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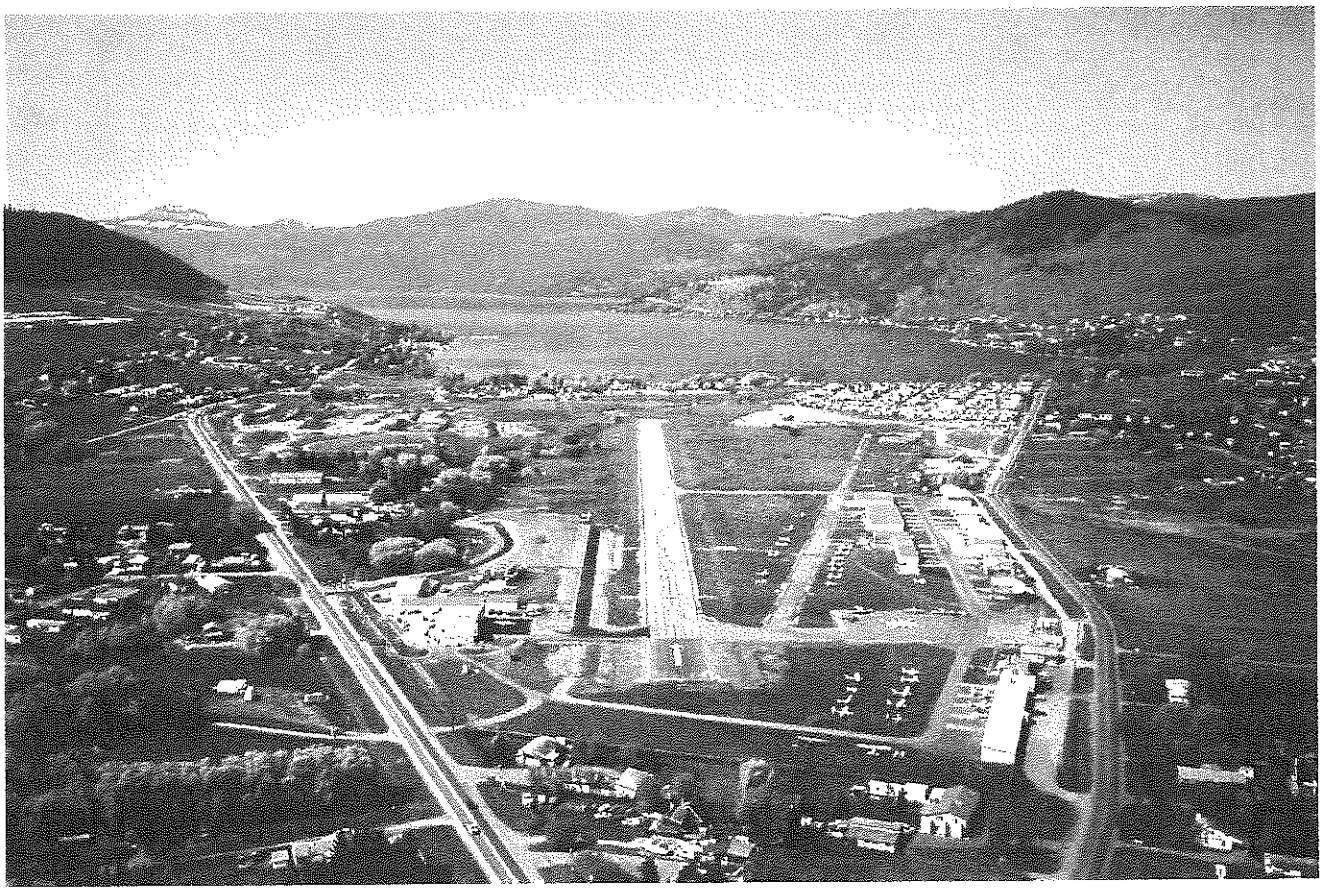
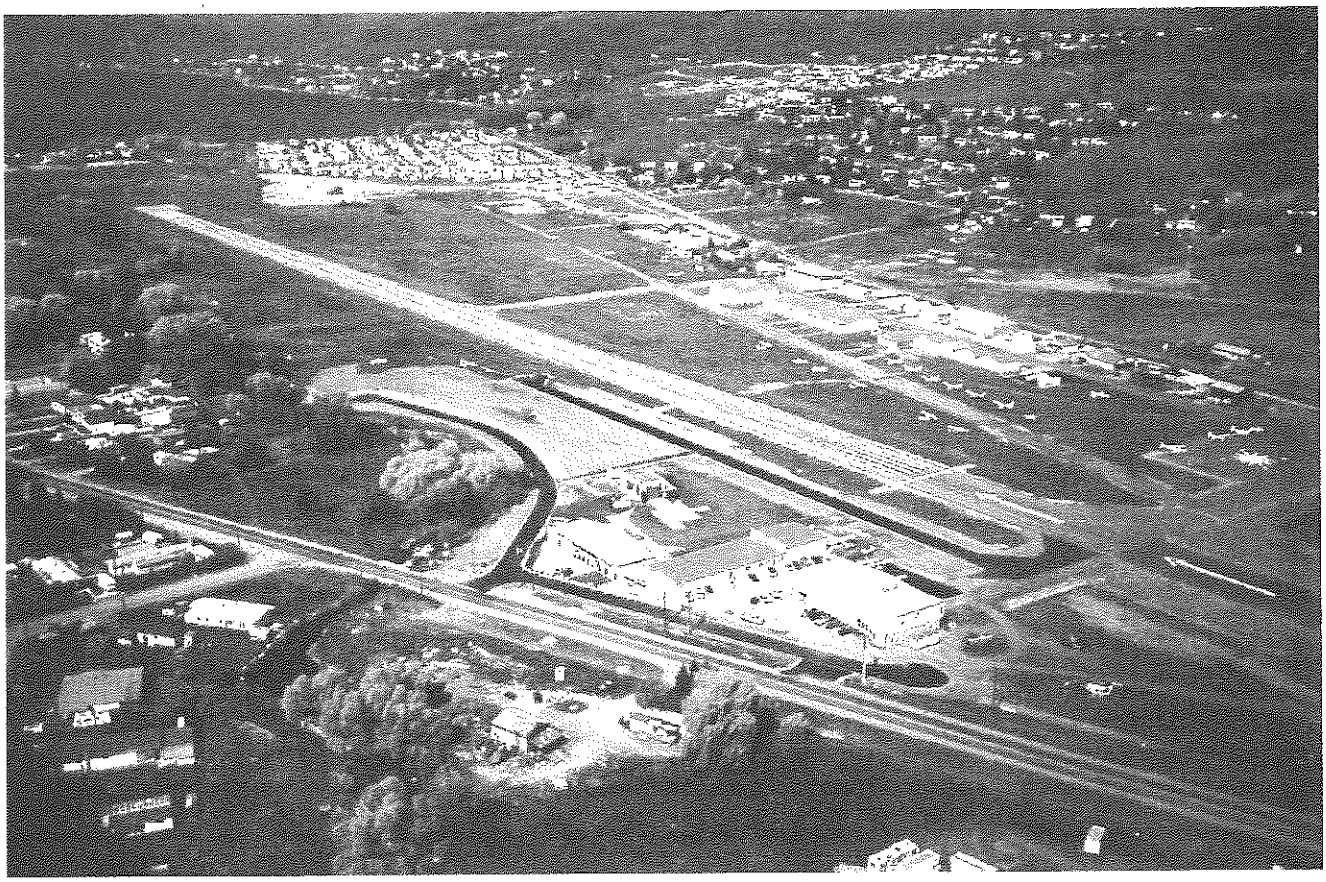
Vernon Regional Airport

Master Plan

2000-2010





INTRODUCTION

The Corporation of the City of Vernon has initiated the preparation of an Airport Master Plan for the Vernon Regional Airport. The purpose of the Airport Master Plan is to incorporate the recent acquisition of the airport and the direction of City Council into a strategic plan and future vision for the Vernon Regional Airport.

In recent years, significant changes have occurred both in the aviation industry and the community. Examples of changing standards and trends in the aviation industry include major modifications of Transport Canada Aviation airport design criteria, a national increase in the number of personal use general aviation aircraft owners, with an increasing number of maintenance facilities, corporate, charter, and air cargo operations. Passenger air carriers have also undergone a shift in dynamics. The structure of the commercial industry has changed, with the transition of major airline hub-and-spoke operations and code sharing regional carriers, and the growth of no-frills operators such as WestJet Airlines and its imitators.

On the local level, there has been significant economic growth in the Vernon and Okanagan Valley region. The City of Vernon has initiated and completed several major steps to ensure the long-term viability of the airport and to enhance service to the aviation user. To ensure long-range capabilities, an assessment of airport requirements, along with consideration of economic and industrial development opportunities and strategies, are major issues that need to be addressed as part of the Master Planning program.

All of these changes, opportunities, and constraints contribute to the need for a comprehensive review of the airport and its role in the community. The Master Plan for the Vernon Regional Airport represents a unique and important opportunity to construct a clear vision of where the airport is in the present and where it should be going in the future. The Airport Master Plan is intended to serve as a medium for assembling community opinion, spirit, and concurrence.

Master Plan Program

The primary objective of the Airport Master Plan program is to evaluate both existing and future aviation needs, to determine long-range requirements, to assess site development alternatives, and to produce a plan which yields an economical, safe, and environmentally acceptable public facility. When approved by City Council, the Airport Advisory Commission, and the Airport Users, the Airport Master Plan represents the long-term intentions of all involved regarding the location and extent of airport improvements. This permits long-range programming and budgeting, reduces lengthy review periods for each project, and provides for orderly and timely development.

The Master Plan has been has been a review process designed to provide an objective look at future airport needs and to answer some basic questions about the Vernon Regional Airport.

These include:

What is the airport's role?

What are the existing and future airport facility requirements?

What are the long-term municipal and private costs associated with future airport development?

What financing options are available for continued improvement of airport facilities?

How can airport revenues be enhanced?

Is the current management operational structure adequate? Should changes be made?

How will airport development affect the surrounding environment?

What effect does the airport have on industrial and economic development?

In addition to answering these basic questions and identifying the airport facility requirements for the short and long-term, other important issues the Master Plan will address include:

an assessment of potential impacts of proposed development adjacent to the airport lands;

the identification of requirements for possible float base operation;

the preparation of an on-airport Industrial/Commercial Development Plan;

an analysis of the area tourism market;

the identification of airport financing opportunities; and,

the analysis of a Capital Improvement Program.

The Airport Master Plan has been conducted to allow for input from the community, current and potential airport users, and the Airport Advisory Commission, comprised of local officials, aviation users, and representatives of local business and industry.

The development of the Airport Master Plan is evidence that the City of Vernon recognizes the importance of aviation in the overall concept of community and transportation planning. With a sound, objective, and realistic Master Plan, the Airport can fulfill its role as an economic asset to the community and a source of pride and satisfaction to the residents of the area.

The Master Plan program is designed to provide an objective look at the future airport role, and intended to permit the City to achieve a workable course of action. For the Master Plan to be successful, the following must occur:

1) The City must be assured that all potential site development alternatives have been identified which are compatible with residential, corporate, and industrial development;

2) Adequate data and analysis must be provided to bring about a consensus on the most desirable development options;

3) The airport site and design improvements must be economically and financially feasible to develop, provide an adequate level of public services to the area, and meet Municipal, Provincial, and Federal Standards.

4) The nature of development is to be accomplished at minimum cost to the user and nonuser alike, without detrimental affects on the environment, and in concert with prevailing municipal, provincial and federal goals and programming plans.

Overall, the objective of the Airport Master Plan is to provide for an airport facility that is:

- Safe
- Economically viable
- In fulfillment of broad local, regional, provincial, and federal goals
- Acceptable to the user and nonuser, general public
- Totally user-supported (operations)

CHAPTER ONE - INVENTORY

CHAPTER THREE - AIRPORT FACILITY REQUIREMENTS

1 INVENTORY

2 FORECASTS

3 AIRPORT FACILITY REQUIREMENTS

4 FINANCIAL

5

CHAPTER ONE - INVENTORY

1.0 Introduction

The inventory is the initial step in the development of the Master Plan. Pertinent data and information was assembled which relate to aviation activity in the region and airport development requirements. The inventory is a systematic and comprehensive data collection process which provides an understanding of past and present aviation factors. The information compiled is then used as a basis to forecast aviation demand and determine future airport facility requirements.

1.1 Airport Setting and Role

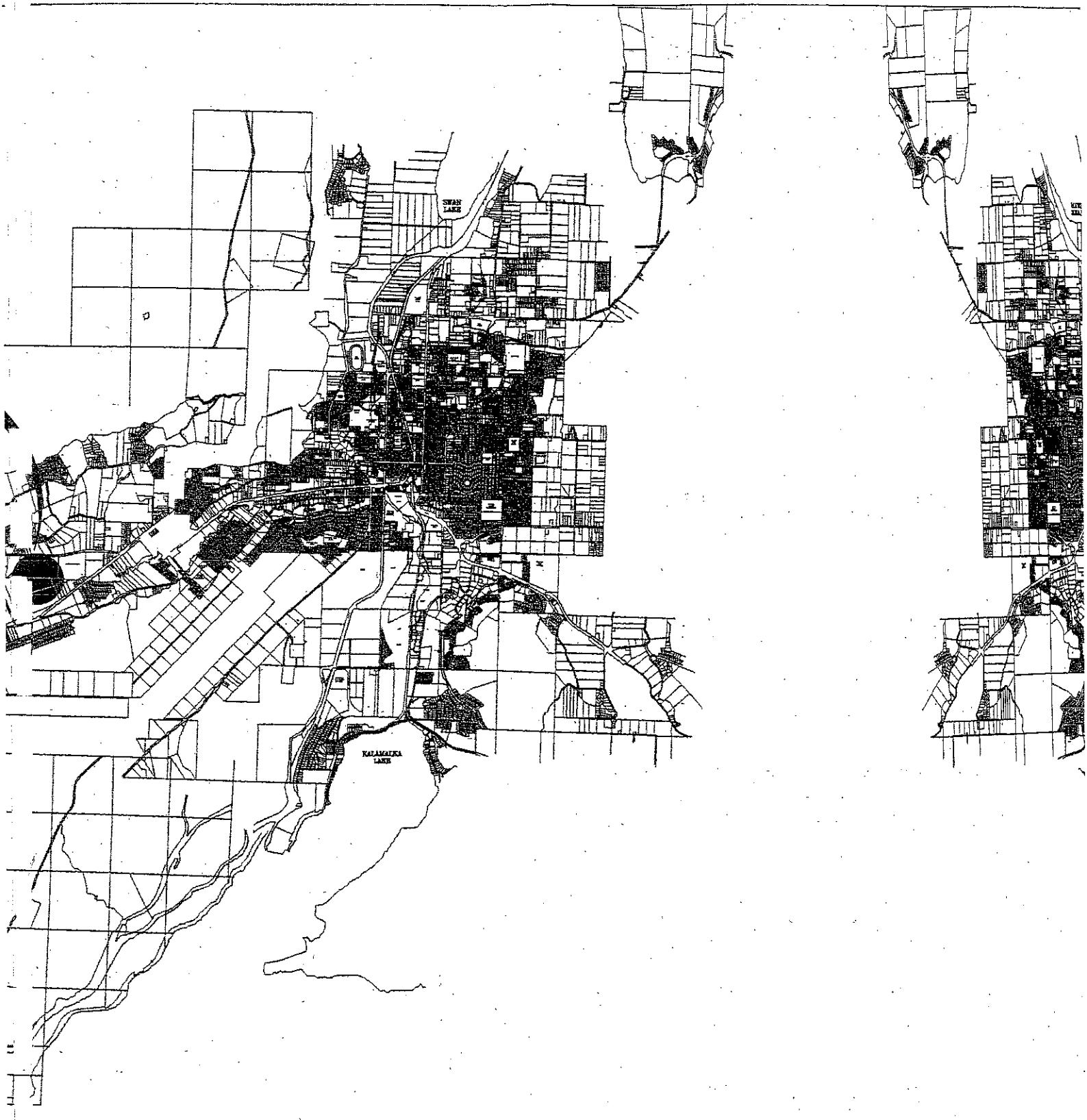
Vernon Regional Airport is located on approximately 90 acres at an elevation of 1140' above sea level. The airport is approximately five miles southwest of downtown Vernon and has access from from Okanagan Landing and Tronson Road. The Vicinity Map, Figure 1-1 shows the airport's proximity to Vernon and other surrounding communities.

