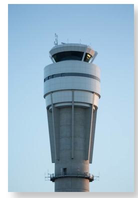
Calgary Departure/Terminal



---

1. Introduction

Control of the Calgary Terminal airspace is a shared responsibility between the Calgary Departure and Calgary Arrival controllers. Departure's traffic therefore includes:

- Calgary departures
- Satellite airport IFR arrivals and departures (Springbank, Airdrie, Chestermere, and Okotoks)
- Aircraft transiting the terminal airspace (overflights)

For smooth traffic flow in the terminal, it is imperative that all Terminal controllers work together and coordinate their traffics control.

This module will introduce general radar procedures, and then deal with specific procedures and techniques used by the Departure controller. Finally, satellite airport operations are addressed, including an introduction to IFR approaches.

Because of the large number of new topics addressed with respect to radar procedures, this module is quite lengthy. To help break it up, satellite can be treated as a separate area from departure. Learn the first few sections up to section 5 Departure Techniques first, and when you are comfortable with Departure, move on to the sections about Satellite.

1.1 References

This module makes regular references to other documents, including real-world documents. While all of the required knowledge is contained within this training syllabus, students may wish to increase their knowledge of related topics. All of the documents listed here are excellent references of real-world knowledge.

1.1.1 MANOPS

This is NavCanada's manual for how controllers are expected to do their jobs. It contains all the rules controllers must learn and follow. All of our training is based on the contents of this document, but simplified for brevity (MANOPS is almost 1000 pages). If questions or uncertainties about our procedures arise, we consult MANOPS.

1.1.2 CARs

These are the laws of Canada, with respect to aviation. Transport Canada is responsible for application and enforcement of them. Operating per our training and MANOPS should keep you on the right side of the law. The CARs are available on Transport Canada's website: www.tc.gc.ca/eng/civilaviation/regserv/cars/menu.htm.

1.1.3 TCAIM
Also published by Transport Canada, the AIM is intended to provide a single-source of information concerning rules, procedures, as well as general background information for operating aircraft in Canada. The AIM provides a reference to how many rules should be applied in a more plain language than the CARs themselves. The current AIM is available from Transport Canada: www.tc.gc.ca/eng/civilaviation/publications/menu.htm.

1.1.4 CAP
The CAP contains all the IFR procedures for all airports in Canada (broken into various books by region). A controller must be familiar with charts relevant to airports they are controlling. (For example, Departure should be familiar with the Standard Instrument Departure (SID) charts for CYYC.) All controllers should have an account with fltplan.com, which obtains all current charts.

---

2. Radar Rules, Procedures and General Knowledge
Terminal controllers are responsible for a large block of airspace. It is not possible to see the entire airspace (unlike a Tower controller), so radar is used as a primary tool to "see" all the relevant traffic and coordinate safe passage within terminal the airspace.

This section introduces procedures and information that any radar controller will need to perform their job effectively.

2.1 Providing Radar Service
An aircraft should be informed any time they are being provided with radar service, and any time the service terminates for any reason.

To provide an aircraft with radar service, you must first confirm the identity of the particular aircraft. On VATSIM, we use one of 3 basic techniques:

M511.1
You may consider an aircraft identified, provided one of the following conditions is met:

A. The aircraft is observed on radar to be in a position, within one mile of the runway used for takeoff, that is consistent with the time of takeoff and the route of flight or assigned heading of a departing aircraft.
B. The appropriate change in the PPS is observed after the aircraft is instructed to operate the Ident feature of its transponder.
C. The appropriate change in the PPS is observed after the aircraft is instructed to change from one code to another.

Once an aircraft is identified, advise the aircraft that they are "Radar Identified." Once an aircraft is identified, you should tag it (F3, then click aircraft), so others know you control that aircraft. (Do not use the phraseology "Radar Contact". This is American phraseology and is not used in Canada.)

If radar service is terminated because the aircraft leaves your airspace, cancels IFR, or disappears below your radar's sightlines, advise the aircraft "Radar Service Terminated". This is not required if the aircraft is on an approach. When radar identification has been lost, aircraft must be told: “Radar Identification Lost”.

Don't say "Radar Identified" and "Radar Service Terminated" if you are simply receiving the aircraft from, or passing the aircraft to another radar controller. The radar service continues with other radar controllers.

2.1.1 Altitude Readout Validation

The altitude displayed on an aircraft's data tag must be validated before it can be used as a means to provide vertical separation to that aircraft. An altitude readout may be considered valid if it does not differ from the aircraft's reported altitude by more than 200 feet. (**M503.1**) Pilots should normally state their current altitude on initial call to a controller. If a pilot does not, they should be asked "Report Your Altitude" (or "Report Passing Altitude" if they are climbing/descending).

2.1.2 Radar Separation

The Departure controller must provide separation between aircraft operating in the TCA that satisfies one of the following:

- Vertical Separation of 1,000 feet
- Lateral Separation of 3 miles, however wake turbulence separation must also be provided in accordance with M533.2 as follows:
  - Heavy behind a Heavy - 4 miles
  - Medium behind a Heavy - 5 miles
  - Light behind a Heavy - 6 miles
  - Light behind a Medium - 4 miles

    (Note: a Boeing 757 is considered heavy if it is the lead aircraft.)

2.1.3 Issuing Vectors to an Aircraft

MANOPs defines a Vector as a heading issued to an aircraft for the purpose of providing directional guidance by means of radar. Therefore in order to issue a heading, the aircraft must first be radar identified (See section 2.1). **M553.1** states that there are three methods to vector an aircraft. They are to:

A. Specify the heading to be flow.
B. Specify the direction of the turn and the heading to be flown after completion of the turn.
C. Specify the direction of the turn and the number of degrees to turn.

The second method is most commonly used where the direction of the turn and the heading are specified. Take care not to issue an incorrect left or right direction with the turn (easy to do for southbound aircraft - turn directions are relative to the aircraft's direction, not your radar screen).

The third method is commonly used to issue minor course adjustments or vectors around traffic.

Aircraft should normally be given the reason for being vectored by ATC. In some cases, the reason may be already known and not need to be mentioned. For example, the CYYC SIDs all specify that radar vectors to the route will be provided, so this does not need to be repeated. Similarly, STARs that end at a Downwind Termination Waypoint specify a heading to be flown and state that vectors will be provided to final. Repeating the purpose of the vectors would be redundant.

Example: "Air Canada 795, turn left 20 degrees, vectors traffic."

2.1.4 Termination of Vectors

M557.2 states that an aircraft must be informed when vectoring is discontinued. This occurs when the aircraft is on a heading to intercept their outbound airway or on a track proceeding directly to a fix on their planned route. The approved phraseology to inform an aircraft when vectors have been terminated is to say "Resume normal navigation". In practice this phraseology is almost never used. The term commonly used is "on course" which is a shortened form of "Proceed on course”.

Examples:
“WJA432 proceed direct LOMLO on course”,
“COM410 cleared direct LOMLO on course”
or to intercept Q821:
“WJA432 turn left heading 330, intercept Q821 on course”

In the first two examples, the aircraft has been authorized to make a turn from their track direct to LOMLO where they will resume their previously cleared route (most often the flight planned route). In the last case, the aircraft will fly the specific heading until it crosses Q821, where it will then turn onto Q821 and continue its cleared route.

M557.1A and **M557.2** state that aircraft do not need to be informed of termination of vectors when an aircraft is cleared for an approach. The vectors will obviously terminate when the aircraft intercepts the approach track.

2.1.5 Altitude Instructions

In Canada's Southern Domestic Airspace, transition from altitude to flight levels occurs at FL180. This is when all aircraft set the standard altimeter for Flight Levels (at or above FL180), or the local altimeter for altitudes (below FL180). Altitudes are always feet ASL, and thus this does not need to be stated.

Instruct aircraft to "Climb" or "Descend". Avoid use of the word "maintain".
Altitudes should be spoken by saying each digit in thousands (and hundreds) or each digit in a flight level..
Examples:
"WEN251, Climb Flight Level Two-two-zero." (Not "Two-twenty")
"WEN268, Descend One-one thousand." (Not "Eleven thousand")
"WEN123, Descend Two thousand five hundred.”

Avoid use of the word "to", as this can easily be mistaken for the word "two" and may cause confusion. (Don't say "Climb to 5,000" - omit the word “to".)

You can specify a time or place to be level, though this is usually only used for descents, not climbs.
Example: "JZA4474, descend 12,000. Cross GVEP level.”

You can also request aircraft to expedite climbs or descents when necessary (for example, to climb over other traffic), or even specify a rate.
Examples:
"DAL123, maintain 2,000 fpm (feet-per-minute) or greater in descent."

"JZA4474, expedite climb through 12,000 for traffic."

2.1.6 Issuing Multiple Control Instructions
When it is desired to issue several control instructions in one transmission, the information should be issued in the same format. Standard phraseology requires that the order be: Heading, Altitude, and Speed. Speed is issued by saying "Speed" then the digits of the airspeed followed by "knots" though in practice often the word "knots" is omitted.

Example: "CJA100 turn left heading two nine zero, climb one one thousand, speed two eight zero knots."

2.1.7 Exchanging Traffic Information
Because vertical separation is the method used to keep departures and arrivals apart, often aircraft will be separated by the minimum required separation of 1,000 feet. When two aircraft will be separated by the minimum separation and the targets are likely to merge, a controller is obligated to exchange traffic information with each pilot. (**M165.4** contains full details.) Traffic information based on radar identified aircraft should always be in the following format: Position, Distance, Direction, Type and Altitude. Position of traffic should be given in terms of the 12 hour clock in relation to the aircraft so a pilot will be able to find their traffic easily. Example phraseologies:

- Position: Traffic 3 o'clock, traffic 12 o'clock
- Distance: 3 miles, 5 miles
- Direction: Southwest bound, Opposite Direction, Eastbound
- Type: Airbus 320, Boeing 767, Light Twin, Cessna Single
- Altitude: Level at 8,000, Climbing to 7,000, In descent to 8,000, 1000 feet below or above

Example: "KLM692 traffic 2 o'clock, 5 miles, a northbound CRJ at 8,000"
In cases where the other target is not radar identified, the following phrases can be used:

- "Type and altitude unknown"
- "Type unknown, altitude indicates 7,000, unverified."

