aircraft unblocked access to the runway. Consideration should be giving to mirroring these runup areas on the west side of runway 32(R) when the parallel runway has been removed.

I appreciate the opportunity to make these comments and sincerely appreciate the efforts of the MAC to implement these improvements to Crystal Airport.

Sincerely

Chris Glaeser

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Metropolitan Airports Commission
Airport Development, Environment, and Reliever Departments
6040 28th Avenue South • Minneapolis, MN 55450
MetroAirports.org