Vernon Regional Airport is a commercial airport that houses industrial based businesses focusing on aircraft manufacturing and maintenance as well as a base for corporate, commercial, and general aviation.

Based on the types of aircraft now operating at the airport, Vernon Regional Airport is classified as a CODE 2B airport. This primary designation is based on the Transport Canada classification system of TP 312(e), which relates to aircraft wing span and wheelbase. Aircraft with higher approach speeds need longer runway lengths to land and to take off safely. Aircraft wingspan and wheelbase relates primarily to runway and taxiway separation criteria.

Over the years, and currently, there has been a considerable amount of commercial service activity and general aviation activity at the airport. Commercial aircraft currently operating at Vernon Regional Airport include the Cessna Citation II, Cessna Conquest, Cessna 414 and 340 as well as single Otters and Beavers.

Typical general aviation aircraft operating at Vernon vary from smaller aircraft such as home builts to the Cessna 172 and twin engine 6 seaters. Currently, there are approximately 100 aircraft based at the airport.



the CORPORATION of the CITY of VERNON

ENGINEERING DEPARTMENT

TITLE: *AIRPORT MASTER FIGURE 1.1*

DRAWN	DATE	SCALE	DATE	DRAWN
JR	99/04/26		99/04/26	JR

1.2 Airport Management

Vernon Regional Airport is owned and operated by the Corporation of the City of Vernon. The Airport Manager is responsible for handling emergency situations, promoting the airport to the aviation community, and for communicating with local interest groups, City Council, the news media, and concerned citizens regarding airport operations. Further responsibilities include daily operation of the airport and ensuring that the needs of all users of the airport (businesses, general aviation, military, and governments) are being met.

1.3 Airport Advisory Commission

The Airport Advisory Commission consists of seven members appointed for two-year terms by the mayor and council. The Commission recommends policies at the airport and recommends policies for land use adjoining and nearby the facility. The Commission is not responsible for supervising airport business. Airport staff meets periodically with the Commission to discuss issues and policies relevant to the airport.

1.4 Airfield Facilities

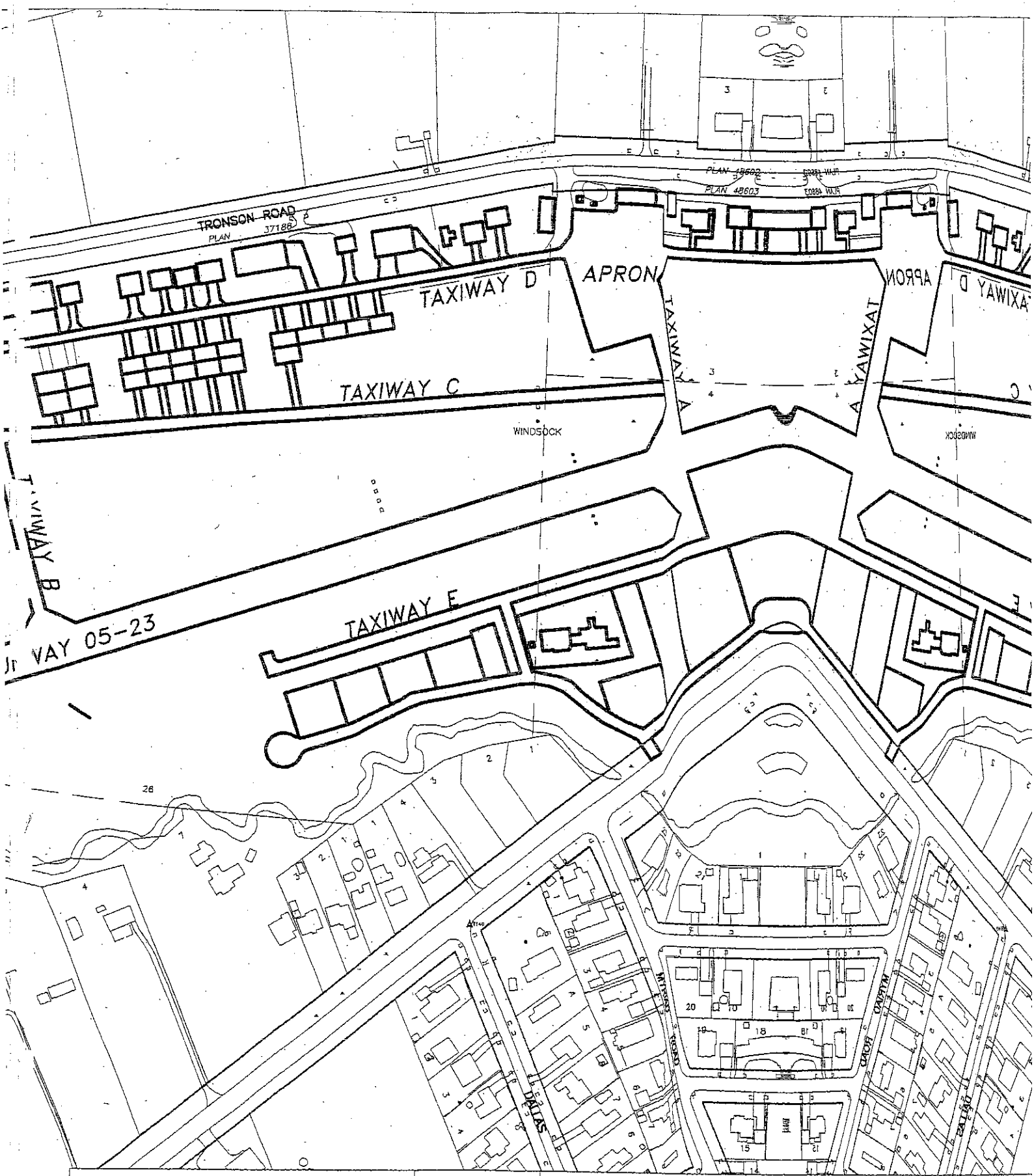
Airport facilities are divided into two groups: airfield and landside. The airfield facilities at Vernon Regional Airport include runways, taxiways, airport lighting, hazard beacons, and navigational aids, among others. The buildings, aircraft parking apron, hangars, and auto parking areas are considered landside facilities. Descriptions of these facilities are given in the following sections. Figure 1-2 graphically shows the existing airport facilities and Table 1-1 describes the major airfield facilities and equipment, with an estimate of the physical conditions.

1.4.1 Runway Facilities

Vernon Regional Airport has one operating runway as shown in Figure 1-2. The runway configuration was designed to accommodate the prevailing winds in the area, which are from the northwest off Okanagan Lake. Runway 05-23 is 3,360 and 75 feet wide. The runway has a weight bearing strength rating of _____ pounds single wheel gear. The runway was constructed of asphalt in 1986 and is in good condition. Runway 05-23 is a non-instrument runway; therefore, it has non-instrument runway markings, is equipped with Medium Intensity Lights, and has a runway strip of 30 meters.

1.4.2 Taxiways

The taxiway system at Vernon Regional Airport is a series of parallel and connecting taxiways. Transport Canada designates all taxiways Code A, B, C, D, E, or restricted depending on the pavement width. Code A taxiways should



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the CITY of VERNON

ENGINEERING DEPARTMENT

TITLE

AIRPORT MASTER PLAN
EXISTING AIRPORT FACIL

DRAWN	DATE	SCALE
JR	99/04/26	

have a width of not less that 7.5 meters. Code B not less than 10.5 meters and code C not less than 15 meters. The taxiway designation is designed to correspond with aircraft coding. For example a code B aircraft similar to the Cessna Citation would require a code B taxiway to operate within safety limits.

Taxiway Alpha is perpendicular to the Runway at the threshold of 23. Taxiway Alpha is a code C taxiway with a width of 45 feet. The current condition of the taxiway pavement, based upon visual inspection, is good.

Taxiway Bravo is perpendicular to Runway 05-23 at the midfield point and is a code B taxiway, 35 feet wide. It was constructed in 1996. It is equipped with Medium Intensity Lights and has the same bearing strength as the Runway. It is currently in good condition, based on visual inspections.

Taxiway Charlie is parallel to Runway 05-23 between taxiways Alpha and Bravo. It was constructed over 30 years ago, serving at that time as the primary runway and is 26 feet wide. It is unlit and designated restricted to day only operations. It is currently in poor shape with extensive breakdowns in the base and asphalt.

Taxiway Delta is parallel to Runway 05-23 between Alpha and Bravo to the North of taxiway Charlie. It is designated code A with 28 feet in width and serves primarily as an access point for North side businesses along Tronson Road. It also services the private hangars positioned on the infield. It was constructed in 1996 and is in good shape.

Taxiway Echo is parallel to Runway 05-23 and runs from the east end approximately 1000 feet to the west. Taxiway Echo is code A and part of a Phase I upgrade of the south side lands. It is 23 feet wide and in new condition.

TABLE 1-1 EXISTING AIRFIELD FACILITIES Vernon Regional Airport		
Airfield Item	Description and Size	Condition
RUNWAYS		
Runway 05-23 Edge Lighting Pavement Markings Visual Decent Indicators True Bearing Magnetic Variation	3360 X 75 – Asphalt Medium Intensity Non- Instrument PAPI (P1) 071 degrees 251 degrees 20 degrees east	Good
TAXIWAYS		
Taxiway Alpha Code Edge Lighting	45 feet wide C Medium Intensity	Good
Taxiway Bravo Code Edge Lighting	35 feet wide B Medium Intensity	Good
Taxiway Charlie Code Edge Lighting	26 feet wide Restricted None	Poor
Taxiway Delta Code Edge Lighting	28 feet wide A None	Good

TABLE 1-1 (cont)		
Taxiway Echo Code Edge Lighting	25 feet wide A None	New
Airfield Items		
Wind Indicator Rotating Beacon Hazard Beacons Obstruction Beacons	Two on airfield Midfield 3 on surrounding hills 2 on surrounding hills	Good Good Good Good

1.4.3 Runway and Taxiway Lighting

A variety of lighting aides are available at the airport to help in the identification, approach, landing, and taxiing operations at night or in poor weather conditions. The pilot can key up the lighting system. The following paragraphs describe the airfield lighting aids at Vernon Regional Airport.

The runway system 05-23 is equipped with a medium intensity edge lighting on either side of the runway. Both runways are equipped with Precision Approach Path Indicators – 1 systems (PAPI-1). PAPI's provide visual decent information to the pilot. PAPI's help the pilot determine whether the approach is high, on line or low while descending toward the runway threshold.

Threshold lights are located at the immediate ends of each lighted paved runway at airports and are critical for the safe landing of aircraft. The lights consist of two-color red/green lens. The green half of the lens faces approaching aircraft and indicates the beginning of the usable runway. The red half of the lens faces the aircraft during takeoff, again indicating the end of the usable runway. Both runways at Vernon Regional Airport are equipped with threshold lights.

After crossing the threshold, the aircraft must complete a touchdown and roll out on the runway. Runway edge lights are used for this landing phase. Edge lights give pilots information on alignment, roll, and distance.

Runway 05-23 is equipped with Medium Intensity Runway Lights. Taxiway edge lighting is also provided to enable pilots to taxi aircraft safely to and from the Ramp area to the runway. At Vernon Regional Airport, blue edge lights are provided on taxiways Alpha and Bravo and the Apron area.

The rotating beacon identifies the location and presence of the airport. The beacon is equipped with an optical system that projects two beams of light, both white, 180 degrees apart. The beacon is located adjacent to the center row of private hangars.

1.4.4 Electronic Navigational Aids

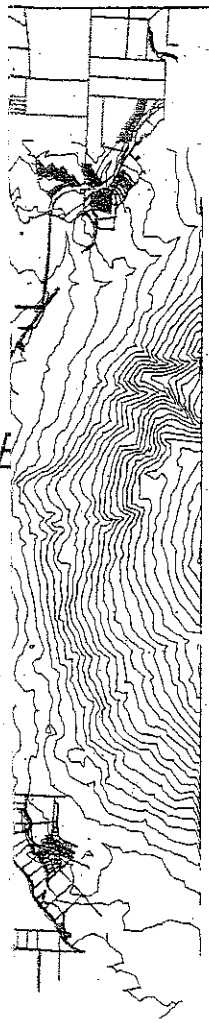
Airport navigational aids are equipment installed on or near the airport to provide pilots with electronic guidance and visual references.

A Non-Directional Beacon (NDB) is a low frequency radio beacon that allows the pilot of an aircraft equipped with directional finding equipment to find and determine aircraft position relative to the radio beacon. Pilots generally fly to the NDB until visual contact is made with the airport or they are free of clouds, then enter the air traffic pattern and proceed with an approach.

New advances in navigation/satellite technology will change present navigational systems. Global Positioning System (G.P.S.) is a satellite navigational system that encodes transmissions from ground-based data link stations and satellite transmitters with an on-board portable receiver. The system works through lines of position (L.O.P.) and is presently used for enroute navigation and non-precision instrument approaches. Precision instrument approaches have not yet been approved but are expected in the near future. However, G.P.S. will most likely be the primary means of all navigation systems in the future, with present electronic aids used as a backup system. It is predicted that eventually G.P.S. will provide worldwide navigation coverage because of its position accuracy, and because its signals are not affected by weather conditions. A GPS overlay is a new technology approach into airports using an encoder in the aircraft and the satellites for navigation instead of the traditional instrument landing approaches that require expensive equipment on the ground. There is no GPS overlay designated for Vernon Regional Airport at this time.