The first phrase is used for traffic without a transponder or altitude readout. The second phrase is used when an altitude readout is available, but it has not been validated by the pilot (see section 2.1.1).

It is important to use the standard format each time traffic information is issued as pilots expect the information to be given in this format to aid them in ascertaining their traffic visually.

2.2 Aircraft Performance Navigation

2.2.1 Aircraft Navigational Equipment
A controller should be aware of the different types of navigation equipment pilots use in flight, and of their associated suffixes filed in flight plans. These codes tell ATC what equipment is onboard, and thus what methods ATC can use to get an aircraft on course. Most aircraft today are /G (GPS) or /Q (RNP). These are types of Area Navigation, where an aircraft can navigate directly to any random point in space (including any named fix, VOR, etc.). Other less common letters are /O for VOR, /F for ADF/NDB. /S is standard which now includes VORs but not NDBs. Aircraft without RNAV may be cleared direct to a specific supported navaid (VOR or NDB), or to intercept an airway connecting the two (eg. "Heading 330 to intercept J510 on course"), but

can't navigate directly to a fix that isn't an actual navaid. This doesn't occur often on VATSIM, but must be considered.

AIM RAC 3.16.4 contains all current equipment codes.

2.2.2 Speed Restrictions

Canadian Aviation Regulations state that aircraft are not to exceed 250 knots indicated below 10,000 ASL (**CAR 602.32)**. This aids controllers in maintaining separation at lower altitudes, where fast and slow aircraft mix, and many aircraft may be converging and manoeuvring to land.

CAR 602.32 contains a second limit to further aid controllers. Aircraft within 10 miles of a controller airport are limited to 200 KIAS below 3,000' AGL. This provides even more breathing room to controllers around airports.

It should be noted that controllers are authorized in the same regulation to permit aircraft to exceed the 200 knot limit, but it must be approved by ATC. ATC cannot authorize aircraft to exceed the 250 knot limit, except if the aircraft's minimum safe speed is greater (in which case, the aircraft must maintain minimum safe speed).

Another factor which restricts a departing jet aircraft's initial airspeed are NADPs. NADP stands for Noise Abatement Departure Procedure, and at Pearson jets are required to conduct their initial climb-out profile following either NADP 1 or NADP 2. The purpose of these procedures is to limit the noise footprint of over noise sensitive areas by planning thrust reduction, flap retraction, and acceleration at certain times.. Both NADP procedures terminate at 3,000 feet AGL and aircraft may then begin accelerating to 250 kts. The impact to the Departure controller is that an aircraft that follows a NADP procedure will, in general, show a higher rate of climb and lower ground speed until they reach 3,000 AGL than would an aircraft not flying a NADP profile. Realistically NADPs are not a significant issue for the VATSIM Departure controller; however one should be aware of the existence of these procedures which may change the initial climb profile of departing jet aircraft.

---

3. Departure-Specific Rules, Procedures and Knowledge

The Calgary Departure Controller has many special rules and procedures in place to help safely coordinate and expedite movement of aircraft through this crowded airspace. Any candidate for this position must be well aware of all rules and procedures to provide safe and efficient service.

3.1 SIDs at Calgary

There are two types of SIDs (Standard Instrument Departures): Pilot Nav and Vector SIDs. Calgary uses both types. The definition of the SID types can be found in MANOPs, but essentially are as follows:

- Pilot Nav - A route is specified in the SID for transition from departure to the enroute strucutre. This generally includes altitudes and specific tracks to specific fixes/waypoints.
- Vector - ATC will provide navigational guidance via radar vectors to help aircraft establish themselves on course.

Calgary uses traditional Vector SIDs, as well as some (Pilot Nav) SIDs. The controller will provide vectors to separate traffic, and eventually guide the aircraft to intercept the route specified in the SID. A sample of each type of SID is shown on the next page.

As per a SID or instructions issued by the Clearance Delivery controller to the pilot, IFR aircraft departing Calgary are authorized to climb initially to 7,000 on (approximately) runway heading.

SIDs were introduced in the Clearance Delivery module, as they are assigned by the Clearance Delivery controller. (Review the Clearance Delivery module if you need to recall the SIDs and when to use them.) You should also review the actual SID charts to familiarize yourself with their routings through Departure airspace (especially the Pilot-Nav SIDs).

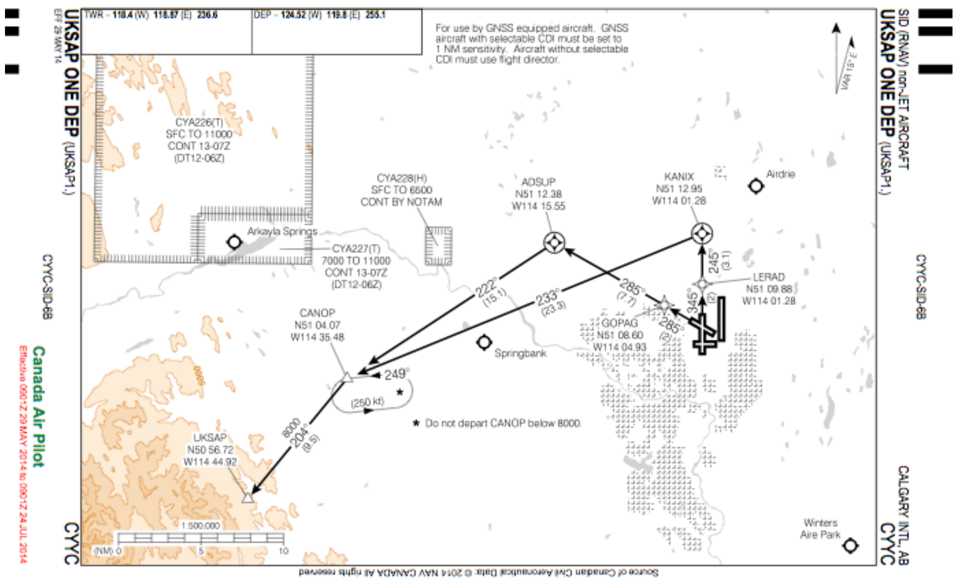


Figure 3-1: An RNAV SID (UKSAP1)

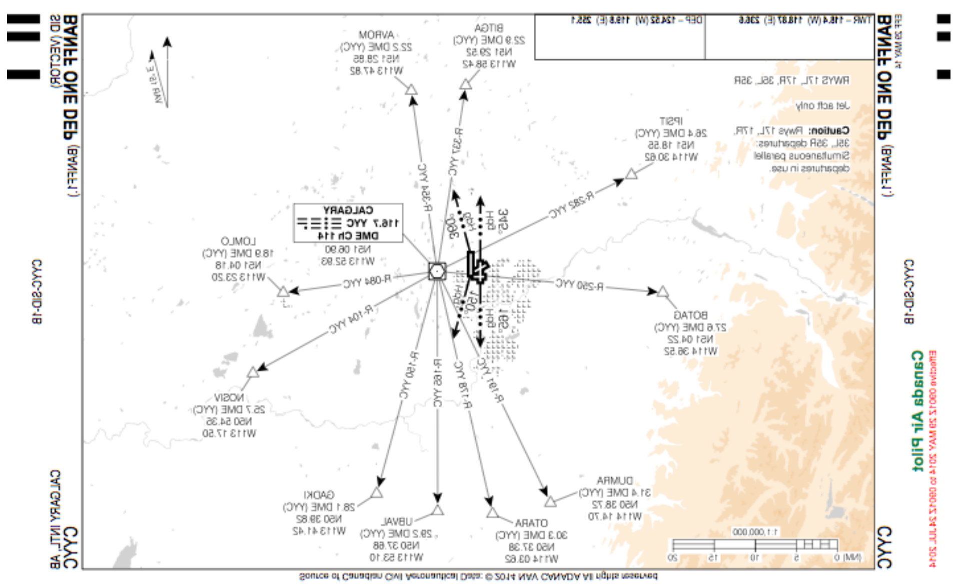


Figure 3-2: A VECTOR SID (BANFF1)

3.2 Altitude Assignment
The Departure controller may assign a maximum of FL210 to any jet or prop aircraft departing CYYC.

3.3 IFR Release of CYYC Departures
Since the Calgary Departure airspace is structured only to take aircraft away from Calgary, a special Auto-Release, or "SYD", agreement is in place between the Tower and Departure. When Departure grants "SYD", or "Subject to Your Discretion" to the Tower, Tower is responsible for initial IFR separation of departing aircraft. Tower does not need to request an individual release for each aircraft departing off the active runway.

3.3.1 Non-Conforming Departures
There are two types of non-conforming departures:
- Departures from an inactive (crossing) runway.
- Departures from an active runway that is not correct for the direction of flight. (eg. Aircraft departing east via LOMLO, but departing off 35L instead of the normal 35R.)

Departures from an inactive (and usually crossing) runway require explicit release from the Departure controller. SYD does not apply to inactive runways.

Active runway non-conforming departures do not require an individual release, but the Departure controller should be advised well before the non-conforming is ready to depart. Tower should coordinate with Departure, to ensure the non-conforming aircraft departs at a time that will allow Departure to arrange a safe crossing of the other runway's departing traffic (possibly by holding departures off the other runway briefly till the non-conformer has crossed the other runway's centreline).

Example Phraseology:
Tower: "Request Release WJA676, a LOMLO transition jet, off 35L."
Departure: "I'll advise" if unable
Departure: "WJA676 valid 35L" to release

3.4 Control Transfer of Departing Aircraft
Although IFR aircraft become the control of the Departure controller once airborne, a prop or overshooting aircraft on a heading assigned by Tower cannot be changed by Departure until that aircraft has left the Control Zone. The Departure controller must keep in mind that if a situation arises where separation may be compromised between an aircraft handed off to them from Tower and any other departure; they are to take appropriate action in order to avoid a loss of separation, and to ultimately ensure flight safety.

3.5 Radar Identification
On initial contact with every Calgary IFR departure, Departure must:
- Inform the aircraft if and when they are being provided with radar service and
- Verify the aircraft’s Mode C readout

On VATSIM, through CanScope, a departing aircraft which has been previously cleared for takeoff by a Tower is to be considered radar identified to the Departure controller on receipt of a handoff (**M511.1I**). When a Tower is not online, and the aircraft has not been provided with

Airport Control service by another controller acting as a Tower, then radar identification may be established by means of **M511.1E** (Ident function) or **M511.1G** (change squawk code).

