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PRELIMINARY AIRPORT LAYOUT PLAN
SUMMARY REPORT

JEFFERSON COUNTY AIRPORT
AIRPORT MASTER PLAN
1977-1997

Prepared for

JEFFERSON COUNTY AIRPORT AUTHORITY

October, 1977

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Denver, Colorado

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COUNTY
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I. OVERVIEW

This report summarizes the findings and recommendations of the Jefferson County Airport Master Plan Study. In this study it was found that projected aviation activity creates a demand which approaches or exceeds the ultimate capacity of the airport facilities. These forecasts of future air traffic indicate a need for expansion of the Jeffco Airport as well as development of additional general aviation airports in the Denver Metropolitan area to meet the anticipated demand for new facilities.

The Jefferson County (Jeffco) Airport is owned by Jefferson County and is operated by an Airport Authority. The airport is located approximately 12 miles northwest of downtown Denver and 12 miles northeast of Golden, as shown in Figure A. This area is situated along one of the many low lying plateaus extending approximately 8 miles east from the foothills of the Rocky Mountains.

The sequence of previous major construction and improvement projects at the airport was as follows:

- | | |
|------|---|
| 1959 | Construction of runway 11L/29R to 6,000 feet with parallel taxiway, tiedown apron and lighting |
| 1960 | Terminal building construction and T-hangar erection |
| 1963 | T-hangar additions and associated apron improvements |
| 1964 | Construction of runway 2/20 to 3,600 feet, with parallel taxiway, tiedown apron and lighting; installation of rotating beacon and unicom (advisory radio system) |
| 1965 | Construction of crash/fire/rescue building; repair and overlay of runway 11L/29R and parallel taxiway, diagonal turn-offs, and apron; enlargement of taxiway holding aprons |
| 1967 | Opening of FAA tower |

- 1968 Extension of runway 11L/29R by 1,500 feet to present 7,500 foot length; addition of a diagonal exit taxiway on the crossing runway; taxiway and lighting improvements; construction and marking of parallel runway 11R/29L to 4,000 feet
- 1970 Installation of visual approach slope indicator four-box system (VASI-4) on runway 29R; T-hangar development including drainage and paving to the east of the installed hangars
- 1972 Property acquisition and installation of medium intensity approach and runway alignment indicator lights (MALSR) on runway 29R
- 1973 Instrument landing system (ILS) commissioned on runway 29R and installation of localizer; addition of runway end identification lights (REIL) on runway 11L; addition of 36 T-hangars and associated drainage and grading improvements
- 1974 Paving of aircraft parking aprons and T-hangar areas south and east of the terminal building and related drainage improvements.
- 1975 Grading, drainage and paving of airport access road

Jeffco Airport primarily serves the north and northwestern portion of the Metropolitan Denver area as a general aviation "reliever" airport for Denver's Stapleton International Airport. Currently an estimated 450 aircraft are based at Jeffco including single and twin engine airplanes and helicopters. No regularly scheduled air carrier or commuter airlines serve the airport although air taxi and charter service is available through the fixed base operators. Major uses of the field include flight training, business and pleasure aviation. General aviation services include aircraft maintenance, repair and sales, as well as aircraft tiedown and hangar rental and fuel sales.

The Jefferson County Airport Authority as Sponsor requested and received Federal Aviation Administration (FAA) participation in the planning of future airport development. The federal share of the study cost is ninety (90) percent and is taken from federal user fees imposed on aircraft fuel, airline tickets and other aviation related activities. As a result, the bulk of the study's expense is being paid for by those who utilize aviation facilities. The remaining ten (10) percent is being provided by the Authority as the local sponsor of the study.

II. PLANNING OBJECTIVES

The planning objectives of this Master Plan include:

- Determine practical development stages which (1) correspond to forecast demand, (2) are consistent with community development goals, (3) provide the most cost effective solution to local aviation needs and (4) serve the largest segment of the entire community;
- Show overall airport development goals, having taken into account the Denver Regional Airport System Plan, the National Airport Systems Plan and sponsor needs and desires;
- Determine the future air travel demands generated by the surrounding air service area, including portions of Adams, Denver, Boulder and Jefferson Counties.
- Maximize the useful life of the existing airfield and building area facilities in an economical manner;
- Provide maximum flexibility to adjust to unforeseen demands and requirements throughout the planning period;
- Ensure environmental compatibility of the airport and aviation with surrounding land uses.