1.4.5 Obstruction Lighting

Surrounding hills may cause a hazard to approaching aircraft at night. Vernon Regional Airport has three flashing red hazard beacons to alert incoming aircraft of the highest peaks in the area. Figure 1.2.1 identifies their locations.



TITLE	AIRPORT MASTER PLAN BEACON LOCATIONS FIGURE 1.2.1		
DRAWN	DATE	SCALE	DWG. No.
JR	99/04/26	N.T.S.	FIG1-2-1

1.5 Area Airspace

The airspace structure in the Vernon Area is uncontrolled. Uncontrolled airspace is defined as all airspace that has not been designated as controlled, and which Air Traffic Control (ATC) has neither the authority nor responsibility for control. Controlled airspace, on the other hand, is supported by ground/air communications, navigational aids, and air traffic services.

Virtually all airspace between 12,500 & 18,000 feet mean sea level is considered controlled. Airspace under that altitude can be either controlled or uncontrolled, depending upon the air traffic density, proximity to an airport, and geographic factors.

The airspace to the south and west is controlled by Kelowna ATC and is deemed mode C. To the west is the Witman intersection, a major air highway intersection that is the beginning of the approach into Kelowna airport.

1.6 Air Traffic

1.6.1 Procedures

The purpose of this section is to describe the management of airspace in the vicinity of Vernon Regional Airport.

Vernon airspace reaches a 5 nautical mile radius from the geometric center of the facility to an altitude of 4100' ASL and is uncontrolled. It has a designation of Air Traffic Frequency and has a private UNICOM that operates on frequency 122.8 Mhz AM VHF. The UNICOM has limited hours and gives pilots an indication of wind direction and other low priority aerodrome information.

Pilots are expected to operate using standard uncontrolled aerodrome procedures as indicated in the Canadian Air Regulations (CARS).

The airport elevation is 1140 feet ASL. The circuit altitude is 2400 ft ASL with a night circuit of 3000-ft ASL. Runway 05 reverts to a right hand circuit for night operations.

1.6.2 Company NDB Approaches

There is a company Non Directional Beacon (NDB) approach used as a cloud break procedure over the Vernon NDB on 302.204 kHz "6K" at co-ordinates N50°21'00" W119°15'36". The minimums are 3280' AGL and used regularly. The NDB is monitored by a local telecommunications company with regular maintenance checks.

1.7 Airport Imaginary Surfaces

Related to the physical layout of the airfield are the runway approach requirements and imaginary surfaces required by Transport Canada.

Descriptions of these standards as they apply to the Vernon Regional Airport are explained in Transport Canada TP312E on Aerodrome Standards. These represent the key components of the airspace at the airport and have an influence on the location of airport and off-airport buildings and above ground facilities.

1.7.1 Runway Protection Zones

A Runway Protection Zone is a trapezoidal area off the runway end and sides used to enhance the protection of people and property on the ground. The type of aircraft and type of operations to be conducted on the runway define the exact dimensions of this zone. Ideally, these areas are controlled by the airport operator or owner in order to assure that the safety of approaching aircraft is protected and to ensure the safety of those on the ground. The RPZ begins at the runway threshold at the end of the area usable for takeoff and landings, and is centered along the extended runway centerline. Table 1-2 identifies the dimensions of the individual RPZs associated with the current runway at Vernon Regional Airport.

TABLE 1-2
Runway Protection Zone

Runway	Approach	Zone Length	Zone Width
05	Non-Instrument	200 feet	196 feet
23	Non-Instrument	200 feet	196 feet

1.7.2 Imaginary Surfaces

Ideally, airports should be located so that the surrounding airspace is free and clear of obstructions that could be hazardous to aircraft on takeoff or approach

paths or when operating in the airport vicinity. It is therefore necessary to maintain the surrounding airspace free from obstacles by preventing the installation, development, or growth of obstructions to airspace that could cause the airport to become unusable. The regulations for the protection of airspace in the vicinity of airports are established by the definition of imaginary surfaces, the penetration of which represents an obstruction to air navigation. Again, the geometry of the imaginary surfaces is governed by regulations set forth in TP312E. The protected airspace around Vernon Regional Airport is made up of five principal imaginary surfaces, two of which which are explained as follows and illustrated in Figure 1-3.

Table 1-3
Runway Approach Surfaces

Runway	Approach	Approach Slope	Length	Transition Slope	Length
05	Visual	1:25	2500 M	1:5	216 M
23	Visual	1:25	2500 M	1:5	216 M

Approach Surface: As defined in Table 1-3.

Approach Surface: Is a horizontal plane from the established airport elevation. The plane dimensions of the horizontal surface are set forth by arcs of specified dimensions from the end of the protection zone, connected by tangents with a slope of 25:1.

Transition Surface: Is an inclined plane with a slope of 5:1 extending upward and outward from the protection zone and approach surfaces, terminating at the point where they intersect with the horizontal surface or any other surface where more critical restrictions apply.

1.8 Facilities and Services

Facilities are defined as that portion of the airport other than the aircraft operating areas. Facilities include a terminal building area, aircraft parking apron, hangar areas, auto parking, and the airport access road.

Fixed base operations (FBOs) are also a part of landside facilities and include: general aviation passenger, waiting areas, pilot lounges, aircraft maintenance, fuel storage, and aircraft rental, storage, and sales.

1.8.1 Terminal Area

The Vernon Regional Airport has no public terminal facility at this time. There is a "private" terminal facility on the north side of the field operated by Okanagan Aviation. This facility has a flight planning room, passenger-waiting area, is adjacent to washrooms, has a snack and pop machine, and operates the UNICOM frequency. A public phone is also available.

1.8.2 Aircraft Parking Apron

The commercial service aircraft-parking apron at Vernon Regional Airport is approximately 23,000 square feet in size. The apron area is currently used by all transient aircraft for overnight parking, medivac aircraft and military operations. The apron is asphalt and based on visual inspection, is in fair/good condition.

Tiedowns are available in grassed areas, which are controlled by the airport manager.

1.8.3 Aviation Fuel Storage

Table 1-5 lists the present fuel facilities and capacities at the Airport. The airport offers 100LL and Jet A and Jet B fuels. Fuel is distributed to aircraft by Fixed on-site storage and mobile fuel trucks.

TABLE 1-5
AIRPORT FUEL FACILITIES

Company	Fuel Available	Capacity	Type
Canadian Helicopters	Jet B	35,000 L	Above Ground Fixed
Okanagan Aviation	100/ LL	22,700 L	Above Ground Fixed
	Jet A	22,700 L	Above Ground Fixed
	Jet A	3,800 L	Mobile
Sterling Pacific Air	100/ LL	35,000 L	Above Ground Fixed
	100/ LL	11,000 L	Mobile
	Jet A	18,000 L	Mobile

Current airport policy allows for individual fuel operations to exist subject to the proponents meeting certain criteria as laid out by the City of Vernon.

1.8.4 Airport and Ground Terminal Access

The majority of users, passengers, and visitors to the airport enter Tronson Road with an increasing number using the Okanagan Landing Road as development continues. Upon entering the service road area, users either park their vehicle groundside or proceed through the main gate to their aircraft.

Access to all the businesses on the field are from a service road on the north, and south sides of the field.

1.8.5 Automobile Parking

Each business must allow space on their lease lot for on-site customer and employee parking. Unfortunately as the airport developed there were not proper provisions put in place to facilitate the growth and expansion of each business with reference to parking requirements.

Currently, there is a shortage of short-term automobile parking spaces on the north side of the airport. There are stalls available on the east end but pilots have determined the walk to be too far and continue to use the airside facilities for car parking.

The south side of the airport has been developed in a more organized fashion, with proper parking requirements imposed on new businesses with expansion in mind and a transient parking lot centrally located to handle any overflow vehicles.

A problem still exists with reference to private hangars constructed on the infield lands. Owners need access to their facilities by vehicle and tend to park adjacent to the facility. The increasing frequency is becoming a hazard to aircraft movements on the adjoining taxiway.

1.8.6 Charter Services

The following Charter operators currently have use agreements or leases at the airport and operate on a daily basis:

Canadian Helicopters
Okanagan Aviation
Sterling Pacific Air
Yellowhead Helicopters

1.8.7 Airport Utilities

Vernon Regional Airport has utility services including sanitary, storm, water, electric power, gas, telephone, and cable on the south side. The north side businesses have power, water, and gas. Sewage on the north side is facilitated through holding tanks and septic fields. The private hangars on the infield have power and gas only. The types of airport utilities and their providers are listed on Table 1-6.

An Airport Servicing Plan Study has been completed by Associated Engineering and forms the technical options for servicing infastructure.

TABLE 1-8
AIRPORT UTILITIES

Utility/Service	Utility/Service Provider
Sewer - north side	On-site holding tank/septic field
Sewer - south side	City of Vernon
Storm	City of Vernon
Water	City of Vernon
Electricity	BC Hydro
Gas	BC Gas
Telephone	BC Tel
Cable	Shaw Cable
Fire Protection	Okanagan Landing Fire Department

1.9 Existing Airport Land Use

Vernon Regional Airport is currently situated on a site containing a total of approximately 90 acres. The property can be divided into seven functional areas based upon current airport use patterns. These areas include:

Airport Runway and Taxiway System Area
Aircraft Tie-down Area
Terminal Area
Commercial/Industrial (north side)
Commercial/Industrial (south side)
Private Hangar Area
Undeveloped Area

Figure 1-4 shows the general locations of the current operational areas on the Vernon Regional Airport.

1.10 Historic Airport Activity Levels

1.10.1 Aircraft Operations

Aircraft operations refers to either the take-off or landing of an aircraft -- commercial, general aviation, or military. Table 1-10 details the number of annual aircraft operations in the past five years with an estimate for the years 1997 and 1998. It should be noted that Vernon does not have a control tower and thus it is difficult for management to confirm exact aircraft movements due to night and after hours operations.

TABLE 1-10
AIRCRAFT MOVEMENTS

YEAR	MOVEMENTS
1995	10,800
1996	11,200
1997	11,700
1998 (estimate)	13,000

1.10.2 Based Aircraft

A based aircraft is an aircraft that is permanently stationed or housed at an airport. The number of aircraft that can be expected to locate at an airport is an important factor in the planning of future airfield and landside facilities, primarily for general aviation users. There are currently 100 aircraft based at the airport.

1.11 Area Airports

Other airports in the vicinity of the Vernon Regional Airport have an influence on the airport in terms of competing services, facilities, and airspace. The Vernon Regional Airport's direction is defined primarily by the location and services of these other airport facilities. The general character and services associated with these airports are indicated in Table 1-11.

TABLE 1-11
AREA AIRPORTS

Airport	Owned/Operated	Runway Length	Focus	Services
Kelowna	City/Transport	7300 feet	Passenger Maintenance	ATC Terminal Building
Penticton	Transport Canada	6000 feet	Passenger Small Business	Flight Service Sewer/Water/Storm
Salmon Arm	Regional District	4500 feet	Small Business	Unserviced

1.12 Vernon Regional Airport Study Area Characteristics

The historic and future levels of activity at an airport will depend, to a great extent, on the economic vitality, growth, and level of development in the airport's area of influence. For these reasons, defining the historical, present, and future

characteristics of the airport's study area is an important step in master planning. Past and present conditions are readily determined; however, selecting a future growth scenario is much less precise. This section describes the study area and defines its historic and existing socioeconomic characteristics.

An area's socioeconomic profile can have a direct relationship on its demand for aviation - related activities. Experience has shown that the most significant factors typically in this profile are population, and income.

1.12.1 Population

Current numbers available on population in terms of growth stem from the 1996 Census Profile. Overall the North Okanagan Region has seen an increase in population of 16% between the years of 1991 and 1996. The City of Vernon has seen an increase in population of 14.8% in the same span. Table 1-12 outlines the current status.

TABLE 1-12
AREA POPULATION

Area	Population (1991)	Population (1996)	Percentage Change
North Okanagan	61744	71607	16.0%
Vernon	27722	31817	14.8%
Armstrong	3200	3906	22.1%
Coldstream	7999	8975	12.2%
Enderby	2128	2754	29.4%
Lumby	1265	1689	33.5%
Spallumcheen	4717	5322	12.8%
Other	15744	18736	19.0%

1.12.2 Area Income

The North Okanagan Region boasts an above average family income with a national average of $46,000 and the North Okanagan average of $51,813. This above average income trend currently relates to the partial success of the Vernon Regional Airport. An above average disposable income in the region gives way to increased recreational activities, including aviation related functions, and an eventual increase in the demand for charter operations and sight seeing tours.

The Vernon Regional Airport has over 100 employees, with a payroll of 1.5 million dollars. A large number of employees carry a diploma or University degree in Engineering, Drafting, or hold a technical diploma from BCIT. As the airport businesses success grows, the attraction to the Okanagan lifestyle, high wages, and warm climate will help towards the continuing increase in the average income for the region. Table 1-13 outlines the current family incomes.

TABLE 1-13
AREA INCOME (1996)

Area	Average Income
North Okanagan	$51,813
Vernon	$50,316
Armstrong	$46,336
Coldstream	$67,817
Enderby	$39,144
Lumby	$44,895
Spallumcheen	$52,717
Other	$41,443

1.13 Surrounding Land Use

An examination of community-wide land use and growth patterns is necessary in determining where future concentrations of residential, commercial, and industrial uses are likely to occur. Land use conflicts can be avoided by carefully studying

alternatives for airport development while taking into consideration these land use patterns.

Land uses currently surrounding Vernon Regional Airport include agricultural, residential, commercial, and recreational. The airport is city-owned and operated, and lies within the contiguous city limits. In the past, residential development has been allowed to encroach on the airport and has impacted future expansion possibilities.

1.14 Indian Reserve #6

To the west and north of the Vernon Regional Airport lies the Indian Reserve #6. 2.83 hectares of these lands are leased to the city and are essential for airport operations as the center portion of the runway transits through the lands. There are 6 years remaining on the current lease.