3.6 Noise Abatement
In reality the Departure Controller has a responsibility to contribute to effective noise management in order to minimize the impact of departure noise to the surrounding communities. The departure noise abatement restrictions must be applied to aircraft at all times. The SIDs in use at Calgary incorporate the noise abatement requirements and, except for weather, emergencies or missed approach separation, jets may not be instructed to commence a turn before reaching 6,500 ASL. Props and are permitted to be turned below 6,500, but only when assigned a heading by a Tower or Departure controller.

3.7 Hand-offs to Centre
In general, aircraft must be handed off to the next controller on their flight planned route. If this is not going to be possible, it must be coordinated in advance with the affected controller.

Handoffs should be initiated as soon as possible (as soon as the aircraft is established to an on-course fix and there are no more traffic conflicts), and must be completed before aircraft leaves the Terminal boundary. The job of Departure is to guide the outbound aircraft away from arrivals, climb them and put them on course and ensure good spacing from previous and succeeding departures. It may be considered poor work practice to ‘hang on’ to aircraft as long as possible before initiating a handoff to the next unit. Consideration for the pilot and the next controller must be taken into account when handing off to Centre and a late handoff may result in an aircraft levelling off unnecessarily. Typically on VATSIM at Calgary if there are no Terminal overflights, a handoff to Centre may be initiated once an aircraft has been cleared to their first fix or is on a heading to join their filed route and is free of all arriving aircraft. Usually handoffs to Centre should be commenced between 17,000 and FL180.

---

4. Calgary Terminal Airspace Overview
Calgary’s Terminal Airspace has been designated to provide an organized environment for the heavy traffic levels at CYYC to be transitioned safely from the airport to the enroute structure and vice-versa. As a secondary function, Calgary Terminal Controllers also coordinates IFR traffic for the 5 satellite airports that are under the Calgary Terminal Airspace.

The Calgary Terminal Airspace is an area within 30 nm of Calgary International that is designated Class C airspace up to 12,500 (above 12,500 to FL210 is Class B). The floor of the Class C airspace varies, from the surface within 7 nm of Calgary, to 4,800 to 8,000 in successive rings around Calgary. Class C requires VFR traffic to be cleared to enter the airspace from the appropriate ATC (Departure in this case). By raising the floor of Class C airspace further away from Calgary, VFR traffic can get to the satellite airports underneath Class C without being required to call the Departure controller.

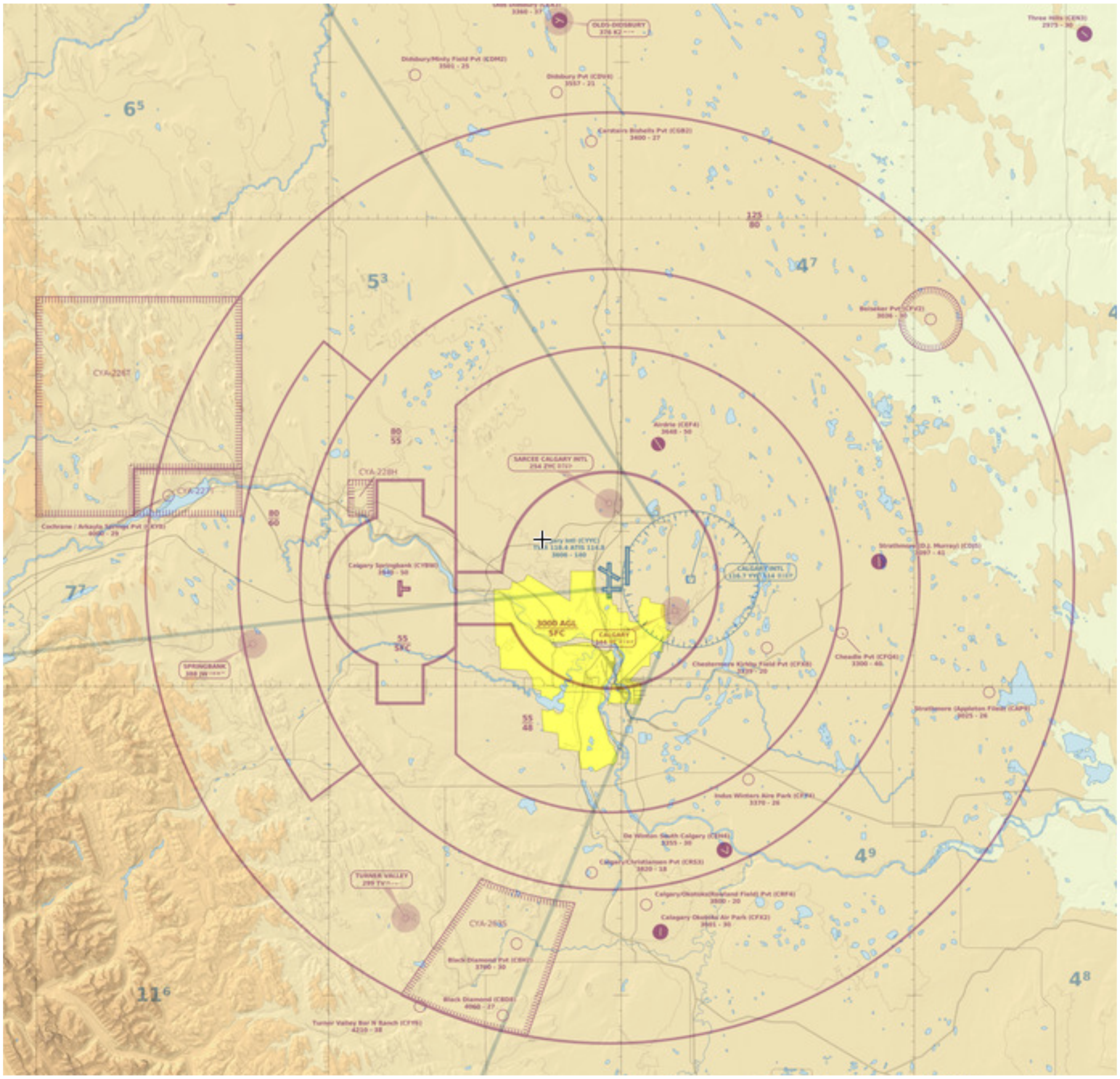


Figure 4-1: Dimensions of the Terminal Control Area (Class C Airspace)

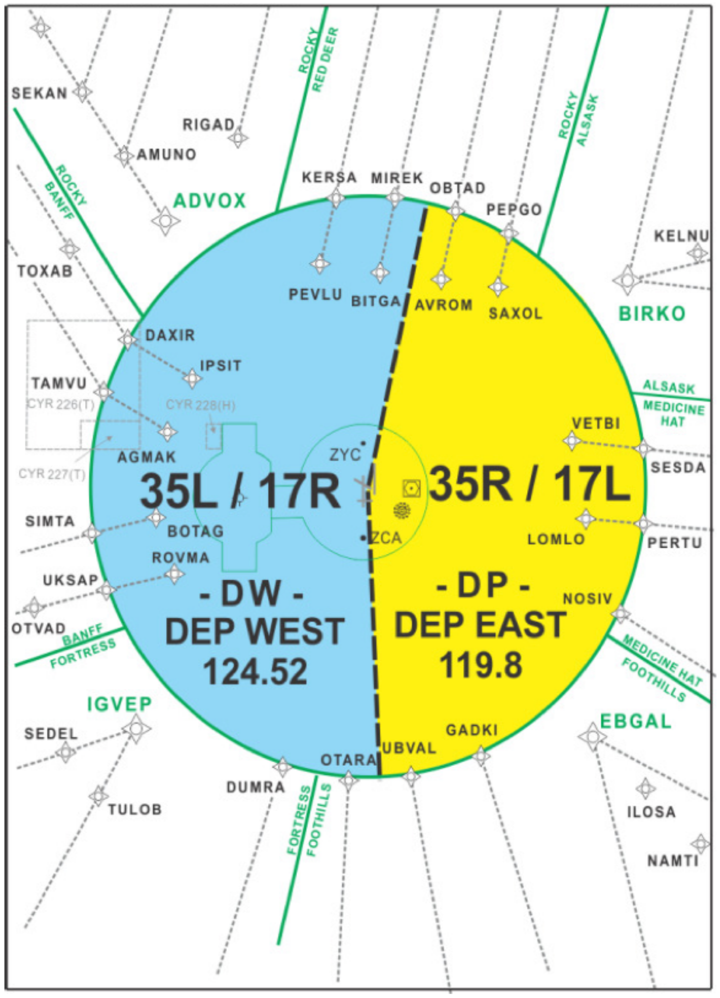
The Terminal Airspace can be subdivided many different ways, depending upon the amount of staff available, traffic levels, and of course the active runways at CYYC.

4.1 Departure Split Operations

When Calgary operates in a dual north-south configuration, Departure may be split into two positions:

West Departure - works runway 17R/35L and uses 124.52 MHz (CYYC_W_DEP)
East Departure - works runways 17L/35R and uses 119.80 MHz (CYYC_E_DEP)

Normally on VATSIM, the Departure position is operated by a single controller using 124.52 MHz. (CYYC_DEP).



4.1.1 Satellite and Satellite Splits

Should traffic levels (and available staff dictate), the Departure airspace can be subdivided again into Departure and Satellite positions. The role of the Departure controller remains the same, guiding aircraft from their departure at CYYC to their first fix, and climbing them to FL210. The Satellite controller takes control of all low level airspace (below 12,500) in the Terminal area.

The Satellite position can be split into two positions:

East Satellite - works east of the CYYC/CYBW CZ border, including CEF4, CDJ5, CEH4 and CFX2 using 119.40 MHz (CYYC_E_TML)
West Satellite - works west of the CYYC/CYBW CZ border including CYBW using 123.85 MHz (CYYC_W_TML)
If only one Satellite controller is online, they use 119.40 MHz (CYYC_E_TML).
Regardless of position, satellite controllers identify themselves on the radio as "Calgary Terminal."

On VATSIM, the Satellite position is very rarely staffed. Satellite airspace is usually covered by the Departure controller, as the traffic levels at the satellite airports are very light (on VATSIM), and the boundary between Departure and Satellite is complex and confusing. It is generally reserved for big events involving satellite airports.

