

STAIRS IN DWELLING UNITS

DISCUSSION

This STANDATA has been developed to provide further guidance on the requirements for stairs within dwelling units governed by Section 9.8. of the Alberta Building Code. Stairs within a dwelling unit would include stairs between the basement and main floor, stairs serving an attached garage, and stairs between other floors. Requirements for guards, landings and handrails within a dwelling unit are also clarified.

The purpose of stair requirements within the Code is to provide for the safe passage of the users of the stairs.

STAIR WIDTH

Over the years, many designers and safety codes officers have had disagreements as to how the width of a flight of stairs is to be measured. Some felt that the minimum stair width was to be measured from the face of the wall that supports the stairs, while others felt that it was to be measured from the inside surface of the stair stringers. With more “architecturally designed” staircases that incorporate open risers and are not supported on adjacent walls, the issue becomes even more complicated.

Additionally, the concept of projections into the required stair width has been a source of debate. Questions have been raised as to whether a set of spindles is considered to be a handrail support as described in Sentence 9.8.7.6.(1), as well as whether the 100 mm projections are allowed on both sides of a stair, or just one.

STAIR CONFIGURATIONS

Sentence 9.8.3.1.(2) explicitly states the types of stair configurations that are permitted within a *flight* of stairs. The effect is to preclude the combination of *normal treads* and *angled treads* within a single flight of stairs in configurations such as “j-stairs” and “horseshoe stairs”, as shown in Figure 1.

Unless stated otherwise, all Code references in this STANDATA are to Division B of the Alberta Building Code 2006.



Issue of this STANDATA is authorized by
the Chief Building Administrator

[Original Signed]
Ata R. Khan, MRAIC



SAFETY CODES COUNCIL