1.15 Surface Transportation Network

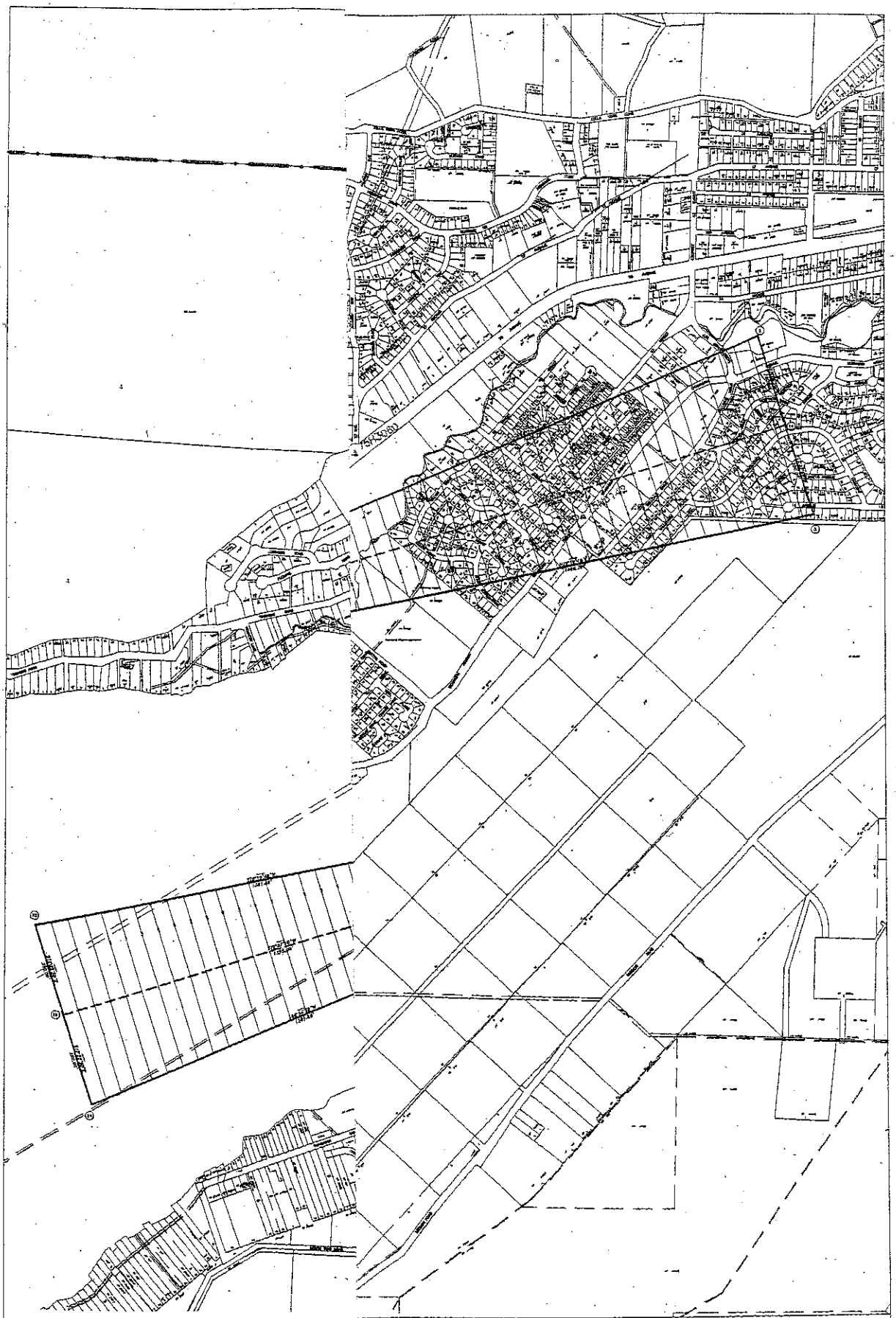
Transportation access to the airport is through road only. There is transit service to both the south and north sides of the airport. Travel time to the airport from Downtown Vernon is 7 minutes with bus service taking 15.

The primary transportation corridor in and out of Vernon is Hwy 97, which links up with the TransCanada Highway north at Sicamous. To the south is Kelowna City, which is 45 minutes by car. Highways 6 also provides access to Vernon from the southeast.

1.16 Climate

The climate in the City of Vernon is affected by its desert like topography and is susceptible to extreme summer temperatures and moderate winters.

Summer months are warm and the average daily maximum temperature is 30C during July. Winter temperatures are moderate and mild winter temperatures are not uncommon. Snowfall averages 36 inches per year and total precipitation is 17 inches. Prevailing winds are from the west and shift to the south-southwest during the passage of cold fronts. The extreme summer heat coupled with an elevation of 1140 feet ASL brings the Vernon Regional Airport runway length of 3360 to the forefront for larger high performance aircraft.



TITLE	AIRPORT MASTER PLAN APPROACH SLOPES FIGURE 1.3		
DRAWN	DATE	SCALE	DWG. No.
JR	99/04/26	N.T.S.	FIG1-3

1.17 Inventory Summary

The information provided within the Inventory-Chapter One provides a background upon which the remaining elements of the master plan are produced. Information on current airport facilities and utilization will serve as a basis for the development of the forecasts of aviation activity and for the determination of future facility requirements.

CHAPTER TWO

AVIATION DEMAND FORECASTS

The demand for aviation services has, historically, been closely related to the socio-economic character of its area of influence. As population and relative income grow there generally is a corresponding growth in the demand for aviation services. This section of the Airport Master Plan presents a summary of the estimated future levels of activity at the Vernon Regional Airport.

2.1 Purpose

Aviation demand forecasts serve three purposes in development of the master plan. Specifically, they provide the basis for:

Determining the necessary capacity of the airfield, terminal area, aircraft tie-down area, leasable space, fuelling requirements, and ground access system serving the airport;

Determining the airport's role, and resulting size, and type of existing facility expansion or new construction;

Evaluating the financial feasibility of alternative airport development proposals.

2.2 Approach

The development of aviation demand forecasts are conducted in two distinct phases: the analytical, followed by the judgmental. In general, past aviation activity data are examined in anticipation of identifying past trends that will give an indication of future activity. Trends in the local economy are factored into future activity levels, as well.

During the analytical process, the past trends of the aviation demand elements are extended into the future using a variety of techniques and incorporating a number of assumptions. Projections are developed by combining historical trends with various analytical procedures. After preparing a number of projections, the analyst is able to identify a range of growth within which the true trend will most likely fall.

The second phase of demand forecasting requires experienced professional judgment. The analyst examines various growth projections for each demand element, studies the character of the community and how it will influence the particular demand element, and then makes a determination as to the "preferred" forecast.

2.2.1 Projection Methodology

The most reliable approach to estimating aviation demand is through the use of more than one analytical technique. Methodologies usually considered for airport master planning include, trend line analysis, survey analysis, and forecast development.

Trend Line Analysis

Trend analysis is probably the simplest and most familiar forecasting technique and is one of the most widely used methods. Historical data is extended into the future, providing an estimate of the aviation demand element in future years.

A basic assumption of this trend analysis technique is that the historical levels for aviation demand will continue and exert a similar influence on future demand levels. As broad as this assumption may be, such a projection method often does serve as a reliable benchmark against which other projections may be compared.

Survey Analysis

Surveys can be developed that will provide an indication of present and future levels of aviation demand. For this study, personal interviews, questionnaires, and structured personal observation were used.

Forecast Development

The analytical projections serve as a basis for developing aviation demand forecasts through the application of experienced, professional judgment.

Informed judgment is perhaps the most valuable factor in forecasting any aviation demand element. Many variables can be accounted for in the analysis and assigned the proper weight, as viewed by the forecaster. Such variables include: development demands from on-site aviation related businesses as well as off site companies, changes in a community's competitive status with reference to job creation, long-term demographic shifts, tourism, and environmental limitations.

2.3 Aviation Demand Elements

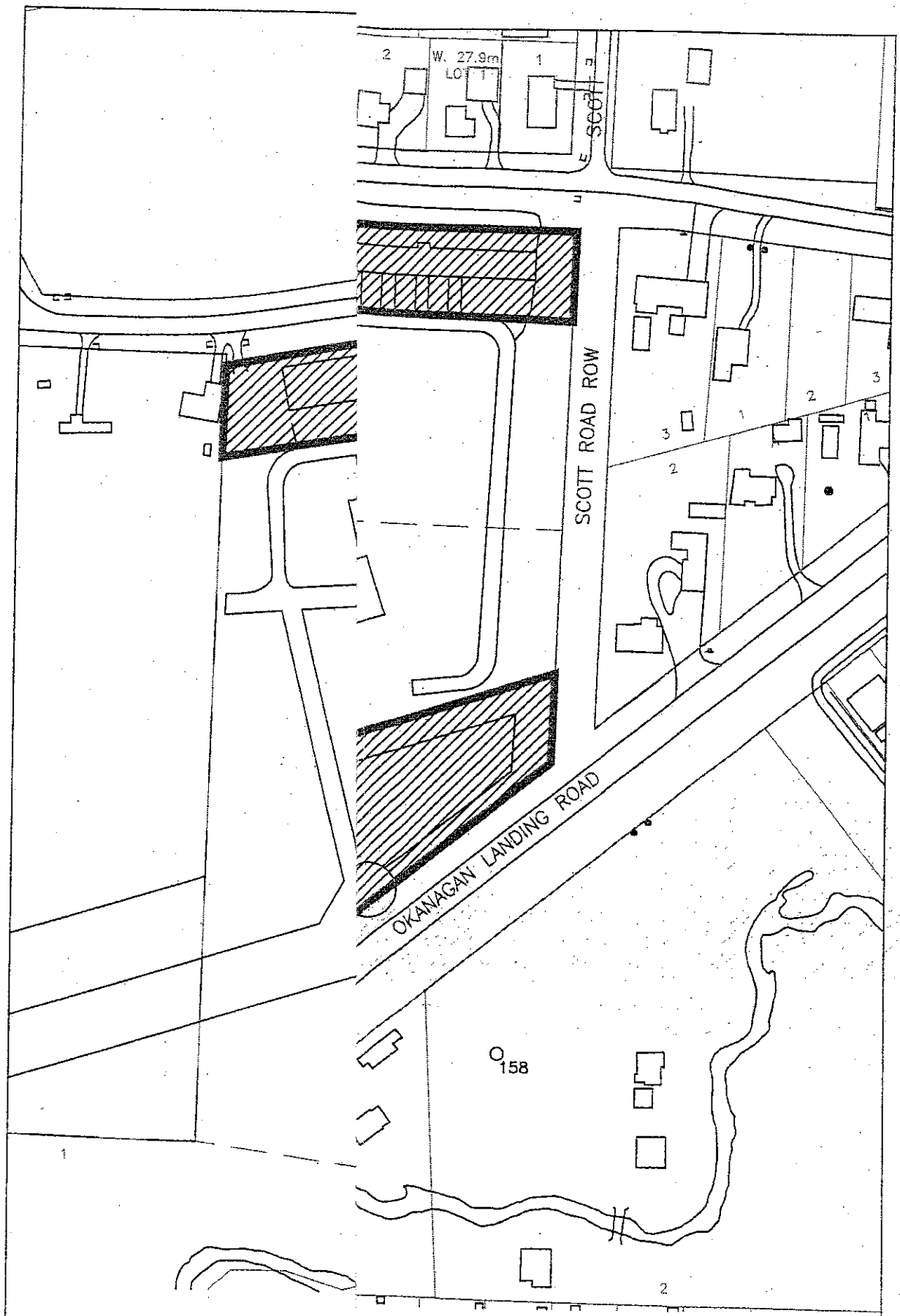
Forecasts of aviation demand can be developed for numerous elements. In the case of airports such as Vernon Regional Airport, the key demand elements are fully serviced land, based aircraft, aircraft operations (performance demand), and aircraft types. Other important elements are derived from these basic indicators. For this study, forecasts were prepared for:

Land Demand
Fuel Sales
Aircraft Tie-Downs
Aircraft Operations (field length)
Instrument Operations
Yearly Budget
Airport Capital Development Fund

The demand forecasts will serve as the basis for determining aviation facility requirements and staged development throughout the forecast period.

2.4 Land Demand Forecast

In 1990, the Vernon Regional Airport consisted of 12 buildings, a few businesses, a handful of aircraft and an active Flying Club. The airport was under the administration, management, and operation of the Regional District. During the early 90s there was intense demand, driven by an economy gaining momentum, for land at the airport for industrial and private purposes. In the last 7 years leased land at the airport increased by 41 %, to a current lease revenue of $57,504.00 yearly. Figure 2.1 displays the current land being used for commercial activities. Table 2.1 refers to the land demands for the last 7 years.



TITLE

AIRPORT MASTER PLAN
COMMERCIAL ACTIVITIES AREA FIGURE 2.1

DRAWN	DATE	SCALE	DWG. No.
JR	96/04/26	N.T.S	FIG2.1

TABLE 2.1 LAND DEMAND HISTORY	
Year	Leased area (sq ft)
1992	269,142
1993	300,831
1994	324,151
1995	343,586
1996	350,944
1997	368,405
1998	380,210

The trend line of table 2.1 has been used in determining future land demand at the airport.

2.4.1 Kelowna Airport

Kelowna Airport, located 30 minutes south of Vernon City Center has positioned itself as the center for passenger air travel. It is serviced by Air BC, Canadian Regional, WestJet, Coastal Mountain Air, Horizon Air, and a variety of charter services. An aggressive terminal expansion is currently underway as well as upgrades to their air navigation system.

Kelowna's philosophy is driven by passenger service, encouraging larger air carriers to use their facility and discouraging operations by smaller aircraft. With that said, Vernon Regional Airport finds itself poised to attract smaller industrial based businesses including aircraft manufacturing and maintenance to their facility. The impact of Kelowna's direction was used in the aviation demand forecast for future land demand.

2.4.2 Penticton Airport

Penticton Airport is located 1.5 hours south of Vernon. It is currently serviced by Air BC, Coastal Mountain Air, and Canadian Regional as well as small charter operators.

The airport is currently operated by Transport Canada and is subject to transfer according to the National Airports Policy. The recipient will be the City of Penticton and negotiations are underway to facilitate the transfer.

Unfortunately for the City of Penticton, the local Indian Band has made claims of ownership and is asking for a reversion clause in the new agreement with

Penticton. Should this reversionary clause not be granted, the band has communicated its intent to block the transfer.

This situation has brought instability to the airport tenants, and has made it difficult for the City to attract future long-term tenants to their airport. The possible impact of the situation was also take into consideration in the analysis of future land demand at Vernon Regional Airport.

2.4.3 Local Demand

There has been intense demand from local interests for developable land at the airport. Several businesses have expressed their interest in land acquisition for hangar and office space in the past 14 months. There is no hangar space available at this time at the Vernon Airport for long term or transient hangarage.

2.4.4 Land Demand Forecast Conclusion

Taking all of the above factors into consideration, using the application of the trend line analysis, survey analysis, and the development forecast, Table 2.2 shows the projected demand for serviced leaseable land.

TABLE 2.2
LAND DEMAND FORECAST (sq feet)

Year	New Land Demand	Total Land Demand
2000	18000	400000
2001	20000	420000
2002	22000	442000
2003	24000	466000
2004	26000	492000
2005	28000	520000
2006	30000	550000
2007	32000	582000
2008	34000	616000
2009	36000	652000
2010	38000	690000

PH I
460,000 ☐

PH II

2.5 Fuel Sales

Demand for fuel at the Vernon Regional Airport has been on the steady increase with the addition of new tenants, businesses, and aircraft. Transient aircraft have

accounted for a very small amount of fuel sales. The majority of fuel flow goes towards the local flying school, the corporate flight department of Kal Air Limited, and Vernon based aircraft.