5. Departure Techniques

The main function of Departure is to attempt to permit aircraft to climb continuously toward their cruise altitude, while guiding them on course and avoiding traffic. In general, the Departure controller will use radar separation (lateral distance) to keep departures separated from each other and use vertical separation (altitude) to keep departures separated from arrivals. The Arrival controller uses the same strategy as well - lateral radar separation to keep arrivals separated from arrivals and vertical separation to keep arrivals separated from departures. Because both Departure and Arrival use vertical separation to keep one's aircraft apart from the other's, procedures are in place in order to move all of the climbing and descending traffic efficiently while ensuring safety. This is done by using the process "look and go." The departure controller handling a departure off RWY 35R, departing to the east, can only clear an aircraft to climb to 7,000 if an arrival on the BIRKO or TIDUK arrival has already been cleared to 8,000. Likewise, the departure can climb to 9,000 if the arrival has only been cleared to 10,000.

5.1 Spacing Techniques

The Departure controller must provide the Centre controller with a minimum spacing of 8 miles between similar-type aircraft departing along the same route of flight. There are two methods to create and maintain spacing between aircraft. They are vectoring and speed control. Generally vectoring is used to create initial spacing and speed control used to maintain it. It would be difficult to try and fully explain the details of spacing techniques here because one must see how a traffic situation unfolds while using them. Nonetheless some basics can be mentioned.

5.1.1 Vectoring

Consider two consecutive similar performance jets departing off the same runway (17R) and both having filed via SIMTA West. Assuming Tower provides the minimum 3 miles radar separation between these two aircraft, vectoring can be used to increase the spacing to the required 8 miles by controlling the flight path distance each flies before reaching SIMTA. The first aircraft can be turned as soon as possible to a heading of 260, and cleared direct to SIMTA as soon as they are clear of the IGVEP STAR. Once they are clear of the arriving traffic, a climb to FL210 can be issued. When the second aircraft departs, there are a few options:

- Keep it on the SID and let it run out for a few extra miles before starting its turn towards SIMTA.
- Extend the crosswind turn. Allow the second aircraft to fly a few extra miles on the 260 heading before they are cleared to direct to SIMTA.
- Vector the second aircraft to parallel the Final Approach Area on a heading of 345. This is longer than being immediately cleared direct to SIMTA, and thus also works to create the 8 miles spacing.

The best way to achieve spacing between aircraft is to use a combination of these methods at the same time.

5.1.2 Speed Control

Speed control is a method used to maintain or slowly build extra spacing between aircraft of similar types. It is not as dependable as vectoring because of variables such as wind speed at different altitudes and aircraft performance. The most straightforward way that speed control is used is to restrict the airspeed of the first aircraft, second aircraft, or both so that one does not catch up to the other. Consider two similar performance jets that have departed runway 35L and both are to be routed via LOMLO. Assume Tower has provided 3 miles of radar separation between the aircraft. Here is a hypothetical scenario:

The first aircraft is turned to a heading of 080 and issued climb to 21,000. The second aircraft is allowed to travel further on crosswind, then issued the turn to 180 and a climb to FL230 but instructed to not exceed 240 kts until advised. What should happen is that spacing will increase once the lead aircraft reaches 10,000 and begins to accelerate above 250 kts. There are however a couple issues that may foul up this plan. The first is that the lead aircraft may not accelerate to 250 kts as fast as the second aircraft and if so the initial 3 miles between them will immediately start to decrease. If it is obvious that this will happen, the altitude of the second aircraft may have to be limited as a last resort so that at least vertical separation will be maintained. Consider what would happen if the winds aloft provided an increasing headwind as the lead aircraft climbs. The headwinds will result in a lower groundspeed for the first aircraft, and if the second aircraft climbs at a slower vertical speed than the first, it will not encounter as high of a headwind at the same position on departure. Here the 3 miles between aircraft will begin to decrease.

In addition, limiting the second aircraft to “not above 240 kts until advised” can foul up the plan if the second aircraft is a good climber. Consider a heavily loaded RJ that departs for Winnipeg prior to a B762 that is lightly loaded and bound to Hamilton. Assume the winds aloft provide an increasing tailwind with altitude. Limiting the B762’s speed by issuing “not above 240 kts until advised” may result in the following undesirable situation to occur: The CRJ climbs at a slower rate than the B762 and even though the CRJ had a lead of 3 miles, the B762 climbs up rapidly and reaches 10,000 at the same time as the CRJ. Now at 10,000 the CRJ begins to accelerate above 250 kts but climbs slower than the B762 in doing so which is climbing limited to 240 IAS, instead of its normal speed of say 300 IAS. Assume the B762 is able to maintain 2,500 feet per minute climbing at 240 IAS and the CRJ is at 290 IAS but climbing at only 1,500 fpm. One of two things (or both) may happen:

- The B762 out climbs the CRJ, so even though the CRJ is further ahead in distance, the B762 has now climbed above the CRJ's altitude.
- The B762, because its IAS in climb has been limited, shoots upward and encounters an ever increasing tailwind which will now push it closer and closer to the CRJ on radar. Now, the B762 would be both outclimbing and overtaking the CRJ on radar which is entirely not what was intended to happen by limiting the second aircraft's airspeed. One way to try and mitigate the above from happening is to instruct the first aircraft to begin accelerating above 250kts once they have climbed through 10,000. This helps the first aircraft to pull ahead of the second quickly, but it does not guarantee that spacing will be held later if the wind issues previously mentioned begin to occur.

With the above complications possible it should be apparent that speed control is not to be used to create spacing exclusively. Speed control applied once spacing has been achieved with vectoring works well. One must have a good knowledge of the performance for different types of aircraft in order to use speed control on departure. For example, instructing a B722 to maintain 320 kts in the climb above 10,000 may result in the aircraft being able to climb at only 1,000 feet per minute or less. Typically high performance turboprop twins such as Dash 8's or Beech 1900's will climb at 160-180 knots and most jet airliners will climb at speeds ranging from 290kts for a F100 or CRJ to 340kts or more for a B744. These numbers depend on factors such as aircraft weight, air temperature, winds aloft and pilot technique. Because pilot technique is such a highly unpredictable variable on VATSIM in addition to pilots using different sources for winds aloft on-line flying, it makes the use of speed control that much more difficult to use.

Aircraft may be handed off to the Centre controller with speed restrictions still being applied that need to be cancelled. Co-ordination between Departure and the Centre controller must occur so that the Centre controller will know they will need to cancel the speed restrictions at some point. Leaving a speed restriction in place on a handoff permits the Centre controller to cancel the restriction when they see fit to do so.

5.2 Missed Approaches

You will receive control of aircraft in the departure phase of a missed approach from Tower. As mentioned in the Tower section, Tower is responsible for providing separation between an aircraft conducting a missed approach and a previous departure by issuing a turn off runway heading if required. If a turn is not necessary Tower may elect to leave the aircraft on runway heading. Aircraft conducting an overshoot are cleared to 6,000 by Tower. Vector the overshooting aircraft further and re-sequenced the aircraft for arrival back to the airport. Typically, the aircraft should be vectored out and away from the airport and issued climb to 7,000 when possible, so that the Tower may continue to depart aircraft.

5.3 Overflights

Departure is responsible for handling aircraft that transit the TCA. These aircraft can be split into two groups: Those that will transit the TCA at a constant altitude (to and from distant airports), and those that depart or arrive at nearby airports, that will need to change altitude within the TCA.

5.3.1 Aircraft Transiting the TCA

Departure handles the flights that transit through the terminal airspace because it is known where, and at what altitudes the Arrival controller has their traffic. It is ideal for the Departure controller to route overflights overhead of Calgary International and above 13,000 as arrival typically uses altitudes 12,000-6.000 while sequencing aircraft for final approach.

5.3.2 Aircraft arriving or departing Satellite Airports

Aircraft departing or arriving at satellite airports may conflict with normal CYYC departure traffic flows, depending upon direction of flight and runway configuration in use at Calgary. There are numerous strategies which are applied depending upon the situation, including

- Routing aircraft around the TCA altogether
- Vectoring aircraft around and below (or above) arrival paths and departure paths
- Trying to make inbound and outbound traffic conform to Calgary traffic flows as much as possible to avoid conflicts.

Each satellite airport has a unique set of strategies, which will be discussed in each airport's description in the Section 6.13.

---

6. Satellite Knowledge and Procedures

Controllers in the Satellite position will need different knowledge from the Departure controller, including a more intimate knowledge of the types of approaches and which ones are available at the various satellite airports, and runway configurations. Since Departure covers the Satellite position when Satellite is not manned, this is essential knowledge before the end of the Departure module. Most of this information is also relevant to the Centre position.
Note: Any reference hereunder to the Satellite controller can be taken to mean the Departure controller if Departure is performing Satellite's duties.

6.1 No Tower Operations

When Springbank Tower is online, their control zones are Class C. When a Tower is not available the control zones function as Class E airspace; However on VATSIM the Calgary Terminal controller may elect to assume some of the responsibilities of an airport controller. Workload permitting Terminal may simply provide traffic advisories or full airport control service acting as the Tower controller. These duties include providing taxi instructions and ensuring aircraft separation during runway operations with regards to known traffic. It is important to remember that when a Tower is not online, local VFR aircraft are under no obligation to inform the IFR controller of either their presence or intentions. Since there may be unknown traffic operating at the airport monitoring the Unicom frequency, Terminal cannot officially clear an aircraft for take-off or landing because they have no way to ensure that the runway, the airspace on final or on the departure path is free of traffic. On VATSIM the Terminal controller may choose to use phrases such as **"no observed or reported traffic, land/depart at your discretion"** as opposed to **"cleared for takeoff"** and **"cleared to land"** depending on the situation. When unable to act as Tower, the controller should instruct an IFR aircraft to make a call to, or remain on the Unicom frequency prior to takeoff or landing in order to attempt to make contact with any local traffic unknown to the controller operating in the vicinity of the airport. If an aircraft uses the Unicom frequency for their arrival, they must report back to the controller once "on", so that the Terminal controller can close their IFR flight plan.