III. HISTORIC AVIATION ACTIVITY

The Federal Aviation Administration (FAA) installed a flight control tower at the Jefferson County (Jeffco) Airport in 1967. The tower is operated daily between 7:00 A.M. and 10:00 P.M. with personnel recording operations (take-offs and landings) over the last ten years as summarized in Table III-1. Prior to 1967 the FAA made estimates of aircraft operations. According to these estimates, from 1962 to 1966 activity increased from 40,000 to 190,000 total operations. Itinerant traffic (cross-country aviation) grew the fastest reaching an estimated 80,000 operations in 1966. The tower counts which began in 1967 confirmed the larger growth in itinerant traffic and reported total operations of 256,962 and 259,675 in 1967 and 1968, respectively. The following three years represented a decline in activity which may possibly be attributed to a combination of factors including an overall slowdown in the economy and the opening of another reliever airport in the southeast portion of the metropolitan area (Arapahoe County Airport).

- Since 1971 total aviation has experienced a steady increase from 183,320 operations in 1971 to 232,337 in 1976, an average growth of 5.3 percent. Local traffic (primarily based aircraft) grew at a modest rate to 109,953 in 1976, while the number of based aircraft increased by an average of 8.6 percent per year to approximately 400 in 1976.
- The trend of the 1960's continued for itinerant traffic as operations increased from 75,990 in 1971 to 122,384 in 1976, an average growth rate of 12.2 percent per year. This increase correlates well with service area socioeconomic trends. The number of based aircraft has grown rapidly in comparison to local operations. This is a good indication of the increase in business aviation taking place at the airport.

- Single engine aviation represents approximately 70 percent of total annual operations; however twin engine aircraft operations are increasing at a higher overall rate.
- Instrument operations increased from 819 in 1967 to 3,176 in 1976. It is estimated that in 1977 instrument operations will exceed 4,600.

TABLE III-1

JEFFERSON COUNTY AIRPORT
HISTORY OF AVIATION ACTIVITY

General Aviation Operations

Year	Total	Local	Itinerant
1967	256,962	180,644	76,318
1968	259,675	174,177	85,498
1969	202,839	127,511	75,328
1970	183,396	112,902	70,494
1971	183,320	107,330	75,990
1972	197,187	116,425	80,762
1973	209,750	119,928	89,822
1974	221,454	116,899	104,555
1975	237,513	125,488	112,025
1976	232,337	109,953	122,384

Military Operations

Year	Total	Local	Itinerant
1967	265	58	207
1968	267	6	261
1969	185	10	175
1970	328	12	316
1971	570	237	333
1972	810	496	314
1973	1,005	636	369
1974	664	311	353
1975	1,284	795	489
1976	1,389	822	567

TABLE III-1 (Cont'd.)

JEFFERSON COUNTY AIRPORT
HISTORY OF AVIATION ACTIVITY

<u>Air Taxi Operations</u>		<u>Instrument Operations</u>	
Year	Total	Year	Total
1967	--	1967	819
1968	--	1968	922
1969	--	1969	832
1970	--	1970	671
1971	--	1971	918
1972	--	1972	1,440
1973	--	1973	1,853
1974	111	1974	2,334
1975	149	1975	2,148
1976	311	1976	N/A

Based Aircraft

Year	Total	Single Engine	Multi-Engine	Helicopter
1967	256	197	50	9
1968	266	235	24	7
1969	280	220	55	5
1970	N/A	N/A	N/A	N/A
1971	280	220	55	5
1972	280	220	55	5
1973	313	258	44	11
1974	N/A	N/A	N/A	N/A
1975	313	258	44	11
1976	400	329	56	15

IV. AIR TRAFFIC FORECAST

Air traffic projections for the twenty-year study period are summarized in Table IV-1 and compared to past activity in Figure B. The forecast of activity is based on the following assumptions:

- Service area socioeconomic trends of housing, employment and particularly population will remain a good indication of airport use by the community.
- The extensive population projections which have been made for the Denver metropolitan area provide a reasonable basis for forecasting future transportation activity.
- FAA tower statistics of historic air traffic are a satisfactory basis for trend extrapolation.
- The Jefferson County Airport will provide facilities in line with forecasted demand.
- Aviation activity will continue to grow similar to increases that have occurred since 1971.
- Possible construction of another reliever airport in the Denver metropolitan area in the future might cause a temporary lull similar to that experienced in 1968-1970; however, overall operations will continue to increase during the 20-year planning period.