2.5.1 Avgas 100/LL

There are currently two authorized tenants for distribution of 100/LL on the airfield. The amount of yearly 100/LL sales is difficult to estimate for the years prior to The City of Vernon's ownership of the airport as there was no need for the Regional District to track or report these numbers.

Traditionally, taking into consideration the amount of aircraft on the facility, the amount of movements, and the makeup of the fleet, fuel sales of 100/LL Avgas are close to 220,000 litres per year.

With the second fuelling operation coming on-line, competition will lead to lower fuel pricing and an anticipated increase in transient aircraft coming to the facility to purchase inexpensive fuel.

The City of Vernon is currently charging a $0.05/L fuel levy and will be in a position to more accurately predict the fuel flowage forecasts through the evaluation of the fuel levy numbers.

2.5.2 Jet Fuel

The majority of Jet fuel sales go to the Corporate Flight Department of Kal Air Ltd. Current estimates and information from the imposed fuel levy show a jet fuel flowage of approximately 250,000 Litres.

2.5.3 Flying School

Airline pilots in North America will be in large demand in the next 2-5 years due to several key factors. Airline Captains at the top of the pay scale are starting to retire in larger numbers than ever before. Further, aircraft are being kept in service longer due to improved technological advances in aviation maintenance and a relaxation of maintenance requirements for non-passenger based aircraft.

Coupled with the record number of orders from aircraft manufacturing companies, demand has never been higher for pilots. This trend has been taken into consideration with respect to flying school movements and hence, fuel sales for those aircraft operations.

2.5.4 Fuel Sales Forecast Conclusion

The existing fuel facilities on the Vernon Regional Airport as laid out in Table 1-5 will be sufficient to handle the fuel flowage into the year 2010. Taking all of the

above factors into consideration, using the application of the trend line analysis, survey analysis, and the development forecast, Table 2-3 shows the projected demand for and forecast for fuel sales into the year 2010.

TABLE 2.3
FUEL SALES FORECAST

Year	Litres	Revenues
1997 (estimate)	400,000	$ 4,492
1998 (actual)	470,000	$11,425
1999	570,000	$28,500
2000	598,500	$30,000
2001	628,500	$31,425
2002	660,000	$33,000
2003	693,000	$34,650
2004	727,500	$36,375
2005	764,000	$38,200
2006	802,000	$40,100
2007	842,000	$42,100
2008	884,000	$44,200
2009	928,500	$46,425
2010	975,000	$48,750

2.6 AIRCRAFT TIE-DOWNS

There are currently 40 aircraft tie-downs on the facility. 31 aircraft currently park outside leaving 9 available tie-down spots available.

2.6.1 Kelowna Class D – Mode C airspace

Nav-Canada, in January 1999 upgrade the airspace over Kelowna airport to a Mode C requirement. All aircraft coming in and out of the facility will need to have a mode C encoding transponder. There is a large number of aircraft housed in Kelowna that do not have the required equipment to operate. It is anticipated that two aircraft a year for the next five years will re-locate to the Vernon area because of this requirement, with the rest upgrading with the $3000.00 piece of equipment.

2.6.2 Ramp expansion

Phases two and three of the master plan with reference to facility requirements refer to a ramp expansion to the east and west of the existing ramp. This expansion will force the closure of 10 tie-down spots.

2.6.3 Private hangar construction

There are 4 more locations available for private hangar construction, all to the south of the north taxiway Delta. Upon construction of these facilities, there will be a loss of 4 tie-down spots.

2.6.4 Local Demand

Using trend-line analysis, there has traditionally been a one aircraft per year increase onto the facility.

2.6.5 Aircraft Tie-Down Forecast Conclusion

Taking all of the above factors into consideration, using the application of the trend line analysis, survey analysis, and the development forecast, there will be a demand of three new tie-down spots per year. Table 2-4 shows the projected demand for tie-down requirements into the year 2010.

TABLE 2-4
AIRCRAFT TIE-DOWN FORECAST

Year	Aircraft Demand	Spots	Remaining (Shortage)
1999 (actual)	31	40	9
2000	34	39*	5
2001	37	38*	1
2002	40	37*	(3)
2003	43	36*	(7)
2004	46	26**	(20)**
2005	49	26	(23)
2006	53	26	(26)
2007	56	26	(29)
2008	59	26	(32)
2009	62	26	(35)
2010	65	26	(38)

* indicates new private hangar construction year resulting in 1 lost spot per year.
** indicates phase two ramp expansion resulting in 10 lost spots.

2.7 AIRCRAFT OPERATIONS (FIELD LENGTH)

2.7.1 Design Aircraft

The design aircraft for the Vernon Regional Airport is the Cessna Citation II, which is the largest aircraft that will be using the facility on a regular basis. Currently there is one Citation housed at the airport. A second Citation, owned by a local company, is housed in Kelowna.

The "balanced field length" or more commonly known as the required runway length for the design aircraft under different configurations is shown in table 2-5 below.

TABLE 2-5
DESIGN AIRCRAFT PERFORMANCE NUMBERS

Operation Class	Temperature	Gross	Field length required
Private	15° C	Loaded	3370 ft
Private	30° C	Loaded	4420 ft
Commercial	15° C	Loaded	5729 ft
Commercial	30° C	Loaded	7514 ft

2.7.2 Corporate Philosophy

Vernon has a number of large sized businesses in the community, some of whom require air travel on a regular basis. Corporate flight departments are an economical and convenient way for executives and employees of the said companies to travel to their destination, with little or no effort.

Vernon Regional Airport has the ability to facilitate these companies needs. This facilitation requires proper planning with reference to runway length and especially long-term expansion planning as well as adjacent airport land use.

2.7.3 Density Altitude

Density is an important factor in the take-off performance of modern aircraft. Low density reduces engine thrust and aerodynamic lift. Density altitude is important in calculating the fuel and payload levels permissible for take-off. Both barometric pressure and temperature affect air density. Density altitude rises with air temperature, giving the aircraft characteristics of a higher altitude, and thus, reducing performance.

The hot Okanagan summers create this density altitude phenomenon throughout the summer months.

2.7.4 General Aviation Aircraft

General Aviation makes accounts for the majority of aircraft movements at the Vernon Airport. The typical general aviation aircraft at the Vernon Regional Airport is the Cessna 172. Characteristics of this aircraft show takeoff and landing distances below.

TABLE 2-5-2
TYPICAL AIRCRAFT PERFORMANCE NUMBERS
Cessna 172

Temperature	Gross	Field Length required	Field Length Required (50 ft obstacle)
10° C	Loaded	930 ft	1670 ft
20° C	Loaded	1000 ft	1790 ft
30° C	Loaded	1075 ft	1915 ft

2.7.5 Survey Analysis

A survey taken by the airport manager on runway field length expansion indicated that it was ranked a priority 5 on a scale of 1 to 10, 1 being the highest and 10 being the lowest.

2.7.6 Field Length Forecast Conclusion

After review of all the criteria, surveys, and taking the design aircraft into consideration, the ideal field length for the Vernon Regional Airport would be 4420 feet, putting the City of Vernon in a position to facilitate a privately registered Cessna Citation II at full gross using the field at 30° Celsius.

Further, an expanded field length will increase the safety margins for the smaller aircraft on the field.

2.8 INSTRUMENT OPERATIONS FORECAST

The forecast of Instrument operations provides further guidance in determining the Airport's requirements for additional facilities, and is especially important for type and extent of navigational guidance equipment. An instrument approach is defined as "an approach to an airport, with intent to land, by an aircraft in accordance with an Instrument Flight Rule (IFR) flight plan, when the visibility is

less than three miles and/or the ceiling is at or below the minimum initial approach altitude."

2.8.1 Current Classification

Vernon Regional Airport is classified as a Code 2B non-instrument airport. The current runway strip of 30 meters from centerline dictates this designation (see table 2-6 for existing regulations.)

TABLE 2-6
RUNWAY CLASSIFICATION REQUIREMENTS

Runway Designation	Required Strip
Non-Instrument	30 Meters from Center Line
Non-Precision	45 Meters from Center Line
Precision	60 Meters from Center Line

2.8.2 Corporate Requirements

The corporate flight department as well as the charter companies at the Vernon Regional Airport are in need of an approach to the airport facility. Currently the only approved approach in use is the Vernon NDB, which is only used as a cloud break procedure. These flight departments are under great pressure to ensure their passengers reach their destination, and under current conditions rarely need to divert to Kelowna or Kamloops.

2.8.3 Limitations

Due to the limited land available at the Vernon Airport, especially when it comes to depth (north/south), a designation of more than 30 meters on the runway strip would negate any land available for development.

The current designation would allow an approach to be as low as 501 feet AGL, which is sufficient for approaches in concert with the surrounding terrain.

2.8.4 GPS

Global Positioning System (GPS) is a technology which allows aircraft installed with certain encoders, to receive information on position, altitude, speed, and decent rate from an array of satellites currently in orbit.

The technology will be further enhanced with the addition of a Canadian Wide Augmentation System, due in 2004. This system will allow pilots the security of further accuracy with reference to altitude encoding of existing units.

This further accuracy will lead the way to more airports designating GPS approaches instead of the traditional localizer, NDB, and ILS approaches.

2.8.5 Survey Results

GPS approach was ranked as a type 7 project, leading to the conclusion that current pilots will continue to use VFR operations at the airport.

2.8.6 Instrument Operation Forecast Conclusion

The majority (95%) of aircraft movements in and out of the Vernon Regional Airport are through Visual Flight Rules (VFR.) The airport is a VFR airport and most aircraft on the facility and pilots prefer to fly VFR.

It is logical to assume that the increasing aircraft numbers based at the airport will operate in a VFR environment. Current demand for IFR facilities will not rise, leading to the conclusion that while a GPS approach would be beneficial, the demand for one at this time is minimal.

2.9 YEARLY BUDGET

SEE APPENDIX

2.10 AIRPORT CAPITAL DEVELOPMENT FUND

The forecasting of the capital development fund takes into consideration only revenues generated on the airport facility with reference to taxes and lease rates, not outside funds designated from City Council.

2.10.1 Lease Rates

Currently, the lease rate for unserviced land at the Vernon Regional Airport is $0.14 for private and $0.15 for commercial per square foot. The lease rate for fully serviced land is $0.23 per square foot.

The difference in the rate ($0.08) is designated for growth into the airport capital fund.

2.10.2 Taxes

City Council has agreed, on a recommendation from the City Treasurer, to allow the city's portion of taxes generated from new development at the Airport, to remain at the airport and in the capital development fund.

The city's portion of the taxes is 8.9394% of assessed value or $893.94 per $10,000.

2.10.3 Assumptions

- One new tenant projected per year on 100 x 100 fully serviced lot with $300,000 facility.
- One current tenant projected per year upgrades to fully serviced lot with $300,000 expansion.

2.10.4 Current Tenants

Several tenants at the Vernon Regional Airport have made requests for fully serviced lots and this trend was carried forward using the above assumptions to forecast the fund revenues.

TABLE 2-7
CAPITAL FUND

Year	Fully Services (sq. ft)	Lease revenues ($0.08)	Tax revenues (%8.9394/1000)
1999	26,000	$ 2080.00	$ 2680.00
2000	110,000	$ 8800.00	$ 7150.00
2001	120,000	$ 9600.00	$ 9830.00
2002	130,000	$ 10400.00	$ 12520.00
2003	140,000	$ 11200.00	$ 15200.00
2004	150,000	$ 12000.00	$ 17870.00
2005	160,000	$ 12800.00	$ 20560.00

2.10.5 Airport Capital Development Fund Forecast

Table 2.8 shows the projected Airport Capital Funds available through the development fund to the year 2005.

TABLE 2-8
CAPITAL GROWTH FUND

Year	Cash In	Fund Value
1999	$ 4,760	$ 4,760
2000	$ 15,951	$ 20,711
2001	$ 19,430	$ 40,141
2002	$ 22,920	$ 63,061
2003	$ 26,400	$ 89,461
2004	$ 29,870	$ 119,331
2005	$ 33,360	$ 152,691

Ultimately, these forecast figures will be used to develop facility recommendations, which will identify the future facility requirements at the Airport.

CHAPTER THREE

AIRPORT FACILITY REQUIREMENTS

Chapter Three identifies the long-range facility requirements for the Vernon Regional Airport to satisfy the annual aviation demand through the year 2010. The facility requirements are developed from information assembled in the inventory and forecast analyses and from Transport Canada criteria for design of airport components. The analysis yields estimates of required "airside" improvements such as runways, taxiways, navigational aids, marking and lighting, and "landside" improvements such as the terminal building, hangars, aircraft parking aprons, fueling facilities, vehicle parking spaces, and airport access requirements.

3.1 Airfield System

The primary components of the "airside" are those directly related to the arrival and departure of aircraft. These facilities are comprised of the runways and taxiways, navigational aids, and airport lighting and marking.

The development of airport facilities is based primarily on the characteristics of the aircraft, which are expected to use the airport. The most important characteristics are the approach speed and the size (wingspan) of the "design" aircraft expected to use the airport. A "design" aircraft is defined as the most demanding aircraft, which performs regular operations annually at the airport.

Transport Canada groups aircraft according to their performance and size. The categories range from Approach Category A, for slower single-engine piston aircraft, to Approach Category E, for supersonic jet aircraft. The "design" aircraft group now using Vernon Regional Airport falls into Category B (approach speed less than 166 knots/wingspan less than 79-feet/ wheel base less than 19 feet), which is considered a transport aircraft. Based on the forecasts of aviation demand, and for future long-term airport requirements, the "design" aircraft group will remain within Category B.

Along with the aircraft's approach speed, the airplane's wingspan is another principal characteristic, which affects airport design standards. There are six Airplane Design Categories, which range from Category A, for small aircraft with wingspans less than 49 feet, to Category E for the largest air carrier and cargo aircraft. The predominant aircraft now using the Vernon Regional Airport fall generally into Design Categories A and B (wingspans less than 79 feet). Based on the forecast analysis, the specific long-range "design" aircraft group for Vernon Regional Airport will fall within Transport Canada Airport Reference Code 2-B. This includes the Cessna Citation II which Kal Air Limited operates in and out of Vernon Regional Airport more that 300 times annually. The Beaver, Twin

Otter, King Air, Beech 99 and 1900, and Cessna Bravo and V, which in the past have also been used at Vernon Regional Airport, are Code B type aircraft. The de Havilland Dash-8 and Boeing 737 are classified as Code C aircraft.