6.2 Co-ordination with Towers

When an airport is staffed with a Tower controller, the Centre should advise the Tower of each IFR arrival well in advance. The Tower controller should be given the arrival sequence and type of approach that each aircraft will be conducting. This information becomes important for the Tower to know if they have local VFR aircraft flying in an area which may impact the flight path of an IFR arrival. The Tower may, when required to separate VFR traffic from IFR arrivals request that the Centre restrict the flight path or altitude of an arrival. The Tower may request the Centre to temporarily restrict the altitude of an aircraft inbound on a visual approach, or to reduce the speed of an arrival. In addition the Tower may request that the flight path of an aircraft be restricted or altered to accommodate local traffic. For example for spacing the Tower may ask: **"Request JZA8101 turn final at or outside the YC NDB"**

6.3 Issuing an IFR Pre-Departure Clearance

When a local controller is online, the airport controller (Tower or Ground) has the authority to issue a pre-departure IFR clearance on behalf of the responsible IFR unit. The airport controller is to verify and amend the filed route and altitude or flight level as necessary. The format of the clearance is to be in accordance with **M412.1**, which was introduced in the Clearance Delivery module. Whenever possible the published SID will be issued. When a pilot does not have the SID, the controller will issue a clearance with departure instructions that replicates the SID.

6.4 IFR Release

The concept of IFR Release was introduced in the Tower module. We will now look at the concept of IFR Release from a radar controller's perspective.

Before an IFR aircraft departs a controlled airport, authorization must first be obtained from the responsible IFR unit. The Calgary Terminal controller is the responsible IFR unit for issuing IFR release to each aircraft individually. When Terminal is not available, Departure, Approach or Centre becomes the responsible IFR controller.

6.4.1 IFR release with a Tower Controller

Normally the Tower will request release for an IFR aircraft while the aircraft is taxiing to the active runway. A request for a departure from a runway other than the active will normally be forwarded by the Tower to Terminal prior to the aircraft taxiing in order to minimize or avoid possible delays. When Tower requests release of an IFR aircraft off a specific runway, they will state the aircraft ident and requested runway: **"Request Release GXCO runway 17"**. The response to the Tower must include the runway number as per **M443.4** such as: **"GXCO valid runway 17"**.

Restrictions, when needed are applied by the IFR controller in order to provide a window of opportunity for the aircraft to depart which will ensure separation will be in place with reference to other IFR traffic. The Tower controller is responsible to comply with the stated restrictions imposed by the IFR controller. A restriction may be expressed in terms of time or an event.
For example, a five minute window of opportunity may be expressed as: **"GXCO clearance valid runway 17 at 1345, clearance cancelled at 1350" (M443.1A).**

Normally on VATSIM an event will be used (**M443.1B**) as opposed to a time constraint to define a restriction.

For example, consider FIML a BE20 King Air 13 miles final on the LOC 35 approach into CYBW while GXCO a C56X Citation jet is taxiing for departure off runway 35. To ensure appropriate separation between the two aircraft will be in place as FIML approaches CYBW on final, Departure may impose the following restriction: **"GXCO clearance valid runway 35, clearance cancelled if not airborne when FIML is 5 final"**. Here, once FIML reaches or reports the 5 mile final, the window of opportunity for Tower to depart GXCO has closed and Tower must then request a new release. Typically when both the arriving and departing aircraft are using the same runway, the FAF will be used at the cut-off point, though it may be changed to a specific mileage or distance on final approach depending on the specific situation (such as when aircraft of differing performance are involved). The terminal controller and tower controller shall always plan for IFR weather conditions, therefore to error on the side of caution with auto transfer of control occurs between the IFR unit and the Control Tower.

6.4.2 IFR release without a Tower Controller

When a Tower is not available to serve as the intermediary between an aircraft and the IFR unit, the IFR controller will issue instructions directly to the pilot who then becomes responsible for their compliance. Restrictions may be issued to the aircraft in a manner similar to how they are issued to a Tower; however the phraseology changes to **"Do not depart until"** rather than **"Clearance valid/cancelled"**. When an aircraft event is used as part of an IFR restriction for another aircraft's departure it is necessary for the two aircraft involved to be on the same frequency at the same time. On VATSIM the Unicom frequency is 122.80 MHz and it is used for pilots to broadcast position reports and intentions to each other.

Examples:

"GXCO cleared to Kelowna via flight planned route. Maintain 6,000. Depart runway 35. Climb runway heading. Squawk 0501. Clearance valid now, cancelled if not airborne by 1345z."

"...Squawk 0501. Do not depart until released."

"...Squawk 0501. Do not depart until inbound King Air has landed. Clearance cancelled if not airborne by 1345z."

6.5 Expediting IFR Departures

6.5.1 Amending SID Headings

At an airport such as Springbank, where the SID calls for runway heading on departure off all runways, ATC has the option of amending the SID heading to one which leads to greater efficiency for both the pilot and controller. This option is not available where specific SID headings are required for noise abatement. However, amended headings can be given that still avoid the noise sensitive areas.

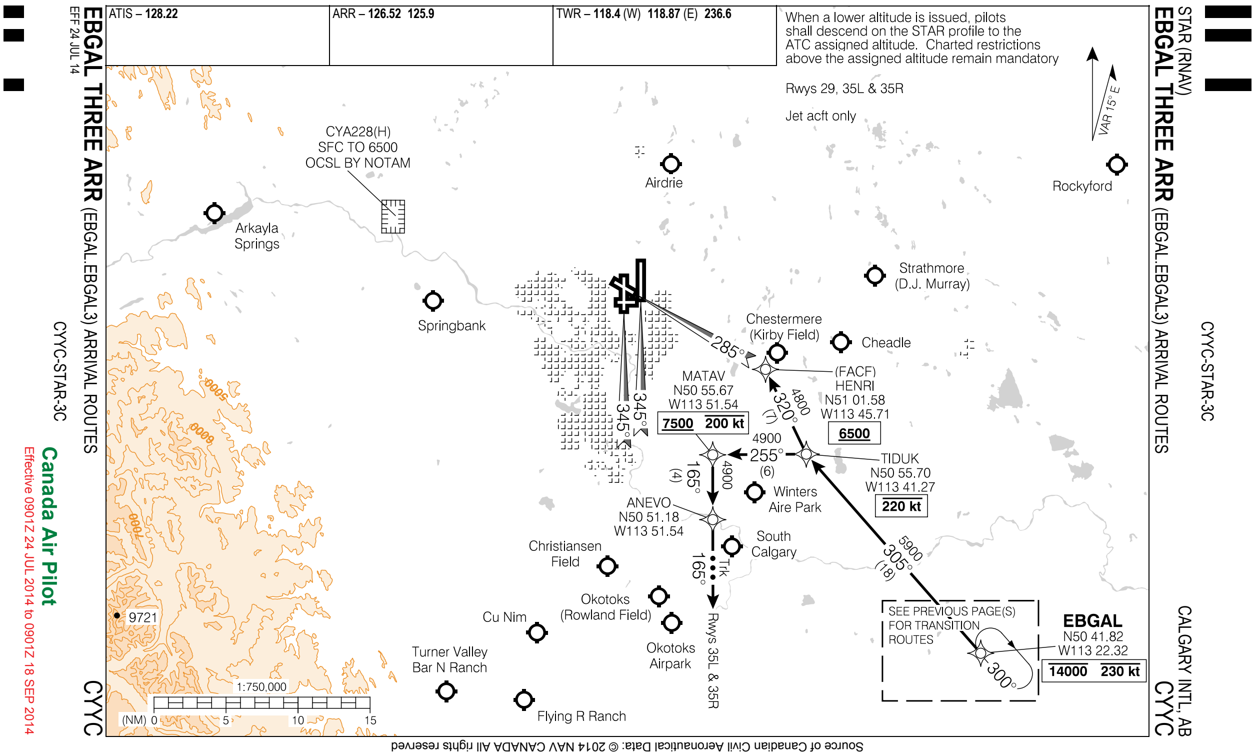
An example of how efficiency gains are realized is as follows: consider WJA182 departing Calgary from 17R flight planned outbound via SIMTA. If an amended SID heading of 200 for example is able to be issued, it accomplishes two things. First, it permits the aircraft to turn towards their flight planned route once the pilot has met their terrain clearance requirements as opposed to having to wait for a vector from Departure. Second, it allows another IFR departure as soon as the first departure is turning and clear of the departure path. (Note: Close succession departures like this must be on diverging headings at least 30° apart, and the following aircraft must be informed of the preceding traffic. M335.1)

6.5 STARS

A STAR is an aRea NAVigation Standard Terminal Arrival Route. It is a published procedure that allows aircraft to use their RNAV capabilities to fly a consistent route all the way from a bedpost fix (generally a point where the aircraft enters the terminal area) to interception of the localizer, or until the aircraft is established on downwind. A pilot that is able, and has been authorized to fly an RNAV STAR requires few or no vectors to intercept their approach, which can be a real advantage to the controller.

In Canada it was the request of one of the major airlines that started the development of the FMS STARs. The STARs benefit both ATC and pilots by streamlining arrival procedures and help airlines reduce fuel costs. For these reasons, an aircraft that has filed an RNAV STAR should be permitted to conduct their own navigation to the fullest extent possible (**M569.1**) traffic permitting.

STARs can be classified as two types: open and closed STARs. A closed RNAV STAR consists of a track which takes the aircraft from the straight-in bedpost to join the localizer at the FACF (Final Approach Course Fix). An open RNAV STAR leads from a bedpost fix along a track that ends at a Downwind Termination Waypoint (DTW). Upon reaching the DTW the aircraft continues on the downwind heading depicted on the chart, or when authorized by ATC to do so, turns directly to the FACF to intercept the localizer of their assigned runway. This allows ATC to specify when a base turn is to be conducted (for traffic sequencing). Both types are typically available for any STAR, depending upon which runway is active. (Approaches that are more-or-less straight in are usually closed. If the aircraft has to pass the airport to get to the approach, the STAR is usually open.) For example, on the EBGAL3 arrival at Calgary (below), the procedure depicted for runways 29 is closed (terminate at FACF HENRI). The procedure depicted for runways 35L and 17R are open (terminate at a DTW of ANEVO and ELSOG respectively, with corresponding downwind tracks of 165 and 345).