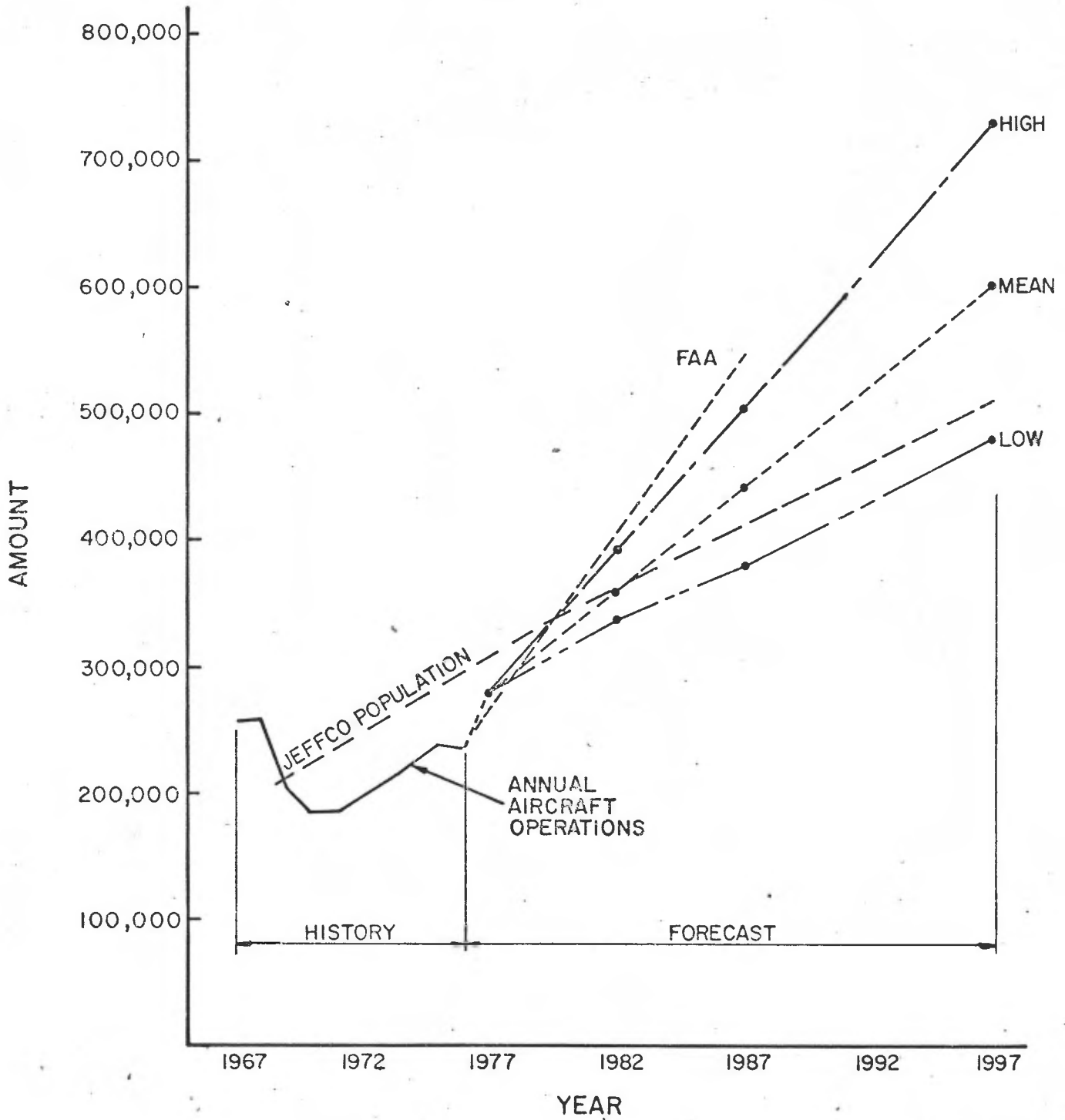
TABLE IV-1

JEFFERSON COUNTY AIRPORT

AVIATION FORECAST
(Operations per Year)

	1977	1982	1987	1997
<u>Air Taxi</u>				
Twin	350	1,500	2,200	7,300
<u>General Aviation</u>				
Heavy Twin	14,000	16,380	18,530	23,640
Light Twin	50,320	60,200	84,400	110,460
Single	201,280	236,020	251,170	318,200
Business Jet	1,300	2,000	3,000	6,100
Helicopter	12,600	13,000	13,500	14,300
<u>Military</u>				
Saberliner	1,330	1,400	1,470	1,600
Helicopter	70	75	80	90
	<hr/>	<hr/>	<hr/>	<hr/>
Total	281,250	330,575	374,350	481,690
	(Estimated)			

FIGURE B
 AVIATION AND POPULATION TRENDS
 JEFFERSON COUNTY AIRPORT



V. EVALUATION OF EXISTING AIRPORT FACILITIES AND REQUIREMENTS

Aviation is projected to increase from the 1976 level of 232,337 operations per year to 481,690 in 1997. Twin engine prop and jet aviation is forecast to grow the fastest; however, in the future single engine aircraft will probably remain at least 65 percent of total operations. In order to meet this demand, several major elements must be analyzed individually and balanced in relation to one another. The major elements include:

- Existing Airfield;
- Airspace and Meteorological Considerations;
- General Aviation Building Complex;
- Airport Access;
- Airport Support Facilities;
- Land Use Compatibility;
- Environmental Impact Assessment.