3.2 Runway Requirements and Orientation

The condition and adequacy of the existing runway system at Vernon Regional Airport, including the runway length, pavement strength, and their orientation relative to area winds were assessed. From this analysis, future runway requirements were determined.

Area wind characteristics were assessed and are a major factor in determining the optimum number and alignment of runways. Wind coverage is not available for the Vernon Regional Airport due to the lack of a weather observation system on the field.

What is known from the re-alignment of the existing runway 05-23 in 1986 is that the winds primarily come up the valley from the Okanagan Lake side and thus the current orientation of 250° true is optimum.

The established goal for wind coverage is ninety-five percent (95%); that is, a light plane should be able to operate at an airport ninety-five percent (95%) of a given period without experiencing a crosswind component greater than 10.5 knots. Wind coverage required for larger, transport-type aircraft are 13 knots. Where a single runway does not provide a ninety-five percent (95%) usability factor, a crosswind runway is recommended. **The runway configuration currently in place at Vernon Regional Airport exceeds this established goal and thus a crosswind runway is not required.**

Another factor used to determine necessary airfield improvements is the comparison between demand and capacity. The most common means of measuring airfield efficiency is by determining the airport's operational capacity, or Annual Service Volume. This acts as a reasonable estimate of an airport's annual capacity. Overall, demand/capacity figures establish a time frame for projecting development to preserve and enhance airport operational safety.

3.3.1 Airport Annual Service Volume (A.S.V.)

The A.S.V. takes into account various airfield assumptions regarding the following features and operational characteristics that would be encountered over a year's time:

Runway and taxiway configuration
Runway use (expressed as a percent-use)

Visual Meteorological Conditions (VMC)
Instrument Meteorological Conditions (IMC)
Touch and Go factors
Aircraft mix categories (expressed as a percent-use)
Weather conditions
Runway lighting

The relationship between capacity, demand and delay is described as:

"As demand approaches capacity, individual aircraft delay is increased. Successive hourly demands exceeding the hourly capacity result in unacceptable delays. When the hourly demand is less than the hourly capacity, aircraft delays will still occur if the demand within a portion of the time interval exceeds the capacity during that interval. Because the magnitude and scheduling of user demand is relatively unconstrained, reductions in aircraft delay can best be achieved through airport improvements which increase capacity."

As a general rule, if aircraft delays develop to exceed 12 minutes, the demand has exceeded the capacity of the existing runway environment.

According to Transport Canada design models, the ultimate annual service volume at Vernon Regional Airport is approximately 87,600 operations annually. The ASV is based upon number of runways, separations between runways and the configuration of the airfield. If airport operations reached this number, Vernon Regional Airport would be at 100% capacity. Current movements are 13,000 operations annually.

3.3.2 Airfield Demand/Capacity Analysis

Ultimate annual operations are estimated to total approximately 23,000 per year by the year 2010. The ASV divided by the total annual operations produces the demand/capacity ratio, as expressed in percent. Given the forecast operating movement level of 23,000 the ultimate ASV is as follows:

Annual Operations/(23,000)

87,600 A.S.V. = 26.25%

As recommended by Transport Canada, airports are recommended to initiate planning to preserve and enhance capacity when 60 percent of the ASV has been reached. With an ASV of 87,600, it would take 53,000 annual operations to generate a demand/capacity ratio of 60%.

Some improvements will affect a particular element of the ASV, but will not significantly change the ASV from its present level. For instance, additional

connecting taxiways or additional runway length is typically not an alternative means of adding airport capacity. Any runway extension would not increase the ASV, but is an accommodation of aircraft performance. To increase the ASV at Vernon Regional Airport, an extension of the current parallel taxiway would be required. However, **the 60 percent capacity level will not be reached during the planning period therefore an extended parallel taxiway is not necessary.**

3.4 Runway Length Requirements

Runway length is generally a function of the performance characteristics of the "design" aircraft and site conditions at the airport. Runway length is also relative to the A.R.C. of the critical aircraft and to the role the airport is forecast to assume. The design aircraft Cessna Citation II has been previously identified in Chapter Two.

The main site conditions that affect runway lengths are airport elevation and the mean temperature of the hottest month of the year. Runway length is usually more dependant on take-off characteristics rather than landing characteristics of aircraft. Take-off requires the aircraft engines to provide thrust, which in turn creates lift over the leading edge of the wing. On hot days, lift is harder to create due to reduced air molecule density. Elevation is also a contributing factor to air density. The higher the airport elevation, the less dense the air becomes. To make up for the lost air density from heat or elevation, the aircraft needs to move faster and farther down the runways to create the lift needed to get airborne.

The runway length requirements at Vernon Regional Airport was determined based on three factors:

(1) The "design aircraft" expected to use the airport;

(2) The mean maximum daily temperature of the hottest month: and

(3) The airport elevation. Based on Vernon Regional Airport site factors MSL is 347 meters or 1140 feet, design temperature = 86F, wet and slippery runways, the required runway lengths were determined and are shown in Table 3-2.

TABLE 3-4 RUNWAY LENGTH REQUIREMENTS (TAKEOFF)			
Category @ Gross	**Length**	**Width**	**Strength**
Code A aircraft (20°C)	3148	75 ft	N/A
Code A aircraft (30°C)	3540	75 ft	N/A
Citation II (15°C)	3370	75 ft	N/A
Citation II (30°C)	4420	75 ft	N/A

3.4.1 Runway 05-23

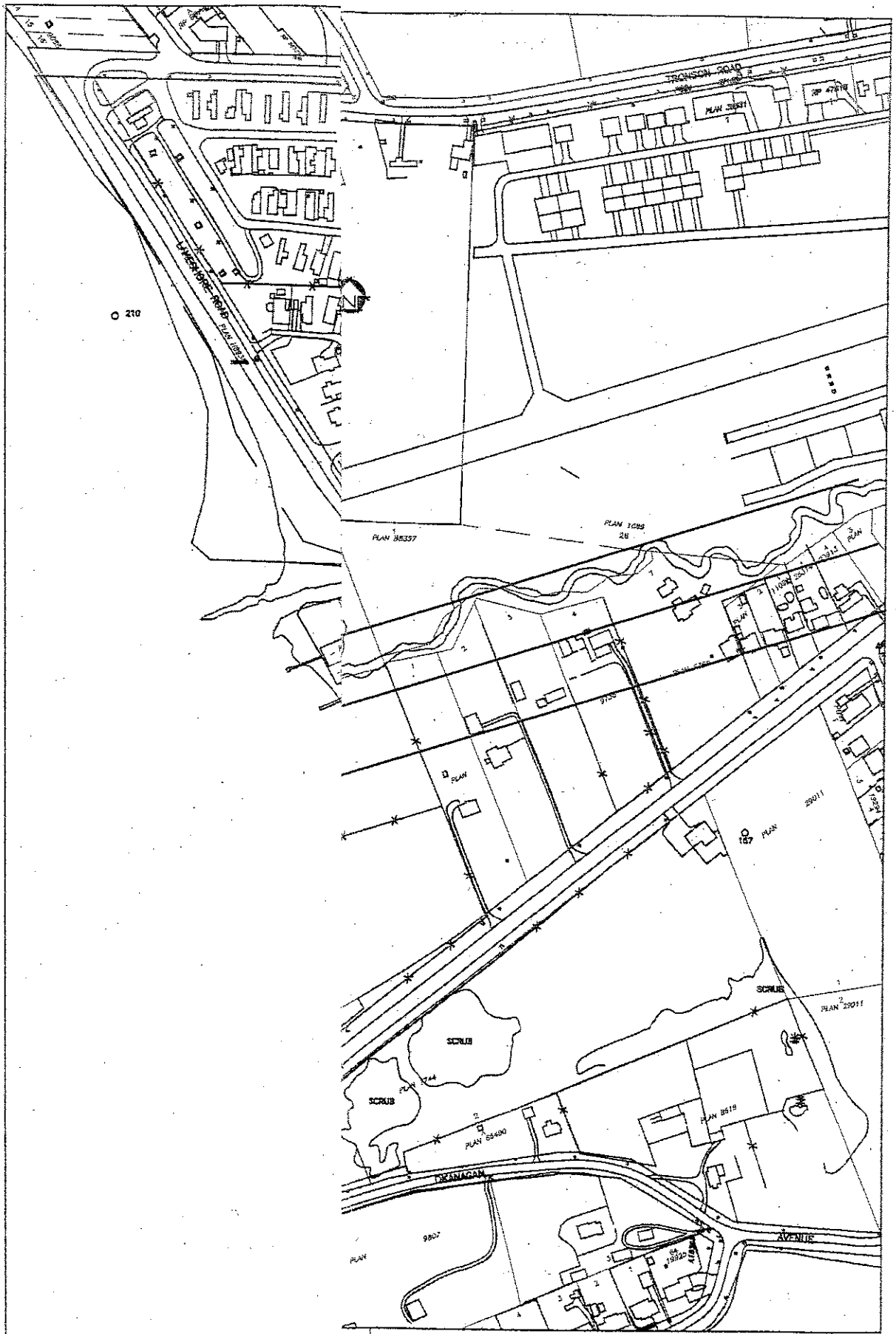
The runway was constructed in 1986 and will not need any major structural upgrades during the planning period. General maintenance will be required such as asphalt treatment and crack sealing. **Based on current facilities at Vernon Regional Airport, length, width, and strength remains adequate in the short term but inadequate throughout the planning period.**

It was identified in chapter two that the ideal runway length for the Vernon Regional Airport is 4420 feet, which would allow for the operations of the design aircraft at 30°C using gross weight numbers.

3.4.2 Extension options

In order to reach the optimum runway length of 4420 feet, a 1060-foot extension must be realized with a further reduction of the 460 foot displaced threshold to zero, leaving a full runway length of 4420 feet.

Upon initial evaluation of this extension, it has been identified that there will be an extreme impact on the adjacent lands and the current land use should this extension take place. Because of this, three options have been identified for runway extensions in Table 3.5 and in Figure 3.1.



TITLE **AIRPORT MASTER PLAN**
FIGURE 3-1

DRAWN	DATE	SCALE	DWG. No.
JR	99/06/24	N.T.S.	FIG3-1

TABLE 3.5 EXTENSION OPTIONS		
Runway Length	Extension Required	Impact on Surrounding lands
3590	230	None
4000	640	Moderate
4420	1060	Significant

3.4.2.1 230 Foot Extension

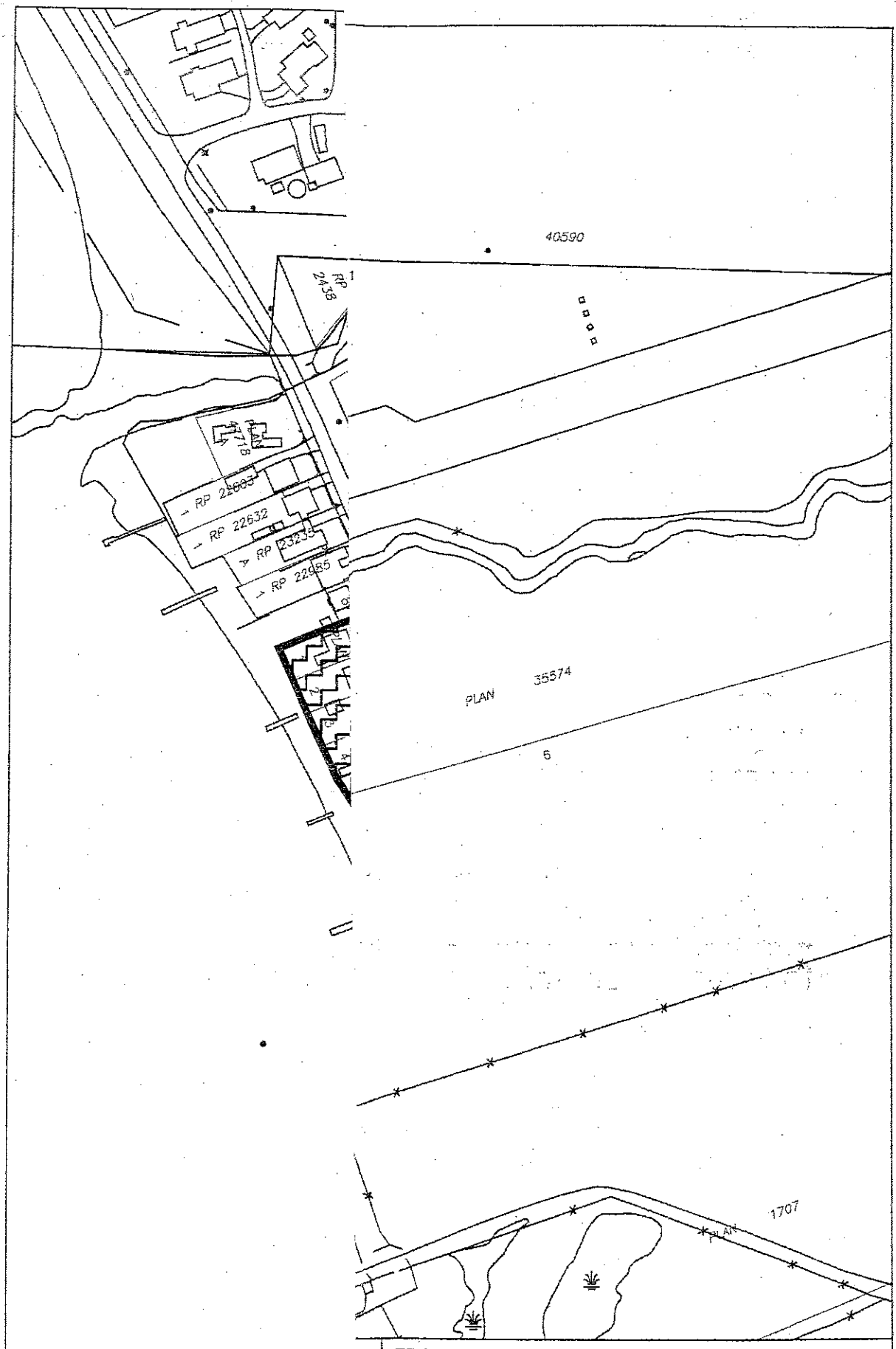
This option is easily attained and will have no impact on the current use of surrounding lands. Similar to the 200-foot extension added in 1998, an extension to the West End of the runway will have little of no impact on the Vernon Creek. The current structures in place on the approach path are below the required Transport Canada glide path. Some shoring up of the Creek will be required. The estimated cost for this project is $140,000.

3.4.2.2 640 Foot Extension

Figure 3.2 identifies the overlay of the existing facility with a 640-foot extension, and the effect it has on adjacent lands. In order to attain a 4000-foot runway through 640 feet of runway extension to the west, three projects must be initiated.

1. The Vernon creek, which flows perpendicular to the runway at the westerly end of the field, must be crossed or moved. Free span bridges are available and have been approved through the Ministry of the Environment in the past. Should the option of moving the creek be pursued, an environmental assessment study will have to be initiated and extensive consultations with the Ministry of Environment. At this time it is unknown if the government would grant approval for a creek relocation. As a general rule, any projects on creek works must be given back on a 2-1 basis. Should the City decide to initiate this type of project, it would have to present to the Ministry the 2X improvements that would be done to other portions of the creek adjacent to the airport lands with reference to improved conditions for fish habitat, etc.

2. The property west of the Laker's golf course, owned by Mr. Balber Thind, would have to be restricted to development under 11 feet. Currently the Thind property has been rezoned to R5, which allows 36-foot buildings. Mr. Thind is proposing duplexes on the lands at a height of approximately the same. Should



TITLE **AIRPORT MASTER PLAN**
FIGURE 3-2

DRAWN	DATE	SCALE	DWG. No.
JR	99/06/24	N.T.S.	FIG3-2

this development be allowed to proceed, the airport's runway length would be sealed to a maximum of 3590 feet.

3. The City of Vernon would have to encourage the GVPRD to continue their direction on acquiring lakeshore properties on the West Side of Lakeshore Road. Once attained, the vegetation would have to be trimmed back permanently to allow a proper 3° glide slope for the approach to runway 05, and for departures off the end of runway 23.

The new runway length of 4000 feet will ensure safe operations for existing aircraft, and aid in attracting larger industry to the airport site. Traditionally 4000 feet is the benchmark for code B aircraft with reference to balanced field length and serves as the optimal safety margin for smaller code A aircraft.

3.4.2.3 1060 foot extension

4420 is the largest runway that can serve the Vernon Regional Airport as it is bounded by Lake Okanagan to the west, and Okanagan Landing Road to the east. For this option to occur steps 1-3 in the above section must occur along with the further purchase of the 4 lots on the East Side of Lakeshore road. These homes would have to be moved or demolished along with the homes on the West Side of Lakeshore Road.

3.5 Taxiway Requirements

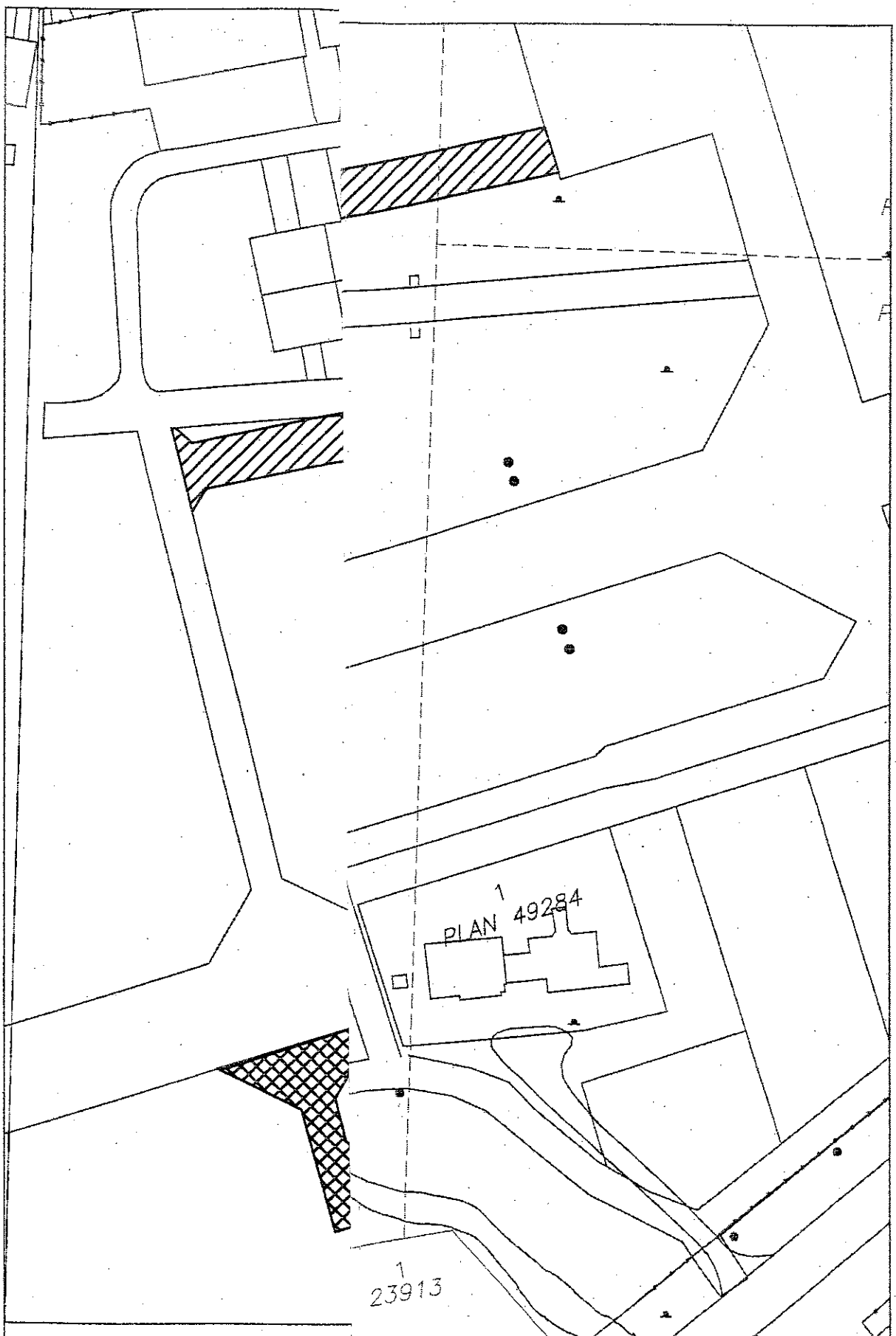
Taxiways are one of the most important factors in determining and maintaining the operational safety of an airport. As airport activity increases (take-offs, landings, and touch and go maneuvers), faster access from the runways to the taxiway system is required to maintain safety.

Because taxiways are considered critical areas, they should be constructed to the same pavement strengths as the runways they serve. Taxiway Charlie, which served as the old runway until 1986, is deteriorating and will require some patching and minor works during the study period. Figure 3.3 outlines future taxiway options.

The current taxiway environment is adequate throughout the planning period at the Vernon Regional Airport.

3.6 Airport Lighting and Marking

In order to obtain the maximum utilization of the airport, lighting is necessary to accommodate aircraft during night and adverse weather conditions. There are



TITLE

VERNON AIRPORT MASTER PLAN
FIGURE 3–3

DRAWN	DATE	SCALE	DWG. No.
EJS	99/06/24	1:1,250	Fig3–3

several different types of lighting aids recommended to facilitate and enhance the identification, approach, landing, and taxiing operations. Recommended systems, many of which are already in place, include:

3.6.1 Runway Lighting

Runway edge lighting is the standard lighting system used to define the lateral and longitudinal limits of the usable landing area. This lighting system is classified according to its intensity and brightness. Airports with over 10,000 annual operations, or runways with visual or non-precision instrument approaches should be equipped with standard medium intensity runway lighting (MIRL). Light posts are placed along the edge of the runway sides and separated by a maximum of 200 feet. Runways with an Instrument Landing System (ILS) are required to have High Intensity Runway Lights (HIRL). **The existing types of edge lighting systems at Vernon Regional Airport are adequate throughout the planning period.**

3.6.2 Taxiway Lighting/Marking

Taxiway edge lights emit blue light and are used to outline the edges of the taxiway system. The existing and ultimate taxiway system has Medium Intensity Taxiway Lights (MITL) for use on taxiways and aprons. MITL's are recommended in conjunction with a runway having MIRL's or HIRL's. Taxiway lights can also be pilot-controlled and wired to the same remote system as the runway lights. **The existing taxiway lighting systems at Vernon Regional Airport are adequate throughout the planning period.**

3.6.3 Visual Guidance Indicators

Visual slope descent indicators are used as an approach aid during the final transition to a runway end. Precision Approach Path Indicators (PAPI) are a system of lights, normally installed on the left side of the runway, which provide continuous visual descent guidance information (5 miles for daytime and up to 20 miles at night) during a visual or instrument approach to the runway. These lights are primarily intended for use during visual flight rules weather conditions. PAPI's are recommended for all runways used by turbojet and air carrier type aircraft. **The existing PAPI system at Vernon Regional Airport is adequate throughout the planning period.**

3.7 Airport Signs

Standard airport signs provide taxiway and runway directional and identification guidance for aircraft movement on the ground. A system of standard signs is currently in-place and is recommended to distinguish runway, taxiway and

aircraft parking destinations. **As improvements to the runway and taxiway system at Vernon Regional Airport are implemented, runway intersections and connecting taxiways should be identified through adequate signage.**

3.8 The Triangle

The lands bounded by Okanagan Landing Road, Tronson Road, and the proposed Scott Road form what is referred to as the triangle. The triangle is critical to operations at the airport, as it is under the short final for runway 23, and on the stage 2-takeoff climb for runway 05. The short final is the most critical portion of landing and the stage two area the most critical for takeoffs.

Currently there is significant vegetation growth in the triangle and residential units. Several properties in the triangle have current growth that go beyond a safe approach surface by up to 22 feet. Because of this growth, Transport Canada has decommissioned the precision approach path indicators (PAPI) for runway 23. The PAPI is mainly used for night landings and have the most impact on the higher performance code B aircraft. The PAPI is an essential tool for safe airport operations.

Title of these lands would allow for the relocation of the existing displaced threshold to the runway edge, increasing the landing distance available for runway 23 and thus increasing the safety margin.

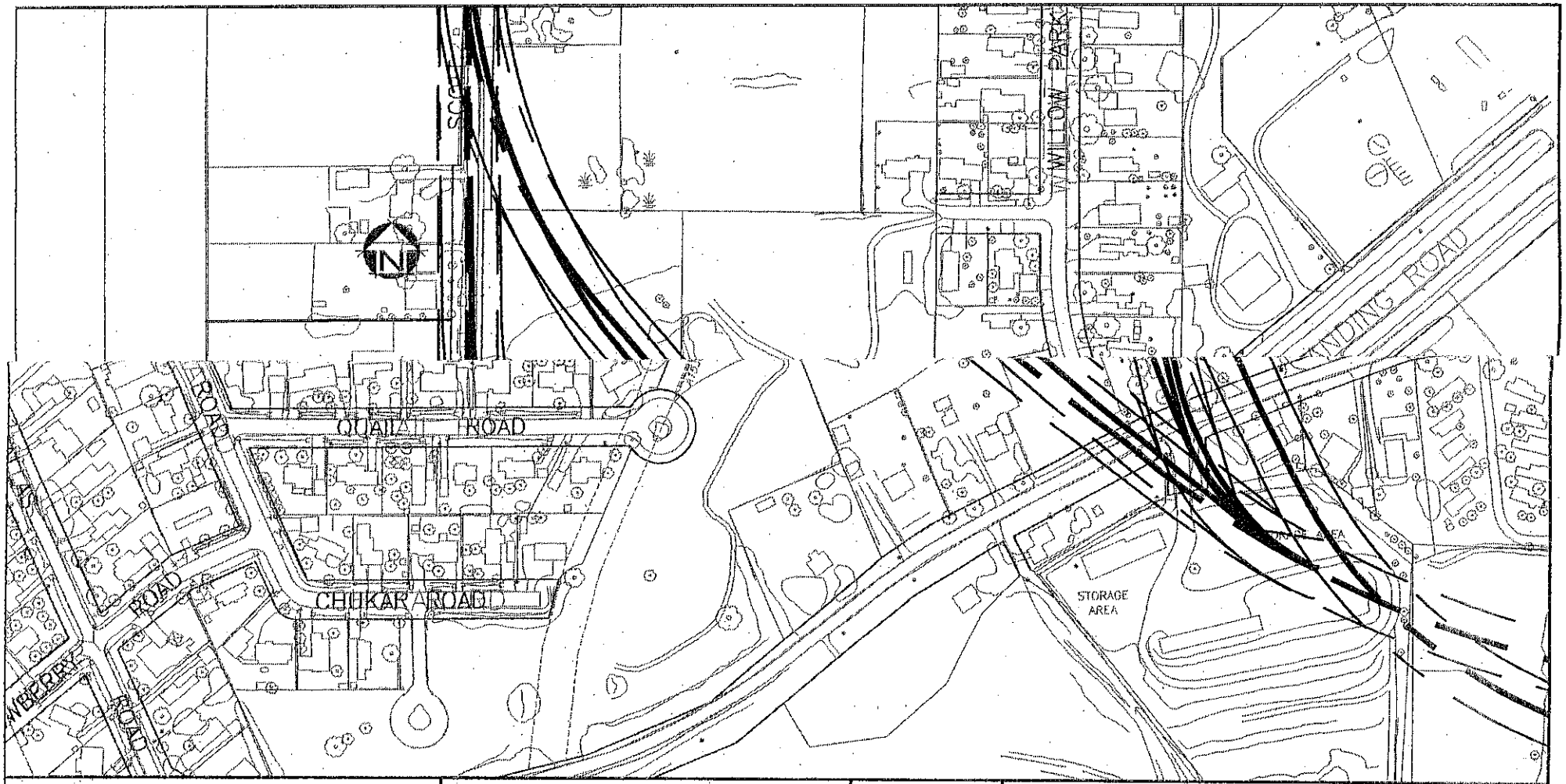
Ownership of these lands is essential to long term safe aerodrome operations leading to the eventual ownership of the same. Approximate cost is $1,200,000. The triangle lands would be used as a long-term aircraft parking area, which will be in a short position in 2002.

Further the lands will be used as the proper entrance into airport lands, with proper signage and landscaping. The triangle serves as a natural expansion for the airport lands.

3.8.1 Scott Road Re-Alignment

The current alignment of the proposed Scott Road is not conducive to safe airport operations. The road falls on the edge of the mandatory safety zone referred to as the stopway, a 60-meter level area off the end of any runway environment. The proposed road further complicates access to the triangle, in order for these lands to be realized and utilized, the proposed Scott Road must be rerouted from its current location.

Alternatives for the relocation of this portion of the Scott road right-of-way have been identified by the Engineering Department and are attached. Alternate 1A will have the least impact on the airport environment if built.



the CORPORATION of
the CITY of VERNON

ENGINEERING DEPARTMENT

REVISIONS

TITLE

AIRPORT MASTER PLAN

FIGURE 3–4, SCOTT ROAD ALIGNMENTS

DRAWN	DATE	SCALE	DWG. No.
LAM	99–07–02	1:3,000	FIG3–4

3.9 Electronic Navigation

Airport navigation aids (NAVAIDS) are facilities and equipment installed on or near the airport for the purpose of providing pilots with electronic guidance and visual references for executing an approach to the airport and landing on a specific runway. The purpose of installing and/or upgrading navigational aids is to increase an airport's reliability. The use of this equipment depends on the ratings of the pilot and the instrumentation capability of the aircraft. Each facility in the NAVAID development process adds greater reliability but at increasing cost. Progressively, each additional NAVAID allows aircraft to fly during lower ceiling and visibility minimums. The traditional development process is as follows: 1.) Non-directional beacon (NDB); 2.) VOR or VORTAC.; 3.) Localizer, and; 4.) Precision Instrument Landing System (ILS/MLS). The only system available to aircraft in the vicinity of Vernon Regional Airport at this time is the Vernon NDB.

On the forefront of navigational systems for aircraft is the Global Positioning System (GPS). Transport Canada has approved non-precision approaches but has yet to established precision approaches. GPS is a navigational system that links on board aircraft receivers to satellite transmitters. Vernon Regional Airport does not currently have non-precision GPS instrument approaches to the Runway.

Upgrading and installation of a navigational aid system is usually accomplished with federal fund assistance from the ATAP or ACAP Airport Improvement Program or through initiations by NavCanada, Canada's facilitator of Nav Aids. Eligible items include visual navigational aids, electronic navigational aids, and weather aids.

3.10 Terminal Area Requirements

Currently, there is no terminal facility at the Vernon Regional Airport. A "private" terminal facility is being operated by the local flight school which has couches and flight planning, with a snack machine and coffee. Adjacent to the flight school are washrooms in the building of the Vernon Flying Club. The terminal is defined as that portion of the airport used by itinerant aircraft for flight planning, washroom, and food services. It is also used as a holding area by departing and arriving passengers of charter and possible future scheduled carriers. **A terminal facility will be required during the planning period.**

The location of the terminal facility will be adjacent to the main ramp on the north side of the airfield. The terminal area is approximately 250 x 70 feet. The terminal facility should be an ongoing concern.

The facility should have the following:

1) Six to eight hundred square feet of common area for passenger with furnishings

2) A restaurant/coffee shop, including a kitchen and an airside outdoor patio.

3) Public washroom space, including a handicapped facility.

4) Office space to house various businesses. This number may vary depending on the anticipated demand.

5) A flight-planning room.

6) Sterile customs search room.

7) Airport Managers office.

8) Two public telephones, one inside the facility and the other outside for after hour calls.

9) Ample parking.

Total size of the facility is 3000 – 4000 square feet.

3.10.1 Terminal Options

There are two option available for the construction of the terminal facility:

1) Private run facility

This model entails a proponent who will lease the land from the City of Vernon and will design, construct, operate, finance, and manage the terminal facility. The operator will become the lessee of the land as set out by the leaseholder's agreement. The operator will manage and operate the facility, and to deal directly with all shareholder's interest. Additional agreement between the City and the proponent may be required. The City will leaseback a small space for the manager's office, while the rest will be the responsibility of the proponent. The common area will be deemed public and thus, access will be available to the general public.

2) Publicly funded facility

The City of Vernon undertakes construction of the facility with funding coming from within or through applications to ATAP for terminal facilities. Approximate cost is $250,000 for the ideal facility.

The upside of this option is the control that the City will have of the facility and how it is run; the facility becomes a truly public facility with revenues coming from lease tenants and commissions on parking and vending machines.

3.10.2 Automobile Parking

Parking demand is a function of the number of persons utilizing the airport, either as passengers, meeters and greeters, vendors, or employees and customers of on-site businesses. The size of parking facilities varies depending on the amount of employees and customers that use the airport as their destination.

Due to land constrains and the tight quarters between the existing taxiways on the north side of the field and Tronson Road, each business will be required to supply adequate parking for their own facility. This leaves the Vernon Regional Airport in a position to only provide itinerant parking on the facility. **Space at this time on the North side is ample, and will be for the duration of the planning period. The City constructed an itinerant parking lot on the south side and thus, space is ample for the planning period.**

3.10.3 Commercial Apron

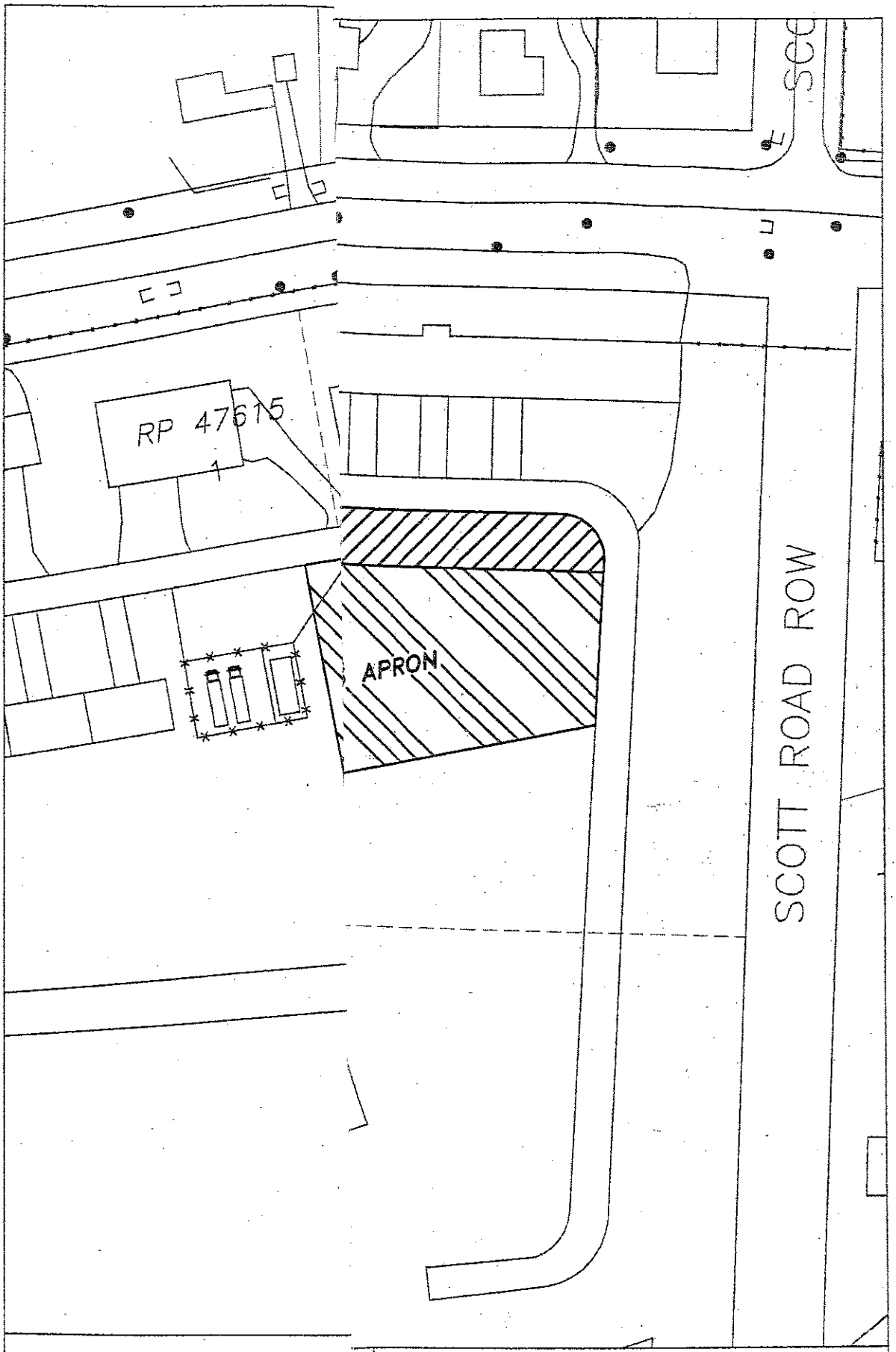
At regional airport locations like Vernon, aircraft are generally taxied in-and-out of parking positions under their own power. This is the most cost-effective operating procedure but requires more space between parked aircraft.

One parking position is necessary per aircraft. During the summer months, and as activity increases at the airport, apron space will continue to be in demand. Currently there are frequent occurrences when itinerant aircraft must park on the grass or private tie-down area due to lack of ramp space. Further, large aircraft are confined in their maneuvering capabilities and require more space for parking operations. **Existing apron space is estimated to be inadequate throughout the planning period.** Figure 3.4 identifies the ultimate proposed apron expansion area.

3.11 Aircraft Rescue and Fire Fighting (ARFF) Requirements

Currently there are no requirements for ARFF at the Vernon Regional Airport. There is however proposed amendments to the Canadian Aviation Regulations, which are designed to require specific emergency response standards at all non-designated airports that serve commercial passenger aircraft. Vernon Regional Airport does not currently have commercial passenger service but for discussion purposes will project that scheduled service will be available during the planning period.

The draft regulations and standards are based on the number of aircraft movements handled per day and the type of operation. Types of operations are



TITLE

VERNON AIRPORT MASTER PLAN
FIGURE 3-5

DRAWN	DATE	SCALE	DWG. No.
EJS	99/06/24	1:1,000	FIG3-5

grouped as follows; air taxis are defined as aircraft authorized to carry fewer that 10 passengers, commuter aircraft authorized to carry between 10 and 19 passengers; and airlines authorized to carry 20 or more.

> Category A airports – which handle air taxis or fewer that eight commuter aircraft movements per day – would be required to have an alerting system to a community-based fire service, as well as on-site fire extinguishers.
>
> Category B airports – which handle eight or more commuter aircraft movements or fewer than eight airliners per day – would be required to have an alerting system to a community based fire service, along with either an on-site trained emergency responder, vehicle and equipment, or community fire response within 10 minutes.
>
> Category C airports – which handle eight or more airliner movements per day – would be required to have trained emergency personnel, vehicles and extinguishing agents on site, and a communications and alerting system, along with a response capability of three minutes.

Vernon Regional airport is within a 10 minute response area of the Okanagan Landing Fire Department and have the capability to meet the Category B airport requirements. **The Aircraft Rescue and Fire Fighting Requirements will be adequate for the duration of the planning period.**

3.12 Conclusion

The Master Plan for the Vernon Regional Airport represents a unique and important opportunity to construct a clear vision of where the airport is in the present and where it should be going in the future. The Airport Master Plan is intended to serve as a medium for assembling community opinion, spirit, and concurrence and has been built with the help of all the tenants and current stake holders.

The Vernon Regional Airport is in a position to capitalize on the growing economy and makeup of the surrounding airports during the next 10 years. With the increasing demand for aviation related industrial sites, coupled with the increased passenger activity of the Kelowna Airport, Vernon finds itself a near perfect fit for smaller aircraft operations, corporate flight requirements, and the industrial maintenance and manufacturing that is subsequent to it.

Financial considerations for execution of the capital projects discussed in the Airport Master Plan are broken down below and reflect 1999 dollar values.

Land Purchase (Triangle)		$1,200,000
Runway Extension		
	Construction Costs	$ 500,000
	Land Purchase	$ 250,000
Terminal Facility		
	Municipal Built	$ 250,000
	Private Public Partnership	$ 50,000
Phase I	Apron	$ 80,000
Phase II	South Side Commercial	$ 160,000
Phase II	Apron	$ 80,000
Phase III	Apron	$ 140,000
North Taxiway Re-Alliignment		$ 200,000
North Side Water/Sanitary/Storm		$ 450,000
North Side Road		$ 170,000

Total (assuming P3 terminal facility) $3,300,000

THE CITY OF VERNON
1999 BUDGET - SECTION SUMMARY

DEPARTMENT: ADMINISTRATION BUDGET CATEGORY: AIRPORT OPERATIONS

DESCRIPTION OF CATEGORY AND LEVEL OF SERVICE

Increase in lease rates not accounted for as directed to Airport Development Fund.

Increases in the 1999 budget include provisions for the following:

Tree trimming in anticipation of zoning
Environmental Insurance

The 1999 budget is based upon the 1998 budget with reallocation of funds to split categories. The major difference is an assumed increase in revenues through a $0.05/litre fuel levy.

SUMMARY DETAIL	1997 ACTUAL	1998 BUDGET	1998 ACTUAL	1999 BUDGET
Salaries	18,000	58,500	49,965	58,500
Airport Advisory Commission		500	243	300
Land Lease	21,000	21,000	21,104	21,000
OPERATIONS				
License and Subscriptions	-	1,000	522	1,000
Utilities & Insurance	8,000	8,400	10,340	9,800
Snow Removal	9,000	20,000	12,795	20,000
Road Maintenance	4,000	-	457	1,000
Runway Maintenance	10,250	-	132	1,000
Other Maintenance	19,600	20,000	13,037	18,000
Office Expenses	-	5,000	7,379	8,400
Tree Trimming/Removal	4,000	-	450	5,000
Administration Allocation	5,400	-		-
Legal/Marketing	2,700	-	195	-
Landscape	-	18,000	32	10,000
Capital	12,000		1,042	
TOTAL COSTS	113,950	152,400	117,693	154,000
REVENUES				
LAND LEASE/TIE DOWNS	63,809.00	68,000.00	66,625.00	64,960.00
FUEL LEVY	3,000.00	10,000.00	11,425.00	28,500.00
TAXATION	31,817.00	74,400.00	64,643.00	60,540.00
TRANSFER FROM RESERVE	15,000.00	-	-	-
TOTAL REVENUES	113,626.00	152,400.00	142,693.00	154,000.00
YEAR END SURPLUS/RESERVE B	85,000.00	-	25,000.00	-

ADDITIONAL INFORMATION:
Does NOT include capital costs.

PROJECTED YEARLY INCOME/EXPENSE REPORT

Assumptions:

One new commercial tenant projected per year on 100 x 100 fully serviced lot.
One new private hangar per year.
2 new aircraft using annual tie down per year.
Fuel sales increase by 5% annually.
All lease rates remain constant for five years.

REVENUES		1999	2000	2001	2002	2003
Tie-down	$365.00 Annually	$ 9,125.00	$ 9,855.00	$ 10,585.00	$ 11,315.00	$ 12,045.00
Commercial	$ 0.15 per sf	$ 49,254.00	$ 51,024.00	$ 52,524.00	$ 54,024.00	$ 55,524.00
Private	$ 0.14 per sf	$ 9,142.00	$ 9,577.00	$ 10,012.00	$ 10,447.00	$ 10,882.00
Fuel Levy	$ 0.05 per litre	$ 28,500.00	$ 29,925.00	$ 31,421.00	$ 32,992.00	$ 34,641.00
ANNUAL REVENUE		$ 96,021.00	$ 100,381.00	$ 104,542.00	$ 108,778.00	$ 113,092.00
ANNUAL EXPENSES (2 % increase)		$ 154,000.00	$ 157,080.00	$ 160,221.00	$ 163,426.00	$ 166,697.00
DEFICIT		**$ (57,979.00)**	**$ (56,699.00)**	**$ (55,679.00)**	**$ (54,648.00)**	**$ (53,605.00)**