The way RNAV STARs at Calgary are handled is different from the way RNAV STARs are handled at some other airports in Canada. In order to reduce the possibility of confusion with pilots, Calgary ATC refrains from using the word "cleared" with an aircraft flying an RNAV STAR until an approach clearance is issued. **M569.2** states that an aircraft with an RNAV STAR included in the route portion of their flight plan is to be considered as previously cleared for the STAR. This means that there is no need or requirement for Centre or Arrival to re-clear an aircraft for a STAR. This might differ from what could be heard at a place like Springbank: "ASP123 via present position direct ANTAK cleared the BRAGG2 Arrival runway 17, descend 7,000". In terms of the vertical profile of the STARs, it is stated on all of the plates that "all altitudes will be issued by ATC".

Without an approach clearance, once a non straight-in aircraft reaches its DTW, the RNAV STAR is cancelled and the aircraft is expected to fly the heading depicted on the STAR. In fact, anytime that an aircraft is issued a radar vector it cancels the RNAV STAR (**M569.1N**) (though the aircraft can be cleared back onto the STAR later). It is important to remember that it will take the pilot a few seconds to engage their FMS once an approach clearance is issued and for this reason controllers should issue an approach clearance prior to the aircraft reaching 3 miles from the DTW (**M569.3**).

Of the satellite airports, Springbank has STARs, the BRAGG2, ELBOW2, KIPEV1, and MADYN1.

6.7 Approaches

There are numerous types of approaches available at the satellite airports. The satellite controller must be familiar with the types of approaches available and how the aircraft will fly them. The following sections provide a brief overview.

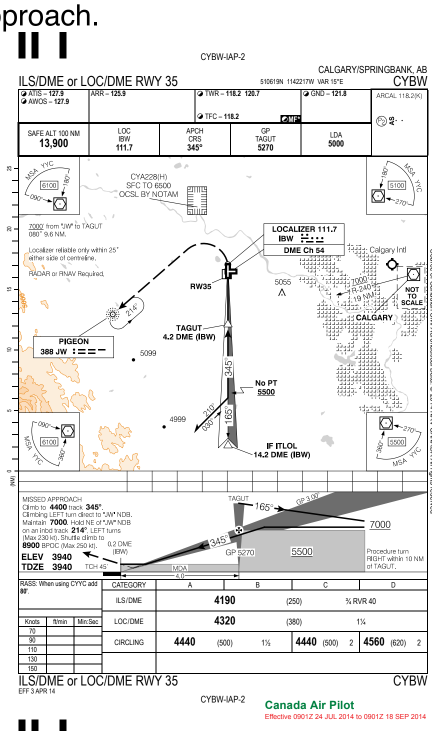
Though a Tower controller may specify an active approach and runway, the final decision on which approach to conduct (and runway to land on) will rest with the pilot. A pilot may be unable to utilize the active approach due to equipment limitations, or weather that they feel is below or too close to minimums, or the active runway being too short. The satellite controller must be ready to accommodate these requests.

6.7.1 Precision vs. Non-Precision

A Precision Approach is one that provides both vertical and horizontal guidance to the runway. The only traditional precision approach is an ILS.

A Non-Precision Approach provides only lateral guidance to the pilot. The pilot must choose when to descend themselves, based on their position in the procedure, as long as they do not descend below the minimum altitude at any given point in the approach. Types of non-precision approaches include VOR, NDB, LOC(alizer), LOC(BC) (LOCalizer BackCourse), and of course RNAV approaches, typically based on GPS with no ground-based navaids required.

With today's modern GPS-based RNAV systems, many aircraft can now fly non-precision approaches using procedures very similar to a precision approach. The FMS can calculate a CDA or Constant Descent Angle that will act like a simulated glideslope (like in an ILS) and lead the pilot in a constant descent to the runway. Even newer is the LPV approach, or Localizer-Precision with Vertical guidance, which is another GPS-based approach where a pre-programmed, GPS-calculated glideslope is displayed to the pilot. Though both of these techniques are legally non-precision approaches, to the pilot and the controller, they will look and act a lot like a precision approach.



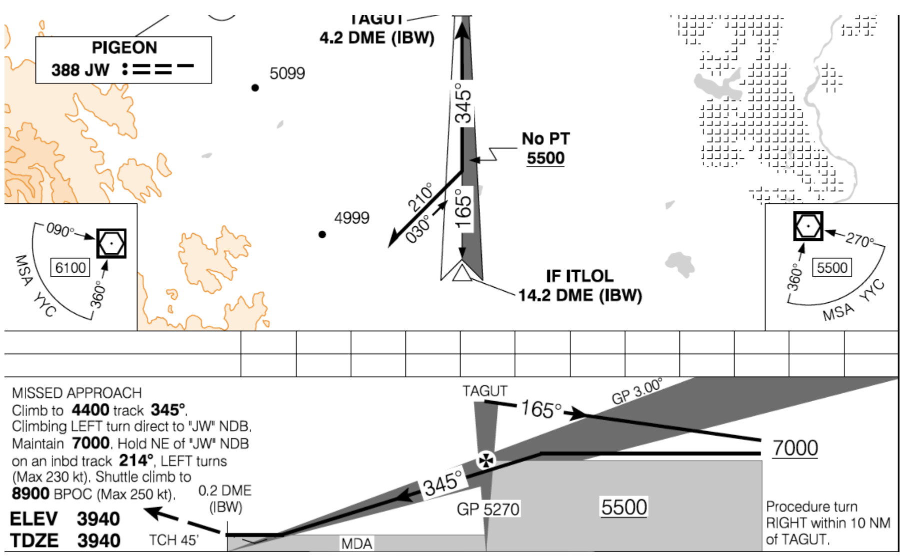
6.7.2 Staright-in vs. Full Procedure

A Transition is the route an aircraft takes from an enroute waypoint to get established on the final approach course.

A Straight-in Transition is the type of approach done most often on VATSIM. The aircraft is routed to a point where it intercepts the final approach course roughly 6-12 miles from the runway in such a way that it is facing straight down the final approach. Straight-in approaches are achieved either through radar vectors most commonly, or through a STAR or approach-specific procedure, where a specified track from the enroute waypoint to the start of the final approach course is followed.

Contrast a Straight-in to a Full Procedure transition. In a Full Procedure transition, the aircraft proceeds direct to the FAF (Final Approach Fix), turns outbound (away from the runway), and flies for a few miles before conducting a manoeuvre to reverse direction and re-intercept the final approach course inbound to the field. These procedures were developed when navigation was crude and only one nav-aid could be placed on any approach. The only way for the aircraft to know where to start the approach was by flying directly to this waypoint. The two key pieces of information a controller needs are the direction of the procedure turn (which direction the outbound aircraft will initially turn), and how far the aircraft has to complete the manoeuvre (usually 10 nm, though sometimes it's less). The one advantage of the full-procedure is that it does not require vectors from the controller (making it common in more remote areas where radar coverage may not be sufficient to provide vectors).

In the Terminal Control Area, where radar coverage dominates, full-procedure approaches are unnecessary and inefficient, wasting time and fuel, and requiring ATC to protect a vast block of airspace (only one aircraft can be in a procedure turn). Many approaches, including all those at Calgary as well as at other satellite airports don't even have procedure turns marked on the charts, indicating they are not allowed. The only time the satellite controller will likely have to deal with procedure turns is for aircraft that request them for training purposes.



6.7.3 Circling Approaches

At the end of most approaches, the aircraft ends up directly aligned with a runway that they plan to land on. This is known as a straight-in landing, and is the norm.

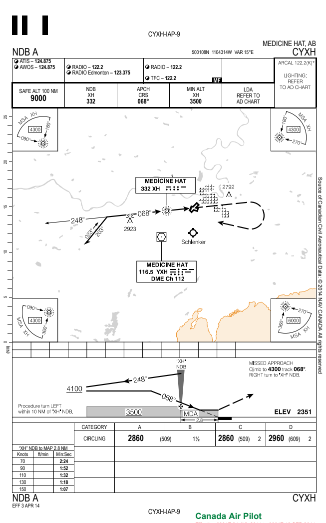
In some cases, an aircraft can not perform a straight-in landing. Possible reasons include a closed runway, strong crosswind, insufficient length, or there may not be a runway directly aligned with the approach. In these cases, the aircraft can conduct a Circling Approach. In a Circling Approach, the aircraft uses the approach to spot the airport, and then manoeuvres to a landing runway by visual reference to the runway. Since a circling aircraft will need a large area to manoeuvre and remain clear of obstacles, the minimum altitude for circling is usually higher than for straight in (where less obstacles need to be considered).

CATEGORY	A	B	C	D
ILS/DME	**4190** (250) ¾ RVR 40			
LOC/DME	**4320** (380) 1¼			
CIRCLING	**4440** (500) 1½		**4440** (500) 2	**4560** (620) 2

If an aircraft will be circling, this must be explicitly stated in the approach clearance. For example, at Springbank, if the wind is 170 at 25, then the preferred approach would be the RNAV 17. For aircraft that are not GPS equipped, they could fly the ILS 35 approach and then once they are below cloud and the airport is in sight, they can circle around to runway 17. The phraseology would be **"GGER, cleared Springbank straight-in ILS 35 approach circling for 17."**

In this example, the aircraft has two options for the circling manoeuvre: turn left immediately after spotting the airport and join the right downwind, or fly overhead the airport and then join the left downwind for 17. If the controller needs circling to be performed on a certain side (to stay away from other traffic), they must specify the direction from the airport where the circling must be done. For example: "...ILS 35 circling west for 17." This would indicate the aircraft must remain on the west side of the field while circling (the first listed above).

Some approaches are specifically designed as circling approaches and do not safely align with any particular runway. Approaches of this type are designated a letter instead of a runway number. No airports inside either the YC or EG TCA have full circling approaches. However, there are some of these types of approaches within the FIR. Examples are the CYXH NDB A. Aircraft conduct the approach and circle for any runway, as there is no runway listed on the approach.



6.7.4 Visual and Contact Approaches

Visual approaches are VFR arrivals performed by IFR aircraft. Aircraft on visual approaches can fly more direct, efficient routes to the airport, without having to fly long, complicated approach procedures. Pilots on a visual approach are responsible for their own terrain clearance and traffic separation. For controllers, this is an advantage, as pilots can follow aircraft closer than IFR separation rules would allow.