Existing Airfield

The Jefferson County Airport was founded in 1959 as a result of the efforts of local businessmen and civic leaders to promote industry in the county. The airport was seen as a means of attracting and servicing aviation and business needs, and as becoming a general aviation reliever for Denver's Stapleton International Airport. The site was selected with FAA assistance, and the initial acquisition was comprised of approximately 1,700 acres of ranch land in the northeast corner of the county.

The present airport facilities are shown and described in Exhibits I and II of the Airport Layout Plan (ALP). The runway complex consists of a main runway designated 11L/29R (7,500' x 100'), a parallel runway 11R/29L (4,000' x 60') and a crosswind runway 2/20 (3,600' x 75'). Parallel taxiway systems are provided

for runways 11L/29R and 2/20. With the exception of portions of the parallel runway the surface of these facilities are generally in good condition with minor repairs periodically being necessary. The main runway is used by all aircraft presently based at the airport as well as frequent use by the heavier jets. The parallel runway is used by the smaller aircraft for training while the crosswind runway is generally used under crosswind conditions.

The primary runway is equipped with an Instrument Landing System (ILS) and Medium Intensity Approach Lighting System (MALSR) on runway 29R. There is also a Visual Approach Slope Indicator (VASI-4) on runway 29 and Runway End Identifier Lights (REIL) on runway 11L. Both the main and crosswind runways have Medium Intensity Runway Lights (MIRL).

- It is recommended that within the 20-year planning period the primary runway be extended to 8,500 feet and overlaid to accommodate the increasing number of business jets and variety of heavy aircraft anticipated at the airport.
- The old medium intensity lights on runway 11L/29R should be replaced with a new high intensity system.
- The parallel runway should be extended to 5,000 feet for improved safety for twin engine aircraft and deteriorated portions of this runway should be reconstructed.
- Parallel and connecting taxiways should be provided to runway 11R/29L for improved safety and additional aircraft handling capacity.

- Missing portions of the parallel taxiways to runway 11L/29R and 2/20 should be constructed for more efficient flow of aircraft ground traffic.
- Additional aircraft tiedown apron and hangars should be constructed to accommodate the ever increasing number of aircraft based at the airport.
- All paved areas should be maintained.

Airspace and Meteorological Constraints

There are no airspace restraints on capacity at Jeffco. Although a complex overlap of the IFR (instrument flight rule) airspace exists between aircraft operations to Jeffco runways and those aircraft operations to runways at Denver-Stapleton International Airport, adequate coordination procedures have been devised. The management of the Terminal Air Traffic Control is the responsibility of the Federal Aviation Administration (FAA) facility of the Denver Tower. As indicated in Exhibit III, there are no physical aviation obstructions affecting the airport as defined by Part 77 of FAA regulations. Review of available meteorological data (Exhibit II) indicates that, on the average, runways 11L/29R and 11R/29L can be safely used 92.1 percent of the time by all aircraft. This figure is based on historical wind and visibility data gathered at the airport.

General Aviation Building Complex

Airport buildings are located on the north side of the field adjacent to both runway 11L/29R and 2/20. These structures consist of maintenance, storage and T-hangars; crash, fire and rescue facilities, FAA Control Tower and General Aviation District Office (GADO), an Airport Administration Building and one large office building located in the industrial park.

The Airport Authority recently applied for and received a federal grant to construct additional apron on the west side of runway 2/20. During the planning period it is anticipated that this area will be further developed to include at least one fixed base operation as well as hangar storage. As demand warrants additional executive and tee hangars can be constructed adjacent to the existing T-hangar area also. See Exhibit I for locations of these existing and future building areas.

Airport Access and Parking

The airport is served by two paved access roads. The older of the two connects with West 120th Avenue on the north side of the field. The new road, which was constructed in 1975, connects with Colorado Highway 121 to the east. Both of these roads consist of two lanes and are in good condition.

Highway 121 connects with Colorado Highway 36 to the north of the airport. These major arterials provide excellent access to and from all points in the metropolitan area. As air traffic increases and the industrial park develops the new access road can be expanded to four lanes.

