Appendix One
Glossary of Common Terms and Acronyms

Air Carrier - A commercial airline with published schedules operating at least five round trips per week.

Air Taxi – An aircraft certificated for commercial service available for hire on demand.

Airport Reference Code – An FAA design criteria based upon the approach speed (represented by a letter) and wing span (represented by a roman numeral) of an aircraft which produces a minimum annual 500 operations per year at an airport.

ALP - Airport Layout Plan – The official, FAA approved map of an airport's facilities.

ALS – Approach Lighting System - Radiating light beams guiding pilots to the extended centerline of the runway on final approach and landing.

AMSL - Above mean sea level. The elevation of an object above sea level.

Approach Lights – High intensity lights located along the approach path at the end of an instrument runway. Approach lights aid the pilot as he transitions from instrument flight conditions to visual conditions at the end of an instrument approach.

APU - Auxiliary Power Unit – A self-contained generator in aircraft producing power for ground operation and for starting the engines.

Arrival – The act of landing at an airport.

Arrival Procedure - A series of directions from air traffic control, using fixes and procedures, to guide an aircraft from the enroute environment to an airport for landing.

Arrival Stream – A flow of aircraft that are following similar arrival procedures.

ARFF – Aircraft Rescue and Firefighting facility.

ARTCC – Air Route Traffic Control Center - A facility providing air traffic control to aircraft on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

ATC - Air Traffic Control - The control of aircraft traffic, in the vicinity of airports from control towers, and in the airways between airports from control centers.

ATCT – Airport Traffic Control Tower - A central operations tower in the terminal air traffic control system with an associated IFR room if radar equipped, using air/ground communications and/or radar, visual signaling and other devices to provide safe, expeditious movement of air traffic.

Avionics – Airborne navigation, communications, and data display equipment required for operation under specific air traffic control procedures.

Altitude MSL –Aircraft altitude measured in feet above mean sea level.

ASE – Three letter designator for the Aspen/Pitkin County Airport.

Base Leg – A flight path at right angles to the landing runway. The base leg normally extends from the downwind leg to the intersection of the extended runway centerline.

Center – See ARTCC.

Commuter Airline – Operator of small aircraft (maximum size of 30 seats) performing scheduled service between two or more points.

Decibel (dB) - In sound, decibels measure a scale from the threshold of human hearing, 0 dB, upward towards the threshold of pain, about 120-140 dB.

Because decibels are such a small measure, they are computed logarithmically and cannot be added arithmetically. An increase of ten dB is generally perceived by human ears as a doubling of noise.

dBA - A-weighted decibels adjust sound pressure towards the frequency range of human hearing.

dBC - C-weighted decibels adjust sound pressure towards the low frequency end of the spectrum. Although less consistent with human hearing than A-weighting, dBC can be used to consider the impacts of certain low frequency operations.

Decision Height – The height at which a decision must be made during an instrument approach either to continue the approach or to execute a missed approach.

Departure – The act of an aircraft taking off from an airport.

Departure Procedure – A published IFR departure procedure describing specific criteria for climb, routing, and communications for a specific runway at an airport.

Displaced Threshold – A threshold that is located at a point on the runway other than the physical beginning. Aircraft can begin departure roll before the threshold, but cannot land before it.

DME - Distance Measuring Equipment - Equipment used to measure, in nautical miles, the distance of an aircraft from the DME navigational aid located on the airport.

DNL - Day/night noise level - The daily average noise metric in which that noise occurring between 10:00 p.m. and 7:00 a.m. is penalized by 10 db. DNL is often expressed as annual average noise levels.

DNL Contour - The "map" of noise exposure around an airport. A contour is computed through a FAA model called the Integrated Noise Model (INM), which calculates the annual noise exposure.

FAA defines significant noise exposure as any area within the 65dB DNL contour; that is the area within an annual average noise exposure of 65 decibels or higher.

Downwind Leg – A flight path parallel to the landing runway in the direction opposite the landing direction.

Duration - The length of time in seconds that a noise event lasts. Duration is usually measured in time above a specific noise threshold.

Enroute – The portion of a flight between departure and arrival terminal areas.

ESID – East Side Infrastructure Development.

FAA - The Federal Aviation Administration is the agency responsible for aircraft safety, movement and controls.

FAR – Federal Aviation Regulations are the rules and regulations, which govern the operation of aircraft, airways, and airmen.

FAR Part 150 – A Federal Aviation Regulation governing noise and land use compatibility studies and programs.

FAR Part 161 – A Federal Aviation Regulation governing the ability of airports to implement restrictions based on noise.

FBO – Fixed Based Operator. A facility on the field providing various services for aircraft such as maintenance, fuel, storage, etc.

Fix – A geographical position determined by visual references to the surface, by reference to one or more Navaids, or by other navigational methods.

Fleet Mix – The mix or differing aircraft types operated at a particular airport or by an airline.

Flight Plan – Specific information related to the intended flight of an aircraft. A flight plan is filed with a Flight Service Station or Air Traffic Control facility.

GA - General Aviation – Civil aviation excluding air carriers, commercial operators and military aircraft.

Glide Slope – Generally a 3-degree angle of approach to a runway established by means of airborne instruments during instrument approaches, or visual ground aids for the visual portion of an instrument approach and landing.

GPS - Global Positioning System – A satellite based radio positioning, navigation, and time-transfer system.

GPU - Ground Power Unit – A source of power, generally from the terminals, for aircraft to use while their engines are off.

Ground Track – is the seeming path an aircraft would follow on the ground if its airborne flight path were plotted on the terrain.

High Speed Exit Taxiway – A taxiway designed and provided with lighting or marking to define the path of aircraft traveling at high speed from the runway center to a point on the center of the taxiway.

IFR - Instrument Flight Rules - Rules and regulations established by the FAA to govern flight under conditions in which flight by visual reference is not safe.

ILS - Instrument Landing System – A precision instrument approach system which normally consists of a localizer, glide slope, outer marker, middle marker, and approach lights.

IMC – Instrument Meteorological Conditions - Weather conditions expressed in terms of visibility, distance from clouds, and cloud ceilings during which all aircraft are required to operate using instrument flight rules.

Instrument Approach – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Knots – A measure of speed used in aerial navigation. One knot is equal to one nautical mile per hour (1.15 knots = 1 mile).

Load Factor – The percentage of seats occupied in an aircraft.

Lmax – The peak noise level reached by a single aircraft event.

Localizer – A navigational aid that consists of a directional pattern of radio waves modulated by two signals which, when receding with equal intensity, are displayed by compatible airborne equipment as an "on-course" indication, and when received in unequal intensity are displayed as an "off-course" indication.

Middle Marker - A beacon that defines a point along the glide slope of an ILS, normally located at or near the point of decision height.

Missed Approach Procedure – A procedure used to redirect a landing aircraft back around to attempt another landing. This may be due to visual contact not established at authorized minimums or instructions from air traffic control, or for other reasons.

NAS – National Airspace System - The common network of U.S. airspace; air navigation facilities, equipment and services, airports or landing areas; aeronautical charts, information and services; rules, regulations and procedures, technical information, manpower and material.

Nautical Mile – A measure of distance used in air and sea navigation. One nautical mile is equal to the length of one minute of latitude along the earth's equator. The nautical mile was officially set as 6076.115'.

Navaid – Navigational Aid.

NDB – Non-Directional Beacon - Signal that can be read by pilots of aircraft with direction finding equipment. Used to determine bearing and can "home" in or track to or from the desired point.

NEM – Noise Exposure Map – A FAR Part 150 requirement prepared by airports to depict noise contours. NEMs also take into account potential land use changes around airports.

Noise Contour – See DNL Contour.

Non-Precision Approach Procedure – A standard instrument approach procedure in which no electronic glide slope is provided.

Operation – A take-off, landing or overflight of an aircraft. Every flight requires at least two operations, a take-off and landing.

Outer Marker – An ILS navigation facility in the terminal area navigation system located four to seven miles from the runways edge on the extended centerline indicating the beginning of final approach.

Overflight – Aircraft whose flights originate or terminate outside the metropolitan area that transit the airspace without landing.

Preferential Runways - The most desirable runways from a noise abatement perspective to be assigned whenever possible.

Precision Approach Procedure – A standard instrument approach procedure in which an electronic glide slope is provided, such as an ILS. GPS precision approaches may be provided in the future.

Radar Vectoring – Navigational guidance where air traffic controller issues a compass heading to a pilot.

Run-up – A procedure used to test aircraft engines after maintenance to ensure safe operation prior to returning the aircraft to service. The power settings tested range from idle to full power and may vary in duration.

Run-up Locations - Specified areas on the airfield where scheduled run-ups may occur. These locations are sited, so as to reduce noise impacts to surrounding neighborhoods.

Runway – A long strip of land or water used by aircraft to land on or to take off from.

Sequencing Process – Procedure in which air traffic is merged into a single flow, and/or in which adequate separation is maintained between aircraft.

SID - Standard Instrument Departure - An aeronautical chart designed to expedite clearance delivery and to facilitate transition between takeoff and enroute operations.

Single Event – Noise generated by a single aircraft overflight.

SRE – Snow Removal Equipment. Typically, this facility coincides or is adjacent to the ARFF.

STAR – Standard Terminal Arrival Route is a published IFR arrival procedure describing specific criteria for descent, routing, and communications for a specific runway at an airport.

Taxiway – A paved strip that connects runways and terminals providing the ability to move aircraft so they will not interfere with takeoffs or landings.

Terminal Airspace - The air space that is controlled by a TRACON.

Terminal Area – A general term used to describe airspace in which approach control service or airport traffic control service is provided.

TRACON - Terminal Radar Approach Control is an FAA air traffic control service to aircraft arriving and departing or transiting airspace controlled by the facility. TRACONs control IFR and participating VFR flights

TSA – Transportation Security Administration.

Vector – A heading issued to a pilot to provide navigational guidance by radar. Vectors are assigned verbally by FAA air traffic controllers.

VFR – Visual Flight Rules are rules governing procedures for conducting flight under visual meteorological conditions, or weather conditions with a ceiling of 1,000 feet above ground level and visibility of three miles or greater. It is the pilot's responsibility to maintain visual separation, not the air traffic controller's, under VFR.

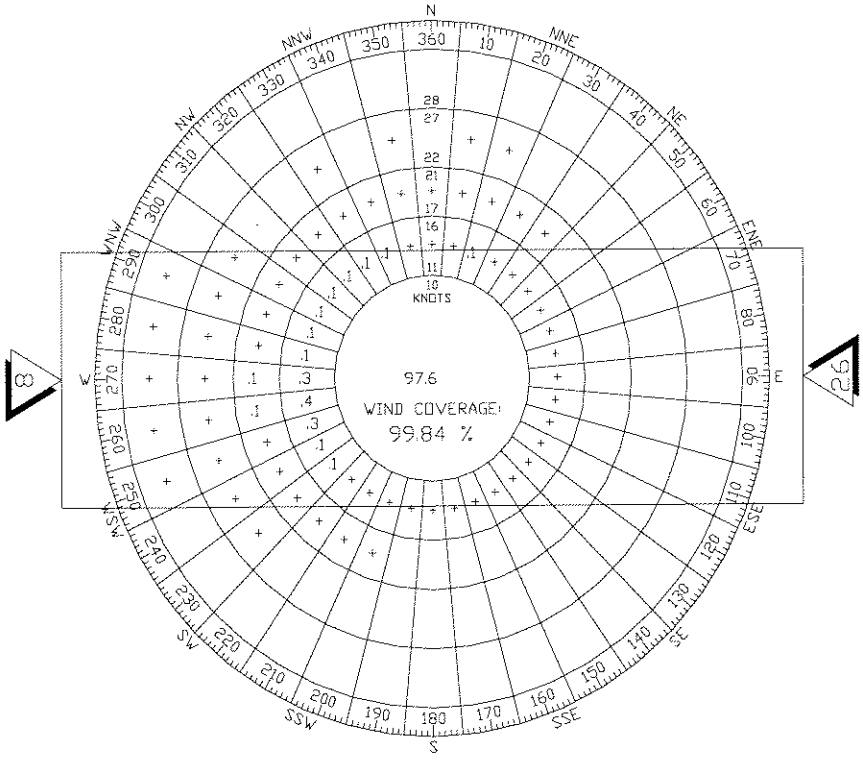
Visual Approach – Wherein an aircraft on an IFR flight plan, operating in VFR conditions under the control of an air traffic facility and having an air traffic control authorization, may proceed to destination airport under VFR.

VASI – Visual Approach Slope Indicator - An airport lighting facility in the terminal area navigation system used primarily under VFR conditions. It provides vertical visual guidance to aircraft during approach and landing, by radiating a pattern of high intensity red and white focused light beams, which indicate to the pilot that he/she is above, on, or below the glide path.

VOR - Very High Frequency Omni-directional Range – A ground based electronic navigation aid transmitting navigation signals for 360 degrees oriented from magnetic north. VOR is the historic basis for navigation in the national airspace system.

Appendix Two
National Center for Atmospheric Research (NCAR) Wind Data

ALL WEATHER WIND ROSE: 13 KNOT CROSSWIND COMPONENT
Boulder Municipal Airport Master Plan Update



Source: National Center for Atmospheric Research (NCAR)
Boulder, Colorado. Period of Record – January 1995-December 2003. Total Observations: 881,431.

BOULDER.TXT
WIND OBSERVATIONS

Boulder Municipal Airport
RUNWAY ORIENTATION: 89.95 89.95 DEGREE
CROSSWIND COMPONENT: 13.00 13.00 KNOTS
TAILWIND COMPONENT: 60.00 60.00 KNOTS
WIND COVERAGE: 99.84 %

	HOURLY OBSERVATIONS OF WIND SPEED (KNOTS)							41	
	0-3	4-6	7-10	11-16	17-21	22-27	28-33	34-40	OVER	TOTAL
DIRECTION										
1	19415	7459	2239	323	13	2	0	0	0	29451
2	18024	6555	2158	471	22	3	0	0	0	27233
3	17495	5593	1568	303	40	0	0	0	0	24999
4	18342	4607	941	112	5	0	0	0	0	24007
5	18587	3540	451	24	0	0	0	0	0	22602
6	18375	2830	204	12	0	0	0	0	0	21421
7	17812	2321	191	14	0	0	0	0	0	20338
8	19300	2484	207	4	0	0	0	0	0	21995
9	19894	2056	188	15	0	0	0	0	0	22153
10	18250	1636	127	6	0	0	0	0	0	20019
11	16689	1585	117	5	0	0	0	0	0	18396
12	16486	2307	144	1	0	0	0	0	0	18938
13	16279	3721	461	24	0	0	0	0	0	20485
14	15552	4884	850	34	0	0	0	0	0	21320
15	14424	4516	868	64	0	0	0	0	0	19872
16	12622	3005	498	36	0	0	0	0	0	16161
17	11044	1946	328	24	0	0	0	0	0	13342
18	10039	1471	268	22	0	0	0	0	0	11800
19	10694	1410	307	30	0	0	0	0	0	12441
20	11692	1856	440	49	4	0	0	0	0	14041
21	12379	2567	734	108	3	0	0	0	0	15791
22	13370	3055	1121	255	9	0	0	0	0	17810
23	15320	4141	1676	471	25	1	0	0	0	21634
24	18022	7223	3656	1145	105	13	0	0	0	30164
25	20780	12023	6874	2680	330	60	1	0	0	42748
26	21538	10754	7120	3634	667	215	14	0	0	43942
27	18748	6223	4852	2673	712	273	14	1	0	33496
28	16470	3822	3015	1166	173	55	9	0	0	24710
29	14580	3172	2530	756	74	7	1	0	0	21120
30	13023	2835	2281	660	30	7	0	0	0	18836
31	11731	2541	2168	779	13	0	0	0	0	17232
32	12093	2193	1796	552	21	0	0	0	0	16655
33	13300	2246	1272	461	11	3	0	0	0	17293
34	14989	3079	1319	467	25	0	0	0	0	19879
35	16567	4357	1289	246	13	2	0	0	0	22474
36	8825	2753	689	103	4	0	0	0	0	12374
0	99999	3367	804	84	5	0	0	0	0	104259
TOTAL:	662749	142133	55751	17813	2304	641	39	1	0	881431

REFERENCE: Appendix 1 of AC 150/5300-13, Airport Design, including Changes 1 through 4.

Appendix Three
Annual Service Volume (ASV) Worksheets

Annual Service Volume
Boulder Municipal Airport

Year	Annual	Peak Month	Average Day of Peak Month	Average Peak Hour	Peak Hour Percent of Peak Month	Daily Demand	Hourly Demand	ASV	
2003	68,262	6,826	220.20	22	10.0%	310.00	10.01	**139,848**	234956.8
2008	68,270	6,827	220.23	22	10.0%	310.00	10.01	**139,865**	234984.3
2013	74,235	7,424	239.47	24	10.0%	310.00	9.98	**181,931**	229223.3
2018	80,721	8,072	260.39	26	10.0%	310.00	10.02	**182,609**	230077.7
2023	87,774	8,777	283.14	28	9.9%	310.00	10.11	**184,382**	232310.7

Hourly Capacity
Boulder Municipal Airport

2003

Weather	Runway - Use	Capacity Figure	Aircraft Mix			Mix Index %(C+3D)	Percent Arrivals	% Touch & Go	Runway Exits		Hourly Capacity Base (C*)	T & G Factor (T)	Exit Factor (E)	Hourly Capacity (C* x T x E)
			% A & B	% C	% D				Location	#				
VFR	8	3.3	99.5	0.5	0	0.5	85	72			104	1.4	0.94	136.864
VFR	26	3.3	99.5	0.5	0	0.5	15	72			104	1.4	0.86	125.216
IFR	8	3.43	50	50	0	50	85	0			56	1	1	56
IFR	26	3.43	50	50	0	50	15	0			56	1	1	56

2008

Runway - Use	Capacity Figure	Aircraft Mix			Mix Index %(C+3D)	Percent Arrivals	% Touch & Go	Runway Exits		Hourly Capacity Base (C*)	T & G Factor (T)	Exit Factor (E)	Hourly Capacity (C* x T x E)
		% A & B	% C	% D				Location	#				
8	3.3	99.5	0.5	0	0.5	85	72			104	1.4	0.94	136.864
26	3.3	99.5	0.5	0	0.5	15	72			104	1.4	0.86	125.216
8	3.43	50	50	0	50	85	0			56	1	1	56
26	3.43	50	50	0	50	15	0			56	1	1	56

2013

Runway - Use	Capacity Figure	Aircraft Mix			Mix Index %(C+3D)	Percent Arrivals	% Touch & Go	Runway Exits		Hourly Capacity Base (C*)	T & G Factor (T)	Exit Factor (E)	Hourly Capacity (C* x T x E)
		% A & B	% C	% D				Location	#				
8	3.3	99.4	0.6	0	0.6	85	71.5			104	1.4	0.92	133.952
26	3.3	99.4	0.6	0	0.6	15	71.5			104	1.4	0.84	122.304
8	3.43	50	50	0	50	85	0			56	1	1	56
26	3.43	50	50	0	50	15	0			56	1	1	56

2018

Runway - Use	Capacity Figure	Aircraft Mix			Mix Index %(C+3D)	Percent Arrivals	% Touch & Go	Runway Exits		Hourly Capacity Base (C*)	T & G Factor (T)	Exit Factor (E)	Hourly Capacity (C* x T x E)
		% A & B	% C	% D				Location	#				
8	3.3	99.3	0.7	0	0.7	85	71			104	1.4	0.92	133.952
26	3.3	99.3	0.7	0	0.7	15	71			104	1.4	0.84	122.304
8	3.43	50	50	0	50	85	0			56	1	1	56
26	3.43	50	50	0	50	15	0			56	1	1	56

2023

Runway - Use	Capacity Figure	Aircraft Mix			Mix Index %(C+3D)	Percent Arrivals	% Touch & Go	Runway Exits		Hourly Capacity Base (C*)	T & G Factor (T)	Exit Factor (E)	Hourly Capacity (C* x T x E)
		% A & B	% C	% D				Location	#				
8	3.3	99.2	0.8	0	0.8	85	70			104	1.4	0.92	133.952
26	3.3	99.2	0.8	0	0.8	15	70			104	1.4	0.84	122.304
8	3.43	50	50	0	50	85	0			56	1	1	56
26	3.43	50	50	0	50	15	0			56	1	1	56

Weighted Hourly Capacity
Boulder Municipal Airport

EXIST	Weather	Runway	Mix Index	Percent of Year (P)	Hourly Capacity(C)	Percent Maximum Capacity	Weighting Factor (W)	P * C * W	P * W	Weighted Hourly Capacity (Cw)
2003	1 VFR	8	0.5	78.71%	136.86	1.00	1	107.73	0.79	**45.07**
	2 VFR	26	0.5	13.89%	125.22	0.91	1	17.39	0.14	
	7 IFR	8	50.0	0.00%	56.00	0.41	4	0.00	0.00	
	8 IFR	26	50.0	0.00%	56.00	0.41	4	0.00	0.00	
	9 IFR	Below Min.	0.0	7.40%	0.00	0.00	25	0.00	1.85	

5yr	Weather	Runway	Mix Index	Percent of Year (P)	Hourly Capacity	Percent Maximum Capacity	Weighting Factor (W)	P * C * W	P * W	Weighted Hourly Capacity (Cw)
2008	1 VFR	8	0.5	78.71%	136.86	1.00	1	107.73	0.79	**45.07**
	2 VFR	26	0.5	13.89%	125.22	0.91	1	17.39	0.14	
	7 IFR	8	50.0	0.00%	56.00	0.41	4	0.00	0.00	
	8 IFR	26	50.0	0.00%	56.00	0.41	4	0.00	0.00	
	9 IFR	Below Min.	0.0	7.40%	0.00	0.00	25	0.00	1.85	

10 yr	Weather	Runway	Mix Index	Percent of Year (P)	Hourly Capacity	Percent Maximum Capacity	Weighting Factor (W)	P * C * W	P * W	Weighted Hourly Capacity (Cw)
2013	1 VFR	8	0.6	78.71%	133.95	1.00	1	105.43	0.79	**58.82**
	2 VFR	26	0.6	13.89%	122.30	0.91	1	16.99	0.14	
	7 IFR	8	50.0	0.00%	56.00	0.42	4	0.00	0.00	
	8 IFR	26	50.0	2.80%	56.00	0.42	4	6.27	0.112	
	9 IFR	Below Min.	0.0	4.60%	0.00	0.00	25	0.00	1.15	

15 yr		Weather	Runway	Mix Index	Percent of Year (P)	Hourly Capacity	Percent Maximum Capacity	Weighting Factor (W)	P * C * W	P * W	Weighted Hourly Capacity (Cw)
2018	1	VFR	8	0.7	78.71%	133.95	1.00	1	105.43	0.79	**58.82**
	2	VFR	26	0.7	13.89%	122.30	0.91	1	16.99	0.14	
	7	IFR	8	50.0	0.00%	56.00	0.42	4	0.00	0.00	
	8	IFR	26	50.0	2.80%	56.00	0.42	4	6.27	0.112	
	9	IFR	Below Min.	0.0	4.60%	0.00	0.00	25	0.00	1.15	

20 yr		Weather	Runway	Mix Index	Percent of Year (P)	Hourly Capacity	Percent Maximum Capacity	Weighting Factor (W)	P * C * W	P * W	Weighted Hourly Capacity (Cw)
2023	1	VFR	8	0.8	78.71%	133.95	1.00	1	105.43	0.79	**58.82**
	2	VFR	26	0.8	13.89%	122.30	0.91	1	16.99	0.14	
	7	IFR	8	50.0	0.00%	56.00	0.42	4	0.00	0.00	
	8	IFR	26	50.0	2.80%	56.00	0.42	4	6.27	0.11	
			Below Min.	0.0	4.60%	0.00	0.00	25	0.00	1.15	

Appendix Four
2003 Pavement Management Plan Summary

Pavement Evaluation

In July, APTech and CDOA inspected the pavements at Boulder Municipal Airport. Pavement conditions were evaluated using the Pavement Condition Index (PCI) procedure – the industry standard in aviation for visually assessing the condition of pavements. During a PCI inspection, inspectors identify signs of deterioration on the surface of the pavement. Pavement defects are characterized in terms of type of distress, severity level of distress, and amount of distress. This information is then used to develop a composite index (PCI number) that represents the overall condition of the pavement in numerical terms, ranging from 0 (failed) to 100 (excellent), as illustrated in figure 3. A network-level sampling rate was used during the inspection, and the sample units inspected are identified on the map shown in figure 1.

Typical Pavement Surface	PCI
	100
	30
	5

Figure 3. Visual representation of PCI scale.

In general terms, pavements above a PCI of 60 that are not exhibiting significant load-related distress will benefit from preventive maintenance actions, such as crack sealing and surface treatments. Pavements with a PCI of 40 to 60 may require major rehabilitation, such as an overlay. Often, when the PCI is less than 40, reconstruction is the only viable alternative due to the substantial damage to the pavement structure. Figure 4 illustrates how the appropriate repair type varies with the PCI of a pavement section.

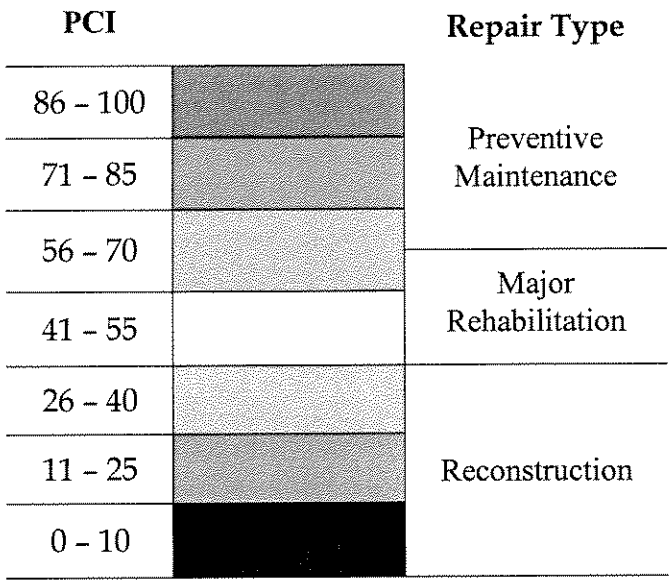


Figure 4. PCI versus repair type.

The types of distress identified during the PCI inspection provide insight into the cause of pavement deterioration. PCI distress types are characterized as load-related (such as alligator cracking, corner breaks, and shattered slabs), climate/durability-related (such as weathering [climate-related] and D-cracking [durability-related]), and other (distress types that cannot be attributed solely to load or climate/durability). Understanding the cause of distress helps in selecting a rehabilitation alternative that corrects the cause and thus eliminates its recurrence.

Appendix A contains tables for asphalt and concrete pavements indicating the typical types of distresses that may be identified during a PCI survey, the likely cause of each distress type, and feasible maintenance strategies for addressing each distress type.

Overall Pavement Condition

The 2003 area-weighted condition of Boulder Municipal Airport is 74, with conditions ranging from 52 to 100 (on a scale of 0 [failed] to 100 [excellent]). Figures 5 and 6 provide graphs summarizing the overall condition of the pavements at Boulder Municipal Airport. Figure 7 is a map that displays the condition of the pavements evaluated. Table 1 summarizes the results of the pavement evaluation.

Appendix B presents photographs taken during the PCI inspection, and Appendix C contains a detailed inspection report. Appendix D summarizes the historic PCI data. A disk with a copy of the Micro PAVER database is attached to the inside of the back cover of this report.

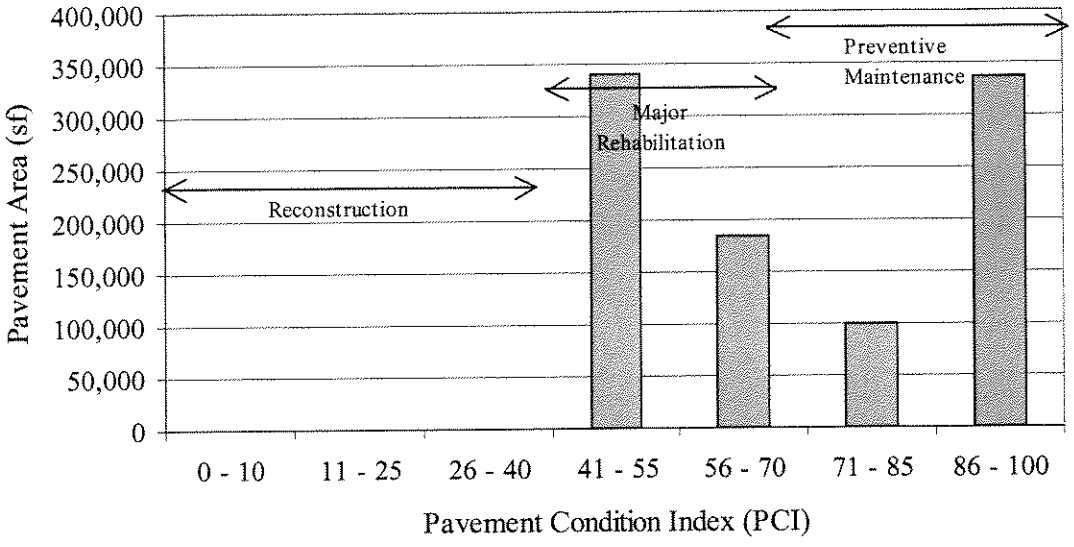


Figure 5. Condition distribution.

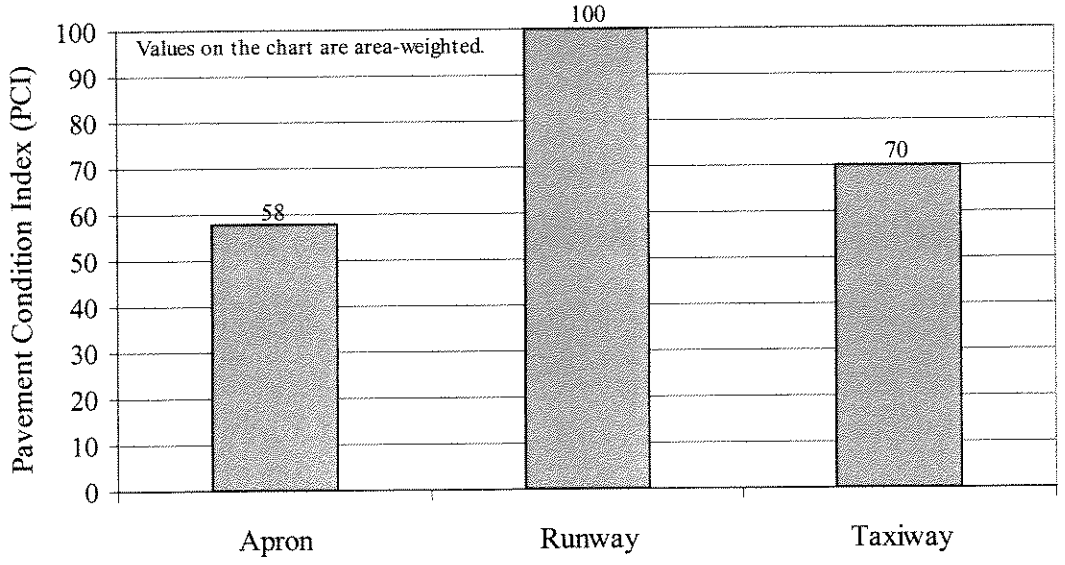
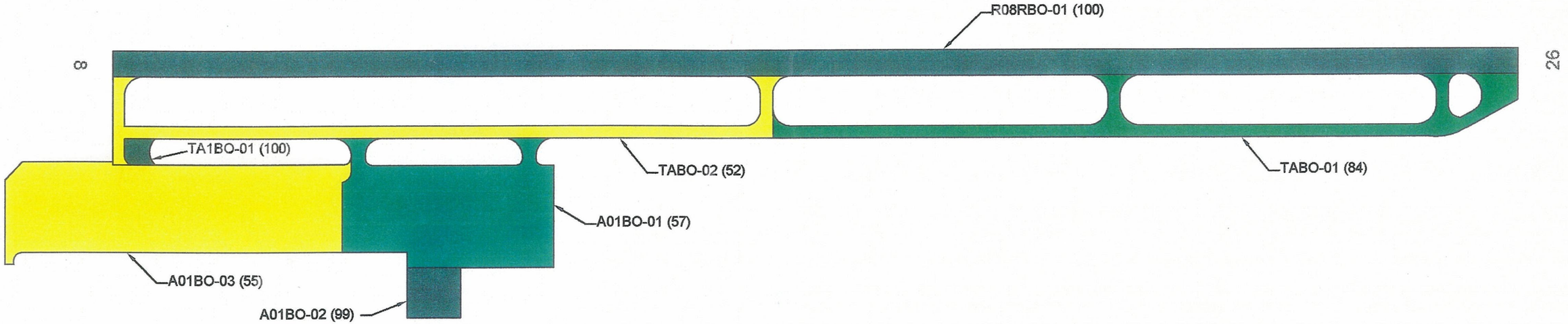
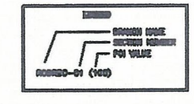
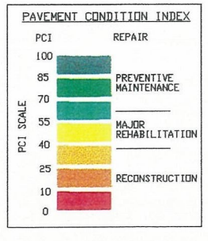


Figure 6. Condition by use.







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AGENCY: DIVISION OF AERONAUTICS
STATE OF COLORADO

LOCATION: Boulder Municipal Airport
Boulder, Colorado

PAGE TITLE: Pavement Condition Index Map

PROJECT DATE:	CREATION DATE:	PROJECT MANAGER:	JOB NUMBER:
April 2000	May 2003	MRB	00-015-AM4
DRAWING SCALE:	LAST MODIFIED DATE:	REVISED BY:	DRAWN BY:
1" = 300'	July 23, 2003	AMR	KAC
FILE NAME:		LAYOUT NAME/NUMBER:	PAGE NUMBER:
Boulder.dwg		PCI	1

Table 1. 2003 pavement inspection results.

BOULDER MUNICIPAL AIRPORT								
BRANCH ID	SECTION ID	SURFACE TYPE [1]	SECTION AREA (sf)	LCD [2]	2003 PCI	% Distress due to:		DISTRESS TYPES [5]
						LOAD [3]	CLIMATE OR DURABILITY [4]	
A01BO	01	AC	185,000	6/3/1989	57	0	97	WEATHERING AND RAVELING, OIL SPILLAGE, BLOCK CRACKING, L & T CRACKING
A01BO	02	AC	23,068	8/1/1996	99	0	0	OIL SPILLAGE, DEPRESSION
A01BO	03	AC	256,670	6/3/1988	55	0	97	BLOCK CRACKING, OIL SPILLAGE, WEATHERING AND RAVELING, DEPRESSION, BLEEDING, L & T CRACKING
R08RBO	01	AAC	308,250	6/1/2001	100	0	0	NO DISTRESSES
TA1BO	01	AC	5,914	6/1/2002	100	0	0	NO DISTRESSES
TABO	01	AC	100,839	11/15/1991	83	0	100	L & T CRACKING, BLEEDING
TABO	02	AC	84,513	6/1/1987	52	0	100	BLOCK CRACKING, L & T CRACKING, WEATHERING AND RAVELING

NOTES:

[1] AC = asphalt cement concrete; AAC = asphalt overlay on AC; PCC = portland cement concrete; APC = asphalt overlay on PCC.

[2] LCD = last construction date.

[3] Distress due to load includes those distresses attributed to a structural deficiency in the pavement, such as alligator (fatigue) cracking, rutting, or shattered concrete slabs.

[4] Distress due to climate or durability includes those distresses attributed to either the aging of the pavement and the effects of the environment (such as weathering and raveling or block cracking in asphalt pavements) or to a materials-related problem (such as durability cracking in a concrete pavement).

[5] L & T CRACKING = longitudinal and transverse cracking.

Pavement Maintenance and Rehabilitation Plan

Based upon the results of the 2003 pavement inspection, a pavement maintenance and rehabilitation plan was developed for Boulder Municipal Airport. Figures 8 and 9 show how the recommendations were determined for asphalt-surfaced and portland cement concrete (PCC) pavements.

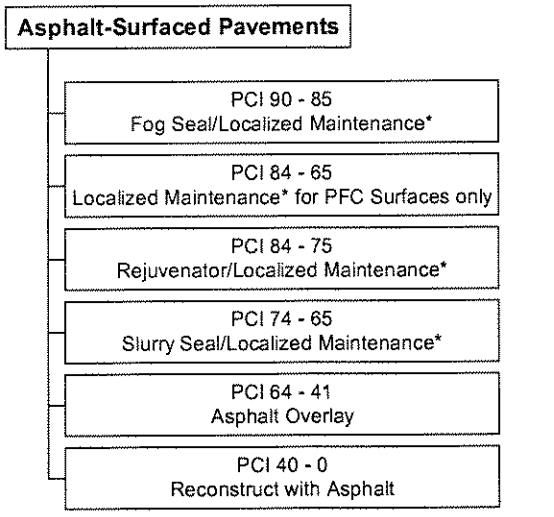


Figure 8. Treatment selection for asphalt-surfaced pavements.

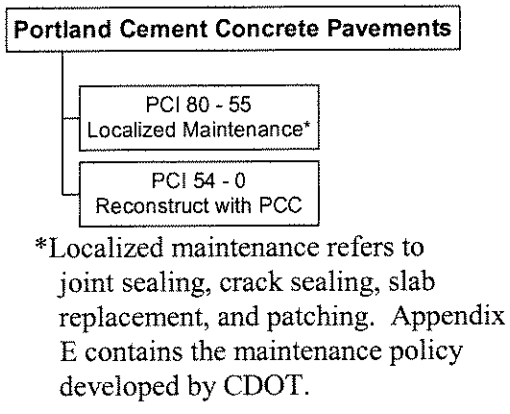


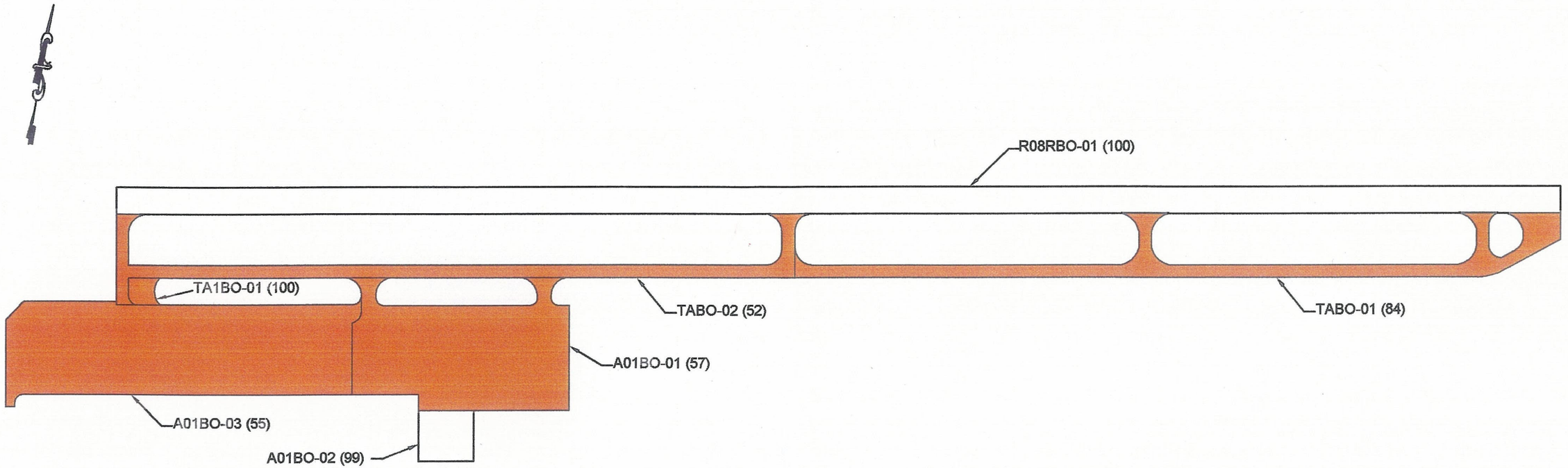
Figure 9. Treatment selection for PCC pavements.

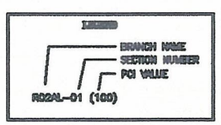
After the treatment had been selected for the pavement section based upon its 2003 PCI value and the criteria listed in figures 8 and 9, its cost was calculated based upon unit cost figures provided by CDOT. These figures are provided in Appendix E. For detailed information on the calculation of the localized maintenance costs, refer to Appendix F.

The recommended work plan was adjusted so that it could be presented in terms of what work needed to be done on each runway, each taxiway system, and each apron rather than breaking it down to the section level shown on the map in figure 1. In other words, if a runway had more than one section only one repair type was recommended for the entire runway rather than separate recommendations for the individual sections comprising the runway. The recommended work plan, based upon the 2003 PCI results, is presented in figure 10 and table 2.

Summary

This report documents the results of the pavement evaluation conducted at Boulder Municipal Airport. During a visual inspection of the pavements in July 2003, it was found that the overall condition of the pavement network is a PCI of 74. The results of the pavement evaluation were used to develop a preliminary work plan for the pavements. It is important to remember that just because work is recommended it does not mean the funding will be available to perform the work.





RECOMMENDED WORK PLAN LEGEND

- Fog Seal with Localized Maintenance
- Localized Maintenance for PFC Surfaces Only
- Rejuvenator with Localized Maintenance
- Slurry Seal with Localized Maintenance
- Portland Cement Concrete Localized Maintenance
- Asphalt Overlay
- Reconstruction

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STATE OF COLORADO

LOCATION: Boulder Municipal Airport
Boulder, Colorado

PAGE TITLE: Recommended Work Plan Map

PROJECT DATE:	CREATION DATE:	PROJECT MANAGER:	JOB NUMBER:
April 2000	May 2003	MRB	00-015-AM4
DRAWING SCALE:	LAST MODIFIED DATE:	REVISED BY:	DRAWN BY:
1" = 300'	November 13, 2003	AMR	KAC
FILENAME:		LAYOUT NAME/NUMBER:	PAGE NUMBER:
Boulder.dwg		RWP	1

Table 2. Recommended work plan.

Pavement Location	Recommended Work	Estimated Cost of Work
Apron 01-01	Asphalt Overlay	$209,000
Apron 01-03	Asphalt Overlay	$318,500
Parallel Taxiway System	Asphalt Overlay	$273,500

Appendix Five
Integrated Noise Model (INM) Echo Reports

```
INM 6.1 ECHO REPORT  22-Mar-06 10:26

STUDY: C:\INM6.1\BOULDER\
   Created     : 19-May-04 16:27
   Units       : English
   Airport     :
   Description :
      Boulder Municipal Airport Master Plan
      Noise Contour Analysis

CASE: Existing w gliders doubled
   Created     : 21-Dec-04 11:20
   Description : Existing with glider tow plane ops doubled

STUDY AIRPORT
   Latitude    : 40.039167 deg
   Longitude   : -105.226390 deg
   Elevation   : 5288.0 ft
   Temperature : 87.5 F
   Pressure    : 29.92 in-Hg
   AverageWind : 8.0 kt
   ChangeNPD   : No

STUDY RUNWAYS
   08
      Latitude  : 40.039162 deg
      Longitude : -105.233690 deg
      Xcoord    : -0.3364 nmi
      Ycoord    : -0.0003 nmi
      Elevation : 5287.0 ft
      OtherEnd  : 26
      Length    : 4096 ft
      Gradient  : -0.30 %
      RwyWind   : 8.0 kt
      TkoThresh : 0 ft
      AppThresh : 300 ft
   26
      Latitude  : 40.039168 deg
      Longitude : -105.219060 deg
      Xcoord    : 0.3378 nmi
      Ycoord    : 0.0001 nmi
      Elevation : 5274.9 ft
      OtherEnd  : 08
      Length    : 4096 ft
      Gradient  : 0.30 %
      RwyWind   : 8.0 kt
      TkoThresh : 0 ft
      AppThresh : 0 ft

STUDY TRACKS
   RwyId-OpType-TrkId
     Sub  PctSub   TrkType   Delta(ft)
   08-APP-L1
      0   100.00   Vectors     0.0
   08-DEP-T1
      0   100.00   Vectors     0.0
```

```
   08-DEP-TW1
      0   100.00   Vectors     0.0
   08-DEP-TW2
      0   100.00   Vectors     0.0
   08-DEP-TW3
      0   100.00   Vectors     0.0
   08-DEP-TW4
      0   100.00   Vectors     0.0
   08-TGO-TG1
      0   100.00   Vectors     0.0
   26-APP-L2
      0   100.00   Vectors     0.0
   26-DEP-T2
      0   100.00   Vectors     0.0
   26-DEP-TW5
      0   100.00   Vectors     0.0
   26-DEP-TW6
      0   100.00   Vectors     0.0
   26-DEP-TW7
      0   100.00   Vectors     0.0
   26-DEP-TW8
      0   100.00   Vectors     0.0
   26-TGO-TG2
      0   100.00   Vectors     0.0

STUDY TRACK DETAIL
   RwyId-OpType-TrkId-SubTrk
         SegType        Dist/Angle    Radius(nmi)
   08-APP-L1-0
       1  Straight       4.5000 nmi
       2  Right-Turn    45.0000 deg     0.3300
       3  Straight       1.0000 nmi
       4  Left-Turn     90.0000 deg     0.1250
       5  Straight       0.4100 nmi
       6  Left-Turn     90.0000 deg     0.1250
       7  Straight       0.8600 nmi
   08-DEP-T1-0
       1  Straight       6.0000 nmi
   08-DEP-TW1-0
       1  Straight       1.1100 nmi
       2  Left-Turn    180.0000 deg     0.3300
       3  Straight       0.1500 nmi
       4  Left-Turn     90.0000 deg     0.2500
       5  Straight       1.4000 nmi
       6  Left-Turn     45.0000 deg     0.3000
       7  Right-Turn    45.0000 deg     0.2500
       8  Straight       4.0000 nmi
   08-DEP-TW2-0
       1  Straight       1.1100 nmi
       2  Left-Turn    180.0000 deg     0.3300
       3  Straight       0.1500 nmi
       4  Left-Turn     90.0000 deg     0.2500
       5  Straight       0.7250 nmi
       6  Right-Turn    90.0000 deg     0.2000
       7  Straight       1.3000 nmi
       8  Left-Turn     90.0000 deg     0.2000
       9  Straight       0.3000 nmi
```

10	Left-Turn	90.0000	deg	0.2000
11	Straight	1.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	0.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	5.5000	nmi	

08-DEP-TW3-0

1	Straight	1.1100	nmi	
2	Left-Turn	180.0000	deg	0.3300
3	Straight	0.1500	nmi	
4	Left-Turn	90.0000	deg	0.2500
5	Straight	1.2700	nmi	
6	Left-Turn	90.0000	deg	0.3500
7	Straight	0.7500	nmi	
8	Left-Turn	180.0000	deg	0.3500
9	Straight	2.6050	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	0.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	1.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	0.3000	nmi	
16	Left-Turn	90.0000	deg	0.2000
17	Straight	5.5000	nmi	

08-DEP-TW4-0

1	Straight	1.1100	nmi	
2	Left-Turn	180.0000	deg	0.3300
3	Straight	1.1100	nmi	
4	Right-Turn	45.0000	deg	0.6000
5	Straight	5.5000	nmi	

08-TGO-TG1-0

1	Straight	2.1400	nmi	
2	Left-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Left-Turn	90.0000	deg	0.1250
5	Straight	3.0000	nmi	
6	Left-Turn	90.0000	deg	0.1250
7	Straight	0.4100	nmi	
8	Left-Turn	90.0000	deg	0.1250
9	Straight	0.8600	nmi	

26-APP-L2-0

1	Straight	6.0000	nmi	

26-DEP-T2-0

1	Straight	1.4800	nmi	
2	Right-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Right-Turn	90.0000	deg	0.1250
5	Straight	1.0000	nmi	
6	Left-Turn	45.0000	deg	0.3300
7	Straight	4.5000	nmi	

26-DEP-TW5-0

1	Straight	0.8000	nmi	
2	Right-Turn	90.0000	deg	0.3300
3	Straight	0.4000	nmi	
4	Left-Turn	45.0000	deg	0.3300
5	Straight	4.5000	nmi	

26-DEP-TW6-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	0.7250	nmi	
6	Right-Turn	90.0000	deg	0.2000
7	Straight	1.3000	nmi	
8	Left-Turn	90.0000	deg	0.2000
9	Straight	0.3000	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	1.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	0.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	4.5000	nmi	

26-DEP-TW7-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	1.4000	nmi	
6	Left-Turn	45.0000	deg	0.3000
7	Right-Turn	45.0000	deg	0.2500
8	Straight	4.0000	nmi	

26-DEP-TW8-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	1.2700	nmi	
6	Left-Turn	90.0000	deg	0.3500
7	Straight	0.7500	nmi	
8	Left-Turn	180.0000	deg	0.3500
9	Straight	2.6050	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	0.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	1.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	0.3000	nmi	
16	Left-Turn	90.0000	deg	0.2000
17	Straight	5.5000	nmi	

26-TGO-TG2-0

1	Straight	1.4800	nmi	
2	Right-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Right-Turn	90.0000	deg	0.1250
5	Straight	3.0000	nmi	
6	Right-Turn	90.0000	deg	0.1250
7	Straight	0.4100	nmi	
8	Right-Turn	90.0000	deg	0.1250
9	Straight	1.5200	nmi	

STUDY AIRCRAFT

BEC58P Standard data

CNA172 Standard data

CNA500 Standard data

```
   DHC6   Standard data
   GASEPV Standard data
   LEAR25 Standard data
   LEAR35 Standard data
   MU3001 Standard data

STUDY SUBSTITUTION AIRCRAFT
   Name    Description
      Acft   Percent
   BEC200  Beech Super King Air 200
      DHC6   100.0 %
   BEC400  Beechcraft Beechjet 400
      LEAR35 100.0 %

USER-DEFINED NOISE CURVES
      Type    Thrust  Op   200   400   630  1000  2000  4000  6300  10000 16000
25000

USER-DEFINED METRICS
   Name    Type      Family        Day    Eve  Night 10Log(T)

USER-DEFINED PROFILE IDENTIFIERS
      Op   Profile Stg  Weight(lb)

USER-DEFINED PROCEDURAL PROFILES
      #  StepType       Flap    ThrType         Alt/Clm    Speed(kt)
Ang/Thr/Dis

USER-DEFINED FIXED-POINT PROFILES
      #    Dist(ft)  Alt(ft) Spd(kt)  Thrust   OpMode

USER-DEFINED FLAP COEFFICIENTS
   Acft    Flap    Op    Coeff-R  Coeff-C/D  Coeff-B

USER-DEFINED JET THRUST COEFFICIENTS
   Acft    ThrType        Coeff-E   Coeff-F      Coeff-Ga      Coeff-Gb
Coeff-H

USER-DEFINED PROP THRUST COEFFICIENTS
   Name    ThrType   Efficiency Power

USER-DEFINED GENERAL THRUST COEFFICIENTS
   Acft    Type Coeff-E   Coeff-F      Coeff-Ga      Coeff-Gb       Coeff-H
Coeff-K1    Coeff-K2

CASE FLIGHT OPERATIONS
   Acft    Op   Profile Stg Rwy  Track  Sub  Group     Day   Evening     Night
   BEC58P  APP  STANDARD 1  08   L1       0  GA     5.7714    0.0000    0.3038
   BEC58P  APP  STANDARD 1  26   L2       0  GA     1.0185    0.0000    0.0536
   BEC58P  DEP  STANDARD 1  08   T1       0  GA     5.7714    0.0000    0.3038
   BEC58P  DEP  STANDARD 1  26   T2       0  GA     1.0185    0.0000    0.0536
   CNA172  APP  STANDARD 1  08   L1       0  GA    12.3260    0.0000    0.6487
   CNA172  APP  STANDARD 1  26   L2       0  GA     2.1752    0.0000    0.1145
   CNA172  DEP  STANDARD 1  08   T1       0  GA    12.3260    0.0000    0.6487
   CNA172  DEP  STANDARD 1  26   T2       0  GA     2.1752    0.0000    0.1145
   CNA172  TGO  STANDARD 1  08   TG1      0  GA    66.7425    0.0000    0.0000
   CNA172  TGO  STANDARD 1  26   TG2      0  GA    11.7781    0.0000    0.0000
```

CNA500	APP	STANDARD	1	08	L1	0	GA	0.2786	0.0000	0.0147
CNA500	APP	STANDARD	1	26	L2	0	GA	0.0492	0.0000	0.0026
CNA500	DEP	STANDARD	1	08	T1	0	GA	0.2786	0.0000	0.0147
CNA500	DEP	STANDARD	1	26	T2	0	GA	0.0492	0.0000	0.0026
DHC6	APP	STANDARD	1	08	L1	0	COM	3.6365	0.0000	0.1914
DHC6	APP	STANDARD	1	26	L2	0	COM	0.6417	0.0000	0.0338
DHC6	DEP	STANDARD	1	08	T1	0	COM	3.6365	0.0000	0.1914
DHC6	DEP	STANDARD	1	26	T2	0	COM	0.6417	0.0000	0.0338
GASEPV	APP	STANDARD	1	08	L1	0	GA	22.4773	0.0000	0.0000
GASEPV	APP	STANDARD	1	26	L2	0	GA	3.9666	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW1	0	GA	8.9909	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW2	0	GA	20.2295	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW3	0	GA	2.2477	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW4	0	GA	13.4864	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW5	0	GA	2.3799	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW6	0	GA	3.5699	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW7	0	GA	1.5866	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW8	0	GA	0.3967	0.0000	0.0000
LEAR25	APP	STANDARD	1	08	L1	0	GA	0.0539	0.0000	0.0028
LEAR25	APP	STANDARD	1	26	L2	0	GA	0.0095	0.0000	0.0005
LEAR25	DEP	STANDARD	1	08	T1	0	GA	0.0539	0.0000	0.0028
LEAR25	DEP	STANDARD	1	26	T2	0	GA	0.0095	0.0000	0.0005
LEAR35	APP	STANDARD	1	08	L1	0	GA	0.1079	0.0000	0.0057
LEAR35	APP	STANDARD	1	26	L2	0	GA	0.0190	0.0000	0.0010
LEAR35	DEP	STANDARD	1	08	T1	0	GA	0.1079	0.0000	0.0057
LEAR35	DEP	STANDARD	1	26	T2	0	GA	0.0190	0.0000	0.0010
MU3001	APP	STANDARD	1	08	L1	0	GA	0.2786	0.0000	0.0147
MU3001	APP	STANDARD	1	26	L2	0	GA	0.0492	0.0000	0.0026
MU3001	DEP	STANDARD	1	08	T1	0	GA	0.2786	0.0000	0.0147
MU3001	DEP	STANDARD	1	26	T2	0	GA	0.0492	0.0000	0.0026

CASE RUNUP OPERATIONS

Acft	RunupId	X(nmi)	Y(nmi)	Head	Thrust	Dur(sec)	Day	Evening	Night

CASE GRID DEFINITIONS

Name	Type	X(nmi)	Y(nmi)	Ang(deg)	DisI(nmi)	DisJ(nmi)	NI	NJ	Thrsh	dAmb (hr)
CONTOUR	Contour	-8.0000	-8.0000	0.0	16.0000	16.0000	2	2	85.0	0.0 0.00

CASE RUN OPTIONS

- Run Type : Single-Metric
- NoiseMetric : DNL
- Do Terrain : No
- Do Contour : Yes
- Refinement : 8
- Tolerance : 0.60
- Low Cutoff : 55.0
- High Cutoff : 75.0
- Ground Type : All-Soft-Ground
- Do Population : No
- Do Locations : No
- Do Standard : No
- Do Detailed : No
- Compute System Metrics:
  - DNL : No

CNEL : No
LAEQ : No
LAEQD : No
LAEQN : No
SEL : No
LAMAX : No
TALA : No
NEF : No
WECPNL : No
EPNL : No
PNLTM : No
TAPNL : No
CEXP : No
LCMAX : No
TALC : No

```
INM 6.1 ECHO REPORT  22-Mar-06 10:26

STUDY: C:\INM6.1\BOULDER\
   Created     : 19-May-04 16:27
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   AverageWind : 8.0 kt
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STUDY RUNWAYS
   08
      Latitude  : 40.039162 deg
      Longitude : -105.233690 deg
      Xcoord    : -0.3364 nmi
      Ycoord    : -0.0003 nmi
      Elevation : 5287.0 ft
      OtherEnd  : 26
      Length    : 4096 ft
      Gradient  : -0.30 %
      RwyWind   : 8.0 kt
      TkoThresh : 0 ft
      AppThresh : 300 ft
   26
      Latitude  : 40.039168 deg
      Longitude : -105.219060 deg
      Xcoord    : 0.3378 nmi
      Ycoord    : 0.0001 nmi
      Elevation : 5274.9 ft
      OtherEnd  : 08
      Length    : 4096 ft
      Gradient  : 0.30 %
      RwyWind   : 8.0 kt
      TkoThresh : 0 ft
      AppThresh : 0 ft

STUDY TRACKS
   RwyId-OpType-TrkId
     Sub  PctSub   TrkType   Delta(ft)
   08-APP-L1
      0   100.00   Vectors     0.0
   08-DEP-T1
      0   100.00   Vectors     0.0
```

```
   08-DEP-TW1
      0   100.00   Vectors     0.0
   08-DEP-TW2
      0   100.00   Vectors     0.0
   08-DEP-TW3
      0   100.00   Vectors     0.0
   08-DEP-TW4
      0   100.00   Vectors     0.0
   08-TGO-TG1
      0   100.00   Vectors     0.0
   26-APP-L2
      0   100.00   Vectors     0.0
   26-DEP-T2
      0   100.00   Vectors     0.0
   26-DEP-TW5
      0   100.00   Vectors     0.0
   26-DEP-TW6
      0   100.00   Vectors     0.0
   26-DEP-TW7
      0   100.00   Vectors     0.0
   26-DEP-TW8
      0   100.00   Vectors     0.0
   26-TGO-TG2
      0   100.00   Vectors     0.0

STUDY TRACK DETAIL
   RwyId-OpType-TrkId-SubTrk
         SegType       Dist/Angle   Radius(nmi)
   08-APP-L1-0
      1  Straight      4.5000 nmi
      2  Right-Turn   45.0000 deg    0.3300
      3  Straight      1.0000 nmi
      4  Left-Turn    90.0000 deg    0.1250
      5  Straight      0.4100 nmi
      6  Left-Turn    90.0000 deg    0.1250
      7  Straight      0.8600 nmi
   08-DEP-T1-0
      1  Straight      6.0000 nmi
   08-DEP-TW1-0
      1  Straight      1.1100 nmi
      2  Left-Turn   180.0000 deg    0.3300
      3  Straight      0.1500 nmi
      4  Left-Turn    90.0000 deg    0.2500
      5  Straight      1.4000 nmi
      6  Left-Turn    45.0000 deg    0.3000
      7  Right-Turn   45.0000 deg    0.2500
      8  Straight      4.0000 nmi
   08-DEP-TW2-0
      1  Straight      1.1100 nmi
      2  Left-Turn   180.0000 deg    0.3300
      3  Straight      0.1500 nmi
      4  Left-Turn    90.0000 deg    0.2500
      5  Straight      0.7250 nmi
      6  Right-Turn   90.0000 deg    0.2000
      7  Straight      1.3000 nmi
      8  Left-Turn    90.0000 deg    0.2000
      9  Straight      0.3000 nmi
```

10	Left-Turn	90.0000	deg	0.2000
11	Straight	1.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	0.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	5.5000	nmi	

08-DEP-TW3-0

1	Straight	1.1100	nmi	
2	Left-Turn	180.0000	deg	0.3300
3	Straight	0.1500	nmi	
4	Left-Turn	90.0000	deg	0.2500
5	Straight	1.2700	nmi	
6	Left-Turn	90.0000	deg	0.3500
7	Straight	0.7500	nmi	
8	Left-Turn	180.0000	deg	0.3500
9	Straight	2.6050	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	0.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	1.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	0.3000	nmi	
16	Left-Turn	90.0000	deg	0.2000
17	Straight	5.5000	nmi	

08-DEP-TW4-0

1	Straight	1.1100	nmi	
2	Left-Turn	180.0000	deg	0.3300
3	Straight	1.1100	nmi	
4	Right-Turn	45.0000	deg	0.6000
5	Straight	5.5000	nmi	

08-TGO-TG1-0

1	Straight	2.1400	nmi	
2	Left-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Left-Turn	90.0000	deg	0.1250
5	Straight	3.0000	nmi	
6	Left-Turn	90.0000	deg	0.1250
7	Straight	0.4100	nmi	
8	Left-Turn	90.0000	deg	0.1250
9	Straight	0.8600	nmi	

26-APP-L2-0

1	Straight	6.0000	nmi	

26-DEP-T2-0

1	Straight	1.4800	nmi	
2	Right-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Right-Turn	90.0000	deg	0.1250
5	Straight	1.0000	nmi	
6	Left-Turn	45.0000	deg	0.3300
7	Straight	4.5000	nmi	

26-DEP-TW5-0

1	Straight	0.8000	nmi	
2	Right-Turn	90.0000	deg	0.3300
3	Straight	0.4000	nmi	
4	Left-Turn	45.0000	deg	0.3300
5	Straight	4.5000	nmi	

26-DEP-TW6-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	0.7250	nmi	
6	Right-Turn	90.0000	deg	0.2000
7	Straight	1.3000	nmi	
8	Left-Turn	90.0000	deg	0.2000
9	Straight	0.3000	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	1.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	0.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	4.5000	nmi	

26-DEP-TW7-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	1.4000	nmi	
6	Left-Turn	45.0000	deg	0.3000
7	Right-Turn	45.0000	deg	0.2500
8	Straight	4.0000	nmi	

26-DEP-TW8-0

1	Straight	0.8000	nmi	
2	Right-Turn	180.0000	deg	0.3300
3	Straight	0.5850	nmi	
4	Right-Turn	90.0000	deg	0.2500
5	Straight	1.2700	nmi	
6	Left-Turn	90.0000	deg	0.3500
7	Straight	0.7500	nmi	
8	Left-Turn	180.0000	deg	0.3500
9	Straight	2.6050	nmi	
10	Left-Turn	90.0000	deg	0.2000
11	Straight	0.3000	nmi	
12	Left-Turn	90.0000	deg	0.2000
13	Straight	1.3000	nmi	
14	Left-Turn	90.0000	deg	0.2000
15	Straight	0.3000	nmi	
16	Left-Turn	90.0000	deg	0.2000
17	Straight	5.5000	nmi	

26-TGO-TG2-0

1	Straight	1.4800	nmi	
2	Right-Turn	90.0000	deg	0.1250
3	Straight	0.4100	nmi	
4	Right-Turn	90.0000	deg	0.1250
5	Straight	3.0000	nmi	
6	Right-Turn	90.0000	deg	0.1250
7	Straight	0.4100	nmi	
8	Right-Turn	90.0000	deg	0.1250
9	Straight	1.5200	nmi	

STUDY AIRCRAFT

BEC58P Standard data

CNA172 Standard data

CNA500 Standard data

```
   DHC6   Standard data
   GASEPV Standard data
   LEAR25 Standard data
   LEAR35 Standard data
   MU3001 Standard data

STUDY SUBSTITUTION AIRCRAFT
   Name    Description
      Acft   Percent
   BEC200  Beech Super King Air 200
      DHC6   100.0 %
   BEC400  Beechcraft Beechjet 400
      LEAR35 100.0 %

USER-DEFINED NOISE CURVES
      Type    Thrust  Op   200   400   630  1000  2000  4000  6300  10000 16000
25000

USER-DEFINED METRICS
   Name    Type      Family        Day    Eve  Night 10Log(T)

USER-DEFINED PROFILE IDENTIFIERS
      Op   Profile Stg  Weight(lb)

USER-DEFINED PROCEDURAL PROFILES
      #  StepType       Flap    ThrType         Alt/Clm    Speed(kt)
Ang/Thr/Dis

USER-DEFINED FIXED-POINT PROFILES
      #    Dist(ft)  Alt(ft) Spd(kt)  Thrust   OpMode

USER-DEFINED FLAP COEFFICIENTS
   Acft    Flap    Op    Coeff-R  Coeff-C/D  Coeff-B

USER-DEFINED JET THRUST COEFFICIENTS
   Acft    ThrType        Coeff-E   Coeff-F      Coeff-Ga      Coeff-Gb
Coeff-H

USER-DEFINED PROP THRUST COEFFICIENTS
   Name    ThrType   Efficiency Power

USER-DEFINED GENERAL THRUST COEFFICIENTS
   Acft    Type Coeff-E   Coeff-F      Coeff-Ga      Coeff-Gb       Coeff-H
Coeff-K1    Coeff-K2

CASE FLIGHT OPERATIONS
   Acft    Op   Profile Stg Rwy  Track  Sub  Group     Day   Evening     Night
   BEC58P  APP  STANDARD 1  08   L1       0  GA     6.5094    0.0000    0.3426
   BEC58P  APP  STANDARD 1  26   L2       0  GA     2.1698    0.0000    0.1142
   BEC58P  DEP  STANDARD 1  08   T1       0  GA     7.3773    0.0000    0.3883
   BEC58P  DEP  STANDARD 1  26   T2       0  GA     1.3019    0.0000    0.0685
   CNA172  APP  STANDARD 1  08   L1       0  GA    14.7350    0.0000    0.7755
   CNA172  APP  STANDARD 1  26   L2       0  GA     4.9117    0.0000    0.2585
   CNA172  DEP  STANDARD 1  08   T1       0  GA    16.6997    0.0000    0.8789
   CNA172  DEP  STANDARD 1  26   T2       0  GA     2.9470    0.0000    0.1551
   CNA172  TGO  STANDARD 1  08   TG1      0  GA    82.0425    0.0000    0.0000
   CNA172  TGO  STANDARD 1  26   TG2      0  GA    14.4781    0.0000    0.0000
```

CNA500	APP	STANDARD	1	08	L1	0	GA	0.4550	0.0000	0.0239
CNA500	APP	STANDARD	1	26	L2	0	GA	0.1517	0.0000	0.0080
CNA500	DEP	STANDARD	1	08	T1	0	GA	0.5157	0.0000	0.0271
CNA500	DEP	STANDARD	1	26	T2	0	GA	0.0910	0.0000	0.0048
DHC6	APP	STANDARD	1	08	L1	0	COM	4.1123	0.0000	0.2164
DHC6	APP	STANDARD	1	26	L2	0	COM	1.3708	0.0000	0.0721
DHC6	DEP	STANDARD	1	08	T1	0	COM	4.6606	0.0000	0.2453
DHC6	DEP	STANDARD	1	26	T2	0	COM	0.8225	0.0000	0.0433
GASEPV	APP	STANDARD	1	08	L1	0	GA	26.1459	0.0000	0.0000
GASEPV	APP	STANDARD	1	26	L2	0	GA	8.7153	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW1	0	GA	11.8528	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW2	0	GA	26.6688	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW3	0	GA	2.9632	0.0000	0.0000
GASEPV	DEP	STANDARD	1	08	TW4	0	GA	17.7792	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW5	0	GA	3.1375	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW6	0	GA	4.7063	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW7	0	GA	2.0917	0.0000	0.0000
GASEPV	DEP	STANDARD	1	26	TW8	0	GA	0.5229	0.0000	0.0000
LEAR35	APP	STANDARD	1	08	L1	0	GA	0.1606	0.0000	0.0085
LEAR35	APP	STANDARD	1	26	L2	0	GA	0.0535	0.0000	0.0028
LEAR35	DEP	STANDARD	1	08	T1	0	GA	0.1820	0.0000	0.0096
LEAR35	DEP	STANDARD	1	26	T2	0	GA	0.0321	0.0000	0.0017
MU3001	APP	STANDARD	1	08	L1	0	GA	0.4550	0.0000	0.0239
MU3001	APP	STANDARD	1	26	L2	0	GA	0.1517	0.0000	0.0080
MU3001	DEP	STANDARD	1	08	T1	0	GA	0.5157	0.0000	0.0271
MU3001	DEP	STANDARD	1	26	T2	0	GA	0.0910	0.0000	0.0048

CASE RUNUP OPERATIONS

Acft	RunupId	X(nmi)	Y(nmi)	Head	Thrust	Dur(sec)	Day	Evening	Night

CASE GRID DEFINITIONS

Name	Type	X(nmi)	Y(nmi)	Ang(deg)	DisI(nmi)	DisJ(nmi)	NI	NJ	Thrsh	dAmb (hr)
CONTOUR	Contour	-8.0000	-8.0000	0.0	16.0000	16.0000	2	2	85.0	0.0 0.00

CASE RUN OPTIONS

- Run Type : Single-Metric
- NoiseMetric : DNL
- Do Terrain : No
- Do Contour : Yes
- Refinement : 8
- Tolerance : 0.60
- Low Cutoff : 55.0
- High Cutoff : 75.0
- Ground Type : All-Soft-Ground
- Do Population : No
- Do Locations : No
- Do Standard : No
- Do Detailed : No
- Compute System Metrics:
  - DNL : No
  - CNEL : No
  - LAEQ : No
  - LAEQD : No
  - LAEQN : No

SEL : No
LAMAX : No
TALA : No
NEF : No
WECPNL : No
EPNL : No
PNLTM : No
TAPNL : No
CEXP : No
LCMAX : No
TALC : No

Appendix Six
State and Federal Agency Coordination Letters

STATE OF COLORADO

OFFICE OF THE STATE ENGINEER
Division of Water Resources
Department of Natural Resources

1313 Sherman Street, Room 818
Denver, Colorado 80203
Phone (303) 866-3581
FAX (303) 866-3589

www.water.state.co.us

February 16, 2005

Mr. Cody Fussell
Barnard Dunkelberg & Company
1616 East Fifteenth Street
Tulsa, OK, 74120

Re: Boulder Municipal Airport Master Plan Update - Environmental Review, Tributary to Boulder Creek, Sections 21 & 22, T 1 N, R 70 W, Boulder County

Dear Mr. Fussell:

The Colorado Division of Water Resources offers the following comments regarding the subject public notice. Our comments are based upon the limited information provided in the notice and are restricted to the potential impacts this development has to water resources and the protection of other vested water rights.

The project proposes the construction/extension of taxiways, roads, and hangars at the airport site. No water use is proposed in the submitted information.

For your information, any diversion of surface water must be made in priority with a water right decreed for the proposed uses. Any out-of-priority diversions may injure vested water rights unless such diversions are made in accordance with a water court approved plan for augmentation or a substitute water supply plan approved by the State Engineer in accordance with C.R.S. §37-92-308. Any use of ground water, or exposure of ground water to the atmosphere requires a well permit to first be obtained. Well permits are typically not available without a water court approved plan for augmentation or a substitute water supply plan approved by the State Engineer in accordance with C.R.S. §37-92-308.

Regarding any construction activity that might affect the flow of water to any stream system, changes in the stream flow may adversely impact water resources or vested water rights. To assist in avoiding this potential injury, we recommend that the applicant consult with the local Water Commissioner, Mr. Bob Carlson (303-438-9303).

Please contact this office if you have any questions regarding this matter.

Sincerely,

Jeff Deatherage, P.E.
Water Resource Engineer

Cc: Jim Hall, Division Engineer, Division 1
Bob Carlson, Water Commissioner, Water District 6
P.O. Box 380, Erie, CO 80516

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

http://www.cdphe.state.co.us

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

Colorado Department
of Public Health
and Environment

January 19, 2005

Cody Fussell
Barnard Dunkelberg & Co.
1616 E. 15th St.
Tulsa, OK 74120

Re: Boulder Municipal Airport
CDPS Permit Cert. No. COR-010042
Boulder County

Dear Mr. Fussell:

This is in response to your letter of January 14, 2005. You had asked for information on potential water quality issues connected with proposed construction at the above-referenced facility. Discharge permits are the means used to regulate water quality impacts from such projects.

A construction dewatering permit would be needed if any construction dewatering were to take place. This permit should be applied for at least 30 days prior to the dewatering taking place. Regarding stormwater construction permits, if at least one acre of ground will be disturbed for any one project, the airport will be required to apply for a stormwater permit for construction activity, at least 10 days prior to breaking ground. Applications for these permits are available on our website at www.cdphe.state.co.us/wq/PermitsUnit.

Also, the airport is covered by stormwater permit certification COR-010042, under the Light Industry general permit. The permit requires a Stormwater Management Plan (SWMP). The City of Boulder will need to update their SWMP to take into account any additional or changed impacts to stormwater quality from the changes to the facility. A summary of the SWMP update should be reported to our office with the City's next Annual Report (due by February 15 of the year following any changes).

If you have any questions, please give me a call at (303) 692-3596.

Sincerely,

Kathryn Dolan
Stormwater Program Coordinator
Permits Unit
WATER QUALITY CONTROL DIVISION

xc: File Copy

COLORADO HISTORICAL SOCIETY

The Colorado History Museum 1300 Broadway Denver, Colorado 80203-2137

January 20, 2005

Cody Fussell
Barnard Dunkelberg & Company
Cherry Street Building
1616 East Fifteenth Street
Tulsa, Oklahoma 74120

Re: Boulder Municipal Airport Plan Update-Environmental Review (CHS #44779)

Dear Mr. Fussell,

Thank you for your correspondence dated January 14, 2005 and received by our office on January 18, 2005 regarding the above-mentioned project.

After review of our database, we have identified two potentially historic resources within the airport boundaries. Resources 5BL.6979/North Boulder Farmers Ditch and 5BL.5820.17/Boulder and Left Hand Ditch have been identified as possibly being located within the existing runway protection zone on the east end of the airport. Further survey efforts are needed to determine the locations of the ditches.

We recommend the identification of possible historic cultural resources during the early planning stages of the master plan so that any potential Section 106 issue may be avoided in later planning.

If we may be of further assistance, please contact Amy Pallante, our Section 106 Compliance Coordinator, at (303) 866-4678.

Sincerely,

for Georgianna Contiguglia
State Historic Preservation Officer

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
755 Parfet Street, Suite 361
Lakewood, Colorado 80215

IN REPLY REFER TO:
ES/CO: T&E/Bldr.
Mail Stop 65412

JAN 2 6 2005

Mr. Cody Fussell
Barnard Dunkelberg & Company
Cherry Street Building
1616 East Fifteenth Street
Tulsa, Oklahoma 74120

Dear Mr. Fussell:

The U.S. Fish and Wildlife Service (Service) received your letter dated January 14, 2005, regarding the Boulder Municipal Airport Master Plan Update.

These comments have been prepared under the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

Based on the provided information, the Service concurs that the 5 proposed projects are not likely to adversely affect federally-listed candidate, proposed, threatened or endangered species.

If the Service can be of further assistance, please contact Adam Misztal of my staff at (303) 275-2377 or at e-mail adam_misztal@fws.gov

Sincerely,

Susan Linner
Colorado Field Supervisor

Misztal: Concurrence/ Boulder Airport

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, OMAHA DISTRICT
DENVER REGULATORY OFFICE, 9307 SOUTH WADSWORTH BOULEVARD
LITTLETON, COLORADO 80128-6901

January 28, 2005

Mr. Cody Fussell
Barnard Dunkelberg & Company
Cherry Street Building
1616 East Fifteenth Street
Tulsa, OK 74120

RE: Boulder Municipal Airport Master Plan Update-Environmental Review
Corps File No. 200580040

Dear Mr. Fussell:

Reference is made to the above-mentioned project located in Sections 21 and 22, T1N, R70W, Boulder County, Colorado.

If any work associated with this project requires the placement of dredged or fill material, and any excavation associated with a dredged or fill project, either temporary or permanent, in waters of the United States at this site, this office should be notified by a proponent of the project for Department of the Army permits or changes in permit requirements pursuant to Section 404 of the Clean Water Act. Waters of the U.S. includes ephemeral, intermittent and perennial streams, their surface connected wetlands and adjacent wetlands and certain lakes, ponds, drainage ditches and irrigation ditches that have a nexus to interstate commerce.

Work in waters of the U.S. should be shown on a map identifying the Quarter Section, Township, Range and County of the work and the dimensions of work in each area of waters of the U.S.

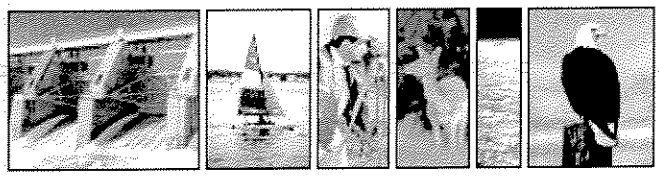
Please see the attached list of "Environmental Consultants" that may help in the identification, delineation and mapping of any waters of the U.S. that may be evolved with this project.

If there are any questions call **Mr. Terry McKee** at **303-979-4120** and reference **Corps File No. 200580040**.

Sincerely,

Timothy T. Carey
Chief, Denver Regulatory Office

tm



US Army Corps of Engineers®

Omaha District

Denver Regulatory Office
9307 South Wadsworth Blvd
Littleton, Colorado 80128-6901
ph: (303) 979-4120
fax: (303) 979-0602

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Federal Links

CONSULTANTS FOR WETLAND DETERMINATIONS AND DELINEATIONS

(Not compiled to endorse any specific consultant - updated October 2004)

ADAPTIVE ECOSYSTEMS, INC.	13013 Fuller Ave, Suite F Grandview, MO 64030	Ph: (816) 966-8199 Fx: (816) 966-8212
P. KAIA ANDERSON Anderson & Company, Ecoplanning	420 Sunset St Longmont, CO 80501	Ph: (303) 776-4636 Fx: (303) 684-9800
PAUL R. AVANT Greystone Consultants	5231 S. Quebec St. Greenwood Village, CO 80111	Ph: (303) 850-0930 Fx: (303) 721-9298
LAURA BACKUS Carter & Burgess	707 17th Street, Suite 2300 Denver, CO 80202	Ph: (303) 820-5240 Fx: (303) 820-2401
INGRID BAMBERG, PhD	8344 S Everett Way. #A Littleton, CO 80128	Ph: (303) 933-7291 Fx: (303) 973-7848
JOHN BARNETT John Barnett and Associates	3200 Greenwood Ct. Ft Collins, CO 80526	Ph: (970) 282-0859 Fx: (970) 282-0847
DAVID BATTS Tetra Tech, Inc.	4900 Pearl East Circle, Suite 300W Boulder, CO 80301	Ph: (720) 406-9110 Fx: (720) 406-9114
ELISABETH A. BENJAMIN Brown and Caldwell	7535 E. Hampden #403 Denver, CO 80231-4838	Ph: (303) 743-5400 Fx: (303) 743-5454
ERIC BERG Wildland Consultants, Inc.	1001 Jefferson Dr. Berthoud, CO 80513	Ph: (970) 635-2436 Fx: (970) 532-4354
DAVE BLAUCH Ecological Resource Consultants, LLC	5672 Juhls Drive Boulder, CO 80301	Ph: (720) 564-0788 Fx: (303) 530-2296 Cell: (720) 273-7743
DENNIS BLINKHORN	6496 Manila Rd. Goshen, OH 45122	Ph: (513) 625-3721
ANDRIA L. BOSCHEE AB Environmental Consulting, Inc.	PO Box 680 Fairplay, CO 80440	Ph: (719) 839-1818
TED BOSS T.R. Boss Consulting	308 Milkyway Ft Collins, CO 80525	Ph: (970) 223-5145 Fx: (970) 223-5145
DAVID L. BUCKNER ESCO Associates	P.O. Box 18775 Boulder, CO 80308	Ph: (303) 499-4277 Fx: (303) 499-4276
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Appendix Seven
2005 Base Year Aviation Activity Forecast Addendum

Addendum Table 1
SUMMARY OF AVIATION ACTIVITY FORECASTS, 2005-2025
Boulder Municipal Airport Master Plan Update

Operations	2005	2010	2015	2020	2025
General Aviation	*59,359*	*61,245*	*66,469*	*72,069*	*78,369*
Air Taxi	5	10	15	20	25
Single Engine	35,223	34,977	37,771	40,824	44,388
Multi Engine	3,894	3,920	4,263	4,636	5,041
Turbo Prop	2,594	2,614	2,842	3,090	3,361
Business Jet	562	594	775	878	955
Helicopter	386	356	388	421	458
Glider	16,695	18,774	20,415	22,200	24,141
Military	*20*	*20*	*20*	*20*	*20*
Total Operations	**59,379**	**61,265**	**66,489**	**72,089**	**78,389**
Local Operations	43,050	44,110	47,539	51,183	54,872
Itinerant Operations	16,329	17,155	18,950	20,906	23,517
Based Aircraft by Type					
Single Engine	125	135	143	151	159
Multi-Engine	20	22	24	26	28
Business Jet	0	1	2	2	3
Helicopter	0	1	1	2	2
Glider	45	48	51	54	57
Total Based Aircraft	**190**	**207**	**221**	**235**	**249**

Source: BARNARD DUNKELBERG & COMPANY.