Before an aircraft is cleared for a visual approach, the pilot must (1) have the airport in sight, and (2) have the preceding aircraft (if applicable) in sight. If the preceding aircraft is not in sighted (but the airport is), the controller can clear the aircraft for a visual approach while giving restrictions to maintain separation until the preceding aircraft lands or is spotted (see example below).

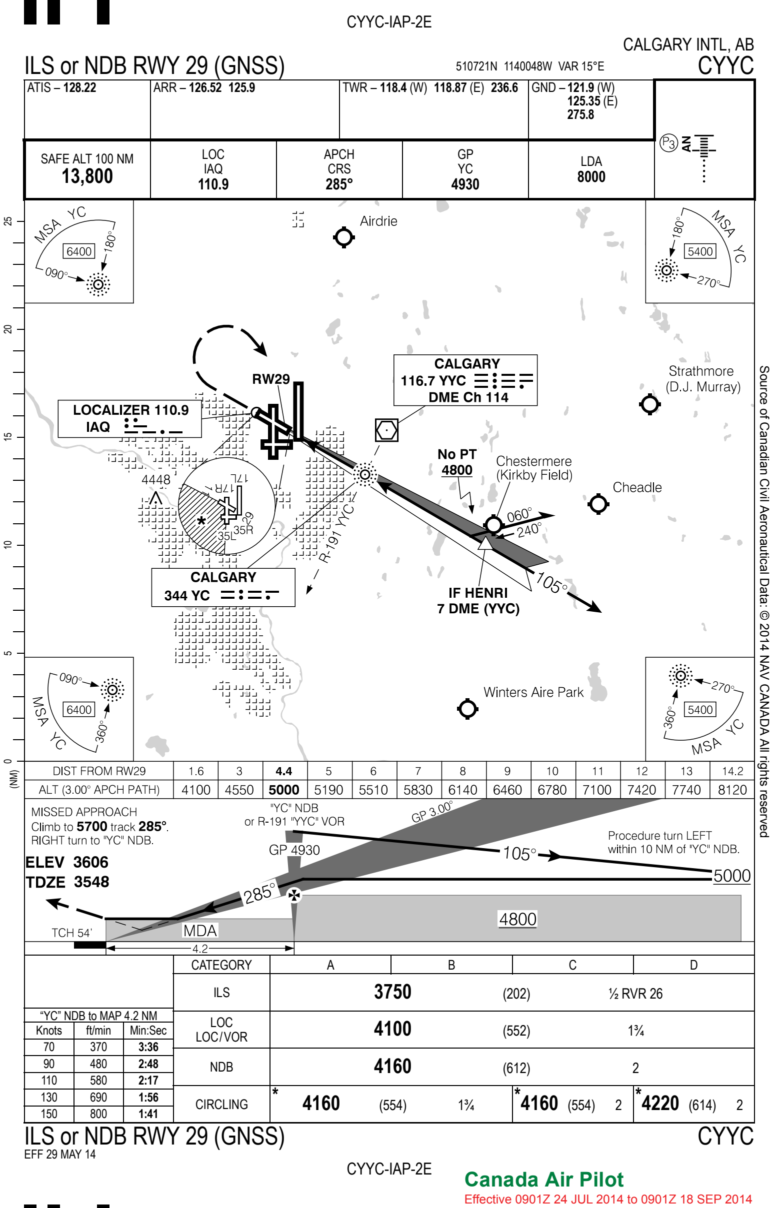
Since an aircraft must be able to see the airport while still IFR to be cleared for a visual, the weather minima required to authorize a visual approach at most airports within CZYZ is a ceiling of 3,000 feet and 5 miles visibility. The IFR controller may restrict the flight path of an IFR aircraft on a visual approach in order to accommodate other IFR or VFR traffic operating around the airport. For example, **"FIML cleared to the Springbank airport for a visual approach runway 35, turn final at or outside of TAGUT"** or **"FIML cleared to the Springbank airport for a visual approach runway 26, not below 6000 until advised by the Tower"**.

A contact approach is defined as: An approach wherein an aircraft on an IFR flight plan having an ATC authorization, operating clear of clouds with at least one mile of flight visibility and a reasonable expectation of continuing to the destination airport in those conditions, may deviate from the instrument approach procedure and proceed to the destination airport by visual reference to the surface of the earth. Contact approaches differ from visual approaches in that they cannot be suggested or offered to the pilot. The pilot must request a contact approach and this normally occurs in situations where the pilot sees the airport, or doesn't see the airport but is able to continue visually when the official weather sequence prohibits the controller from authorizing a visual approach. If the pilot states that they are requesting a contact approach, it may be authorized subject to **M466.1**, however IFR separation must still be maintained between all other IFR traffic and the aircraft flying the contact approach **M466.3**. A contact approach is of benefit to both the controller and pilot because the controller is relieved from vectoring the aircraft to the airport, and for the pilot they may fly their own headings to the airport. Because the flight path of an aircraft on a contact approach cannot be altered or restricted in any way, care must be used when there is other IFR aircraft in the vicinity.

While Visual approaches are very common on VATSIM, many pilots are not aware of contact approaches, and few request them. As always though, you must be aware of their existence and be ready to grant them when requested (if operationally feasible).

6.7.5 Approach Minima

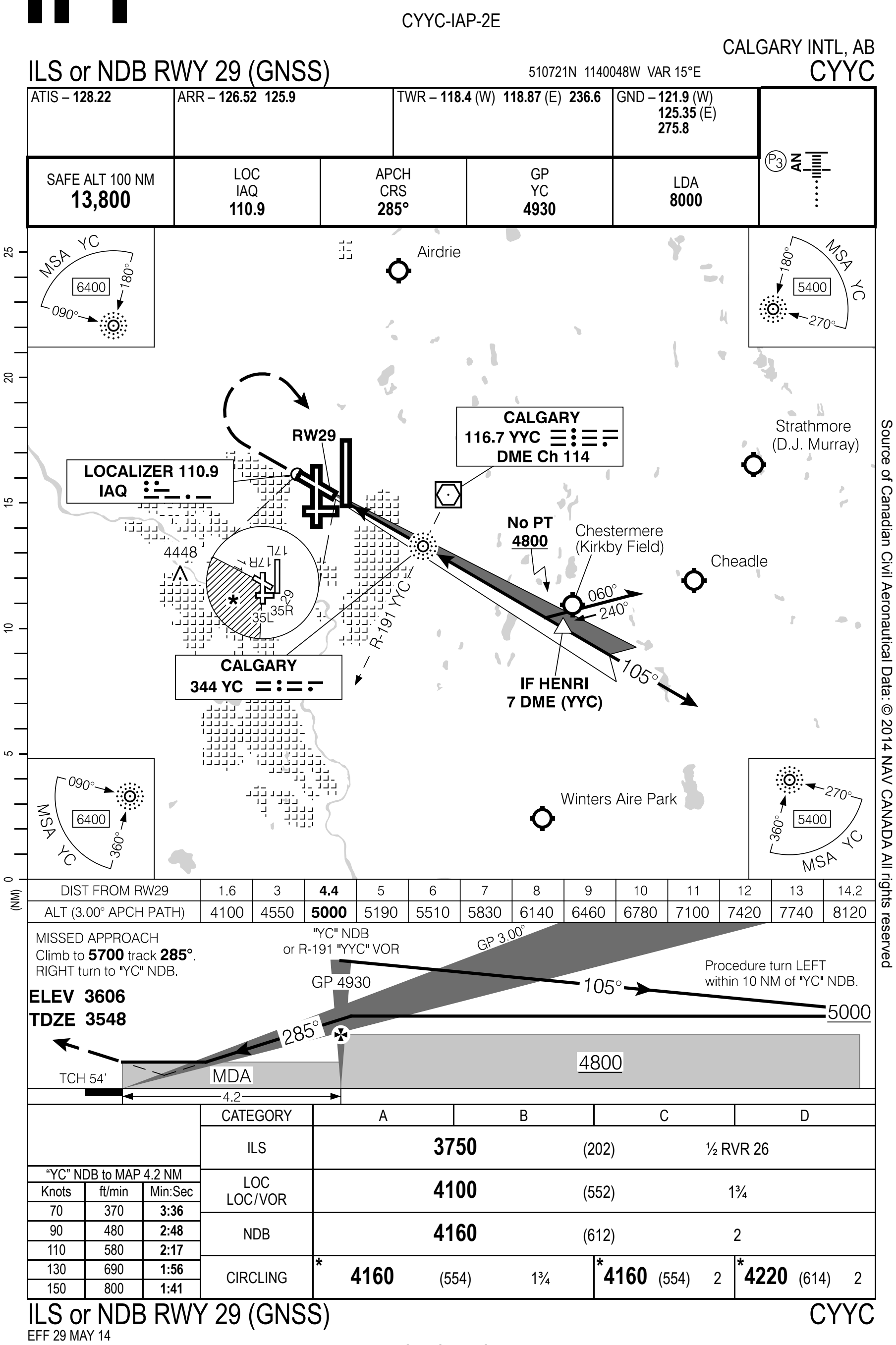
ILS minima are expressed in terms of a 'decision height' (DH). An aircraft may not descend below the DH unless the required visual reference has been established and is maintained in order to complete a safe landing. Having the required visual reference does not mean that the pilot has the runway in sight. Visual reference may be one of several indications such as the approach lights, the runway threshold or the touchdown zone to name a few. Most CAT I ILS approaches with typical approach lighting have a DH of 200 feet AGL. As with non-precision approaches, an advisory visibility is published with each DH, indicating the minimum forward visibility that should result in establishing visual reference to the runway. For an ILS that is flown



at a constant angle (usually 3°), the visibility will correspond to the DH. Normal 200' DH will usually require 1⁄2 mile visibility, or RVR 2600' (if RVR reports are available).

Non-precision approaches do not have a decision height. They instead have a Missed Approach Point or MAP and a Minimum Descent Altitude or MDA. The MAP is the point at which, if the aircraft has not established visual reference to land, it must initiate a missed approach. Since there is no glide path associated with a non-precision approach, the MDA is the lowest altitude that an aircraft may descend to on the approach.

For example, consider again the ILS and NDB 29 approach at Calgary (Figure 6-2: CYYC ILS or NDB 29. Compare Precision ILS to Non-precision NDB. The FAF is YC (Calgary NDB). An aircraft on the ILS will cross YC at 4930 and can descend all the way to 3750 before a missed approach must be initiated. If the glidepath is failed and only the localizer is being used, an aircraft can descend no lower than 4800 by YC, and past YC can descend as low as 4100 without visual reference. This higher minimum is because of the loss of precise vertical guidance. If the localizer is offline as well and the NDB approach is being attempted, the lowest altitude past YC is 4160.



DIST FROM RW29	1.6	3	4.4	5	6	7	8	9	10	11	12	13	14.2
ALT (3.00° APCH PATH)	4100	4550	5000	5190	5510	5830	6140	6460	6780	7100	7420	7740	8120

CATEGORY	A	B	C	D
ILS	3750 (202) ½ RVR 26			
LOC LOC/VOR	4100 (552) 1¾			
NDB	4160 (612) 2			
CIRCLING	*4160 (554) 1¾		*4160 (554) 2	*4220 (614) 2

"YC" NDB to MAP 4.2 NM

Knots	ft/min	Min:Sec
70	370	3:36
90	480	2:48
110	580	2:17
130	690	1:56
150	800	1:41

Canada Air Pilot
Effective 0901Z 24 JUL 2014 to 0901Z 18 SEP 2014

6.7.6 Approach Ban
While the visibilities listed on approach plates are advisory, the Canadian Aviation Regulations prohibit pilots from attempting approaches when visibility gets very low. The criteria for commercial aircraft is based upon the advisory visibility listed on the approach plate. Depending on the particular operator, the approaches will be prohibited when visibility drops below 75% or 50% of the advisory visibility. (Eg. If the advisory visibility is 2, some operators will be banned starting if visibility drops below 1½, while the others will be banned when visibility drops below 1.)

Pilots are responsible for being aware of their own (company's) approach ban limits. ATC is not responsible for enforcing approach bans. Controllers should simply be aware of the existence of the approach ban, and pass along visibilities that drop below the approach ban minima to pilots as soon as possible, so pilots can make decisions on whether they can shoot an approach, or if they need to hold or divert.

6.8 Approach Clearances
Approach clearances, like all clearances are fairly straightforward but must follow a consistent format (**M465.1**):
- Airport
- Approach Name, including runway
- Circling (if applicable)
- Transition

Example: **"GGMI, cleared Springbank Airport RNAV 17 approach via MEGMO."**
Example: **"GAJV, via ITLOL cleared Springbank Airport ILS/DME circle for 26"**

If an aircraft is already established on the final approach or is on a vector to intercept the final approach course, the transition need not be specified.

Example: "GMHP, turn left heading 020, intercept localizer, cleared Springbank Airport ILS 35 approach."

6.9 Establishing Aircraft on Final
Aircraft planning straight-in LOC, VOR and NDB approaches are vectored in the same way that aircraft are vectored to fly straight-in ILS approaches. The vector issued to intercept final is such that the turn is to final will be made at an angle of 30 degrees or less. A difference between these three approaches is how the name of the final approach course is stated. Aircraft flying an ILS or LOC approach are vectored to intercept the localizer, an aircraft flying a VOR approach intercepts the inbound radial, and an aircraft flying an NDB approach intercepts the inbound track.

Alternatively, aircraft that are capable of RNAV can be cleared to a fix on the approach. (This is easier, as most RNAV-capable FMS/autopilot systems will conduct "smart-turns" that will start a turn early enough to intercept the final approach course without overshooting.)

Aircraft requesting full-procedure approaches will establish themselves on final. They only need to be cleared direct to the nav-aid where the procedure turn begins (which is often the FAF). (And of course they must be issued the approach clearance as well.)

6.10 Missed Approaches

When weather conditions at the destination near the approach minima for the IFR approach that an aircraft will be flying, the controller should plan for the possibility of a missed approach (**M465.10**). If an aircraft goes around, it will conduct the published missed approach procedure in the CAP for the approach which they are flying, unless the aircraft was previously issued alternate missed approach instructions. An aircraft that goes around on a visual approach, it will climb to circuit altitude, and enter the traffic pattern on the crosswind leg. Alternate missed approach instructions if needed should be issued to the pilot prior to the aircraft being established on the final approach course, and stated beginning with the phraseology **"In the event of a missed approach…"**

6.11 Control Transfer

Terminal should initiate a handoff of an arriving aircraft to Tower as soon as they are satisfied that the aircraft is established on final approach to the proper runway and separation will be assured with other arrivals to the same or parallel runway. Ideally on VATSIM, aircraft should be in communication with Tower prior to reaching the FAF so that Tower will have sufficient time to issue control instructions to the aircraft if required. **M495.2** states that control of an arriving IFR aircraft is automatically transferred from the IFR unit to the Tower as soon as the aircraft has landed unless otherwise coordinated. This means that the IFR unit (Terminal) is responsible for the radar separation between aircraft until they have landed.

6.12 Multiple IFR Approaches

It is not uncommon to have an aircraft file an IFR flight plan for the sole purpose of conducting multiple IFR approaches. These types of flights are seen in the real world and are generally flown by students learning IFR flight, or IFR-rated pilots practicing to remain proficient. An aircraft may file an IFR flight plan to remain within the vicinity of the departure airport to conduct multiple approaches and holds, then eventually land. Alternatively, an aircraft may wish to depart from one airport and do several approaches at different airports with no intention to land until completing their last approach back at their departure airport. This is known as an IFR "Round-Robin" flight.

Usually a typical flight consists of departing airport A to land at destination B. The approach clearance issued at the destination will include their clearance limit which is their destination aerodrome. However, when an aircraft conducts an approach with no intention of landing, they must be issued an additional clearance, with a clearance limit beyond that aerodrome, and be given instructions on how they are to proceed once they have completed their current approach (**M426.4**). In effect, the aircraft is given two IFR clearances: the first is a clearance to conduct a specific approach to the airport, and the second permits them to leave the aerodrome and continue on another IFR clearance. The items and information issued in this new clearance are to be in the standard order as would any other IFR clearance that is issued as per **M412.1**.

An aircraft should be issued their missed approach instructions by ATC prior to them becoming established on final approach. This will allow the pilot to have the information they need for their overshoot well in advance so they may focus on conducting their current approach without distractions. The clearance limit for an aircraft not intending to land after completing their current approach may be that same airport, another airport or a NAVAID. Examples:

GXCO is being vectored for a straight-in ILS 11 approach at CYYC and is requesting the full procedure VOR 26 approach at CYYC next:

“On the completion of this approach, GXCO is cleared to the Calgary airport via the full procedure VOR runway 26 approach not above 6,000. Overshoot runway 11, turn left direct Calgary VOR”

Note that the above clearance consists of an approach clearance followed by departure instructions detailing the overshoot portion prior to commencing the VOR 26 approach. The phrase **“maintain 3,000”** would not be appropriate in this instance since the aircraft must climb on the overshoot then descend for the VOR 26 approach. Issuing **“not above 3,000”** permits GXCO to climb up to 3,000, level off, and descend again on the VOR 26 approach.

Once the above missed approach instructions have been given, the approach clearance for GXCO’s present approach may be given:

“GXCO readback correct, position seven miles from KISIL, turn right heading 080 intercept the localizer, cleared Calgary airport straight-in ILS runway 11 approach”

Note that if GXCO was intending on doing a touch-n-go on runway 11 as opposed to simply a low approach and overshoot, it is considered a takeoff. Proper phraseology would be **“depart runway 11”** as opposed to **“overshoot runway 11”**.

After a CYBW ILS 35 approach GXCO would like to proceed to the Red Deer airport for an IFR approach there:

“On the completion of this approach, GXCO is cleared to Red Deer NDB via radar vectors maintain 8,000. Overshoot runway 35, turn right heading 020 for vectors”

Note the clearance limit is the NDB. If this will be the final airport on the flight plan, clearance limit should be **“Red Deer airport"** in lieu of **“Red Deer NDB"**.

6.13 Holds

Since holds aren't typically used by Departure, and not very common in Satellite, holds will be dealt with in the Arrival module.

---

7. Satellite Airport Details

Each Satellite Airport is unique, both in terms of types of traffic and departure and arrival procedures, especially for aircraft which will need to cross the TCA on their way to/from the Satellite Airport. These descriptions are by no means exhaustive, but intended to give general guidelines for controllers as well as airport-specific knowledge. Copies of all relevant IFR charts and procedures for these airports should be available for reference when working Satellite.

7.1 CYBW Departures & Arrivals

Springbank has one SID, the CYBW1. The Springbank 1 SID has all runways climb runway heading to 7000 for vectors. The CYBW1 SID is not authorized on Runway 35 when CYA 228 (H) is active. Typically, IFR aircraft will get a full route clearance, or a heading issued for departure to replicate the SID. Springbank departures will use the same routes to exit the Calgary area as CYYC departures.

For Hamilton arrivals, there are STARS from the northeast, northwest, southeast, and southwest. Aircraft not on the STARs should be vectored along similar routes for consistency. Arrivals from the east enter the TCA by one of the standard terminal bedposts. All arrivals from the east cross the arrival boxes of either the 17's or 35's in Calgary and are required to be below CYYC arrival traffic at all times.

---

8. Class F (CYA) Airspace

Within the Calgary TCA, there are multiple blocks of airspace designated Class F. Any Class F zone will be designated either CYR, CYD, or CYA. CYR stands for restricted, CYD means danger (usually used for CYR areas over international waters), and CYA stands for advisory. CYA zones will also have a letter identifying the type of activity in the zone: A - aerobatics, F - aircraft testing, H - hang gliding, M - military, P - parachuting, S - soaring, T - training. For entry into a CYR or CYD zone, an aircraft needs the permission of the operating authority. Pilots may enter CYA zones at their discretion, but are encouraged to avoid them unless taking part in the activity.

The Calgary TCA CYA Class F airspaces are as follows:
CYA226(T) - SFC TO 11000 CONT 13-07Z (DT 12-06Z)
CYA227(T) - 7000 TO 11000 CONT 13-07Z (DT 12-06Z)
CYA228(H) - SFC TO 6500 OCSL BY NOTAM
CYA263(S) - SFC TO 8000 OCSL DAYLIGHT BY NOTAM