Cars and trucks are expected to remain the dominant form of transportation to the airport for many years to come. To accommodate the inevitable increase in ground traffic, additional and expanded auto parking areas will be required. A new parking lot should be provided for the new building area west of runway 2/20. In addition parking areas should be expanded adjacent to the fire station and existing T-hangar area to meet this demand.

Airport Support Facilities

Gas, electricity and telephone are all provided by privately owned public utilities which operate throughout this area of the county and region. These services are all located underground and generally follow the access road. While local fuel shortages have caused restrictions in obtaining gas taps in the area, this has not affected service to the airport.

Water for the airport is presently supplied by two storage tanks owned by the City of Broomfield located west of runway 11R/29L. The Airport Authority is considering deep ground water wells to provide an independent system.

Sewage disposal is handled by septic tank systems. The Airport Authority has been investigating the feasibility of various sewage treatment alternatives including its own centralized treatment facility on the airport site, but no decision has been made regarding this matter.

Land Use Compatibility

During the course of the study several meetings have been held with the Planning Departments for Jefferson and Boulder Counties and the Cities of Broomfield and Westminster in an effort to establish a cooperative and compatible approach to handling land use in the vicinity of the airport. To aid in this process an airport area of influence was established by using the Colorado Land Use Commission's guidelines for recommended land use around airports. These guidelines define an area including aircraft flight patterns, critical areas off the runway ends and noise contours. The influence area is generally a rectangular area extending approximately 2 miles off both ends of the main runway and one mile off both ends of the crosswind. This area roughly encompasses 5,000 acres of mixed agriculture, residential, commercial and industrial

uses. Each of the previously mentioned planning departments is in the process of updating its Comprehensive Plan. It is anticipated that through continued coordination between these entities a compatible surrounding environment will be assured for the airport.

Included in the Master Plan Study recommendations is provision for acquisition of approximately 74 acres of land off the ends of runways 11L and 11R for clear zone protection. An additional 480+ acres should also be considered for acquisition to provide an adequate buffer zone from the rapidly developing residential areas south of the airport. Preliminary estimates of noise impacted areas indicate adverse reactions to aircraft activity will be confined to areas north and east within two miles of the airport. A detailed study to assess these impacts is presently underway. As airport activity increases, noise impacts might be expected to increase also. However, federal regulations requiring reductions in noise produced by the larger and noisier aircraft will tend to mitigate increased future noise exposure.

Environmental Impact Assessment (EIA)

An environmental impact assessment was made of the present airport site, the forecast activity and proposed improvements. The EIA was prepared according to FAA requirements (FAA Order 1050.18, June 16, 1977) and included consultation with numerous local, state and federal agencies. The Denver metro area is growing, with more growth anticipated, particularly as energy resource development focuses on the Rocky Mountains. For this reason it is important to provide environmental compatibility between the Jeffco Airport and the Denver metro area.

Review of natural elements such as geology, soils, vegetation, wildlife and water quality determined that construction measures should be taken to preserve topsoil and prevent erosion; however, no major adverse impacts were found. It is desirable to phase out existing septic systems in order to avoid possible ground water contamination problems. This is particularly important because of community domestic water storage in the area.

Extensive automobile traffic in the metro region has resulted in periodic violations of both federal and state air quality standards. Emissions per aircraft will decrease as new engine standards take effect; however, as operations increase, air quality will deteriorate. Although additive to regional air pollution, the airport should not, in itself, prevent the attainment of air quality standards. Restoration of vegetative cover and construction measures should be implemented to prevent dust problems which also violate standards throughout the region.

Economic impacts of the development program are limited to the local share of capital costs. The steady increase in business itinerant air traffic is seen as a benefit to this local economy and as such the overall socioeconomic impact should be beneficial. It is important, as previously discussed, to protect the airport's compatibility with the surrounding community. A buffer zone of controlled uses is necessary within the airport's area of influence, particularly as a growing trend in residential subdivisions exists in the suburban areas of Denver.

VI. FUTURE AIRPORT DEVELOPMENT

The Airport Master Plan is a guide for facility development in an orderly, cost-effective manner. After consideration of past and present aviation and socioeconomic trends and goals of the Jefferson County Airport Authority, a recommended development program is outlined as follows for the 20-year planning period:

Phase I (0-5 Years)

The main objective during Phase I is to make on-site improvements to existing facilities. Pavement repairs, reconstruction and overlays are recommended for the runway system with the addition of needed taxiways and runway lighting. Additional aircraft hangars and ground access roads are also included as is the acquisition of land for clear zone protection and land use compatibility. Recommended work items include:

- Overlay and Mark Runway 11L/29R; Install New High Intensity Runway Lighting System
- Rubberized Seal and Chip Terminal Area Apron
- Construct New T-Hangars and Associated Access Paving
- Reconstruct Portions of Runway 11R/29L*
- Construct Apron Taxiway North of Terminal Area Apron*
- Construct New Apron and Connecting Taxiways for Future FBO Area Including New Access Road*
- Acquire Land Off End of Runways 11L and 11R
- Acquire Land South of Airport
- Install New Water and Sewer Systems

* Included in 1977 Construction Project

Phase II (5-10 Years)

During this phase airfield improvements include extension and overlaying of the smaller of the two east-west aligned runways and expansion, as needed, of the taxiway and apron facilities. Emergency and maintenance facilities are expected to be in need of enlargement as is available auto parking.

- Extend and Light Runway 11R/29L 1,000 feet (to 5,000 feet)
- Construct and Light Remaining Parallel Taxiway to Runway 11L/29R
- Overlay Runways 11R/29L and 2/20 and Associated Taxiways
- General Apron and Hangar Area Expansion
- Expand Auto Parking
- Expand Maintenance and C/F/R Facilities

Phase III (10-20 Years)

Larger business jet activity is anticipated to increase during the study period to a degree that would justify extension of the main east-west runway (11L/29R). Taxiway construction, apron and hangar expansion and general airfield improvements are also expected to be needed during this period.

- Extend Runway 11L/29R 500 feet on both ends (to 3,500 feet)
- Construct Parallel and Connecting Taxiways to Runway 11L/29R
- Construct remaining Parallel Taxiway to Runway 2/20
- Overlay and/or Seal and Chip All Paved Areas
- General Apron and Hangar Area Expansion

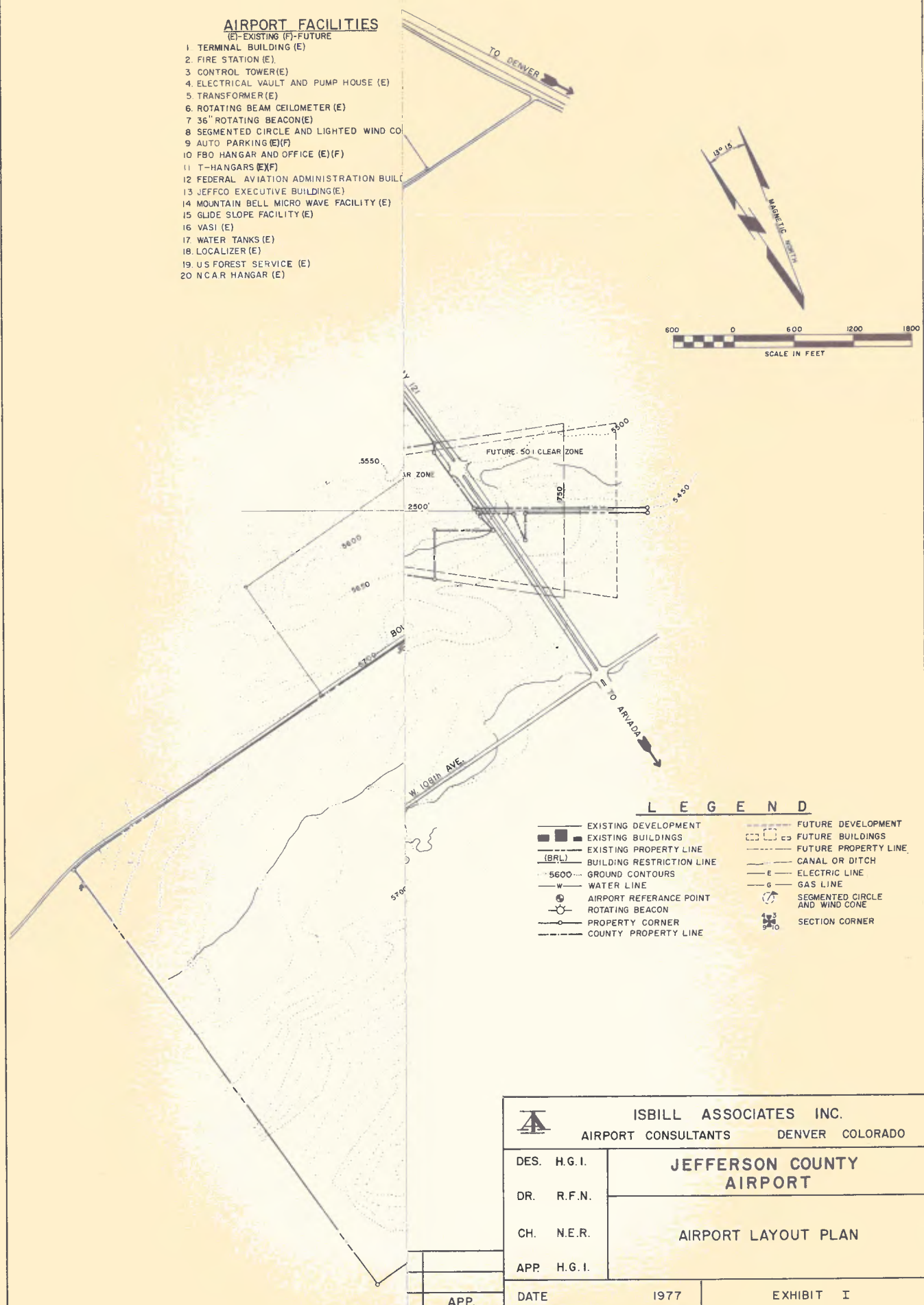
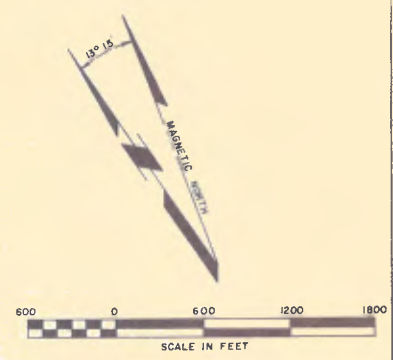
Because of the high priority of those projects included in Phase I of the capital improvement program it is recommended that the Authority initiate Phase I improvements as soon as financing arrangements can be made. Additional improvements should be implemented on an "as required" basis, consistent with the Authority's financial capability.

Cost estimates for the development program outlined above are currently being prepared. Most of these improvements are eligible for federal funding, presently furnishing 90 percent of eligible costs. The federal share is expected to continue in future years at a rate of 80 percent. Local financing will be necessary for the balance of the capital costs.

AIRPORT FACILITIES


(E)-EXISTING (F)-FUTURE

- 1 TERMINAL BUILDING (E)
- 2 FIRE STATION (E)
- 3 CONTROL TOWER (E)
- 4 ELECTRICAL VAULT AND PUMP HOUSE (E)
- 5 TRANSFORMER (E)
- 6 ROTATING BEAM CEILOMETER (E)
- 7 36" ROTATING BEACON (E)
- 8 SEGMENTED CIRCLE AND LIGHTED WIND CO
- 9 AUTO PARKING (E)(F)
- 10 FBO HANGAR AND OFFICE (E)(F)
- 11 T-HANGARS (E)(F)
- 12 FEDERAL AVIATION ADMINISTRATION BUIL
- 13 JEFFCO EXECUTIVE BUILDING (E)
- 14 MOUNTAIN BELL MICRO WAVE FACILITY (E)
- 15 GLIDE SLOPE FACILITY (E)
- 16 VASI (E)
- 17 WATER TANKS (E)
- 18 LOCALIZER (E)
- 19 US FOREST SERVICE (E)
- 20 N CAR HANGAR (E)

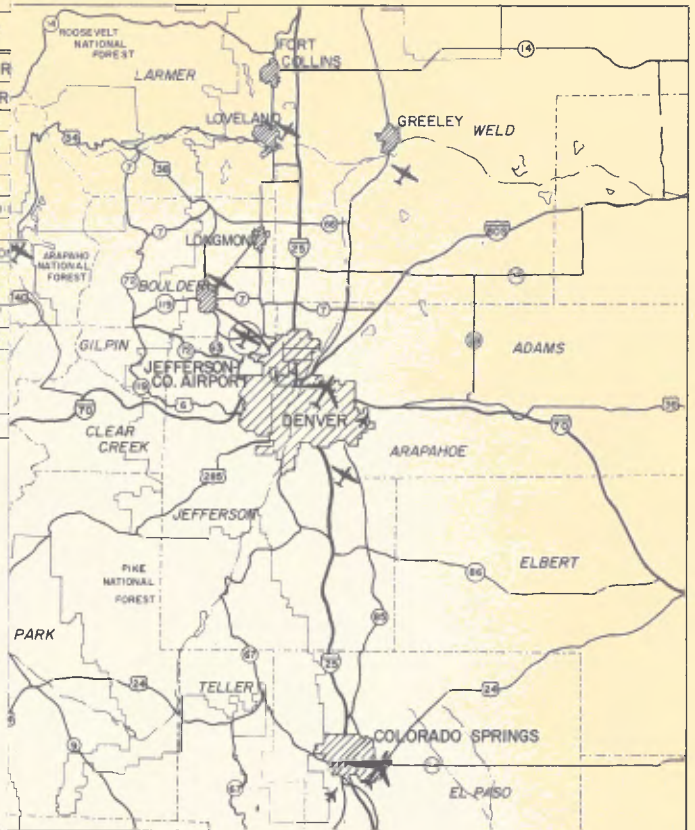


LEGEND

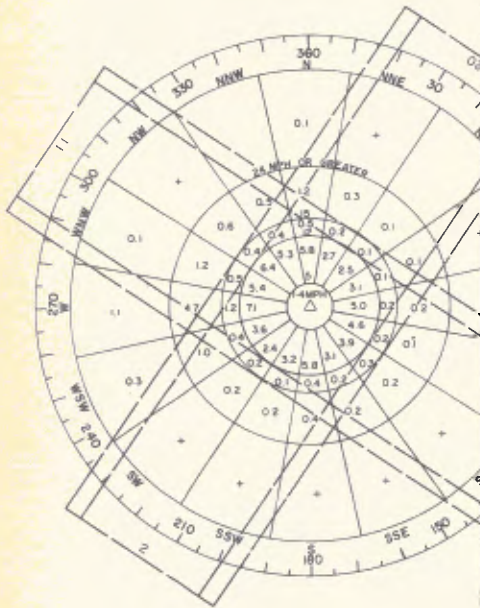
- | | | | |
|---------|---------------------------|---------|--------------------------------|
| — | EXISTING DEVELOPMENT | - - - - | FUTURE DEVELOPMENT |
| ■ | EXISTING BUILDINGS | □ | FUTURE BUILDINGS |
| --- | EXISTING PROPERTY LINE | - - - - | FUTURE PROPERTY LINE |
| (BRL) | BUILDING RESTRICTION LINE | - - - - | CANAL OR DITCH |
| ... | GROUND CONTOURS | - - - - | ELECTRIC LINE |
| W | WATER LINE | - - - - | GAS LINE |
| ⊙ | AIRPORT REFERENCE POINT | ⊙ | SEGMENTED CIRCLE AND WIND CONE |
| ⊙ | ROTATING BEACON | ⊙ | SECTION CORNER |
| ○ | PROPERTY CORNER | | |
| - - - - | COUNTY PROPERTY LINE | | |

 ISBILL ASSOCIATES INC. AIRPORT CONSULTANTS DENVER COLORADO			
DES. H.G.I.	JEFFERSON COUNTY AIRPORT AIRPORT LAYOUT PLAN		
DR. R.F.N.			
CH. N.E.R.			
APP. H.G.I.			
APP.	DATE	1977	EXHIBIT I

	RUNWAY	
	EXISTING	FUTUR
EFFECTIVE GRADIENT (IN %)	1.44	1.082
% WIND COVERAGE (12 MPH)	92.1	SAME
INSTRUMENT RUNWAY	YES	YES
MAXIMUM ELEV ABOVE MSL	5648.21	5649
APPROACH SURFACES	401/50-1	34-1/50-1
RUNWAY LIGHTING	MIRL	HIRL
RUNWAY MARKING	NON-PRECISION	PRECISION
NAVIGATIONAL AIDS	MALS, ILS, VASI, REIL	SAME
RUNWAY LENGTH	7500'	8500'
RUNWAY WIDTH	100'	SAME
RUNWAY STRENGTH (IN LBS.)	45,000 SWG 35,000 DWG 85,000 DTG	SAME
RUNWAY SAFETY AREA	300'	500'




LOCATION MAP



ALL WEATHER-WIND ROSE

12 MPH CROSSWIND COVERAGE ON RUNWAY 11/29 =
 15 MPH CROSSWIND COVERAGE ON RUNWAY 11/29 =
 12 MPH CROSSWIND COVERAGE ON RUNWAY 2/20 =
 15 MPH CROSSWIND COVERAGE ON RUNWAY 2/20 =
 12 MPH CROSSWIND COVERAGE ON ALL RUNWAYS =
 15 MPH CROSSWIND COVERAGE ON ALL RUNWAYS =
 Δ = 3.1% CALMS; 0-1 MPH

 ISBILL ASSOCIATES INC. AIRPORT CONSULTANTS DENVER, COLORADO		JEFFERSON COUNTY AIRPORT	
		AIRPORT LAYOUT PLAN TECHNICAL DATA	
DES.	N.E.R.	DATE	1977
DR.	K.A.C.	EXHIBIT II	
CH.	N.E.R.		
APP.	H.G.J.		
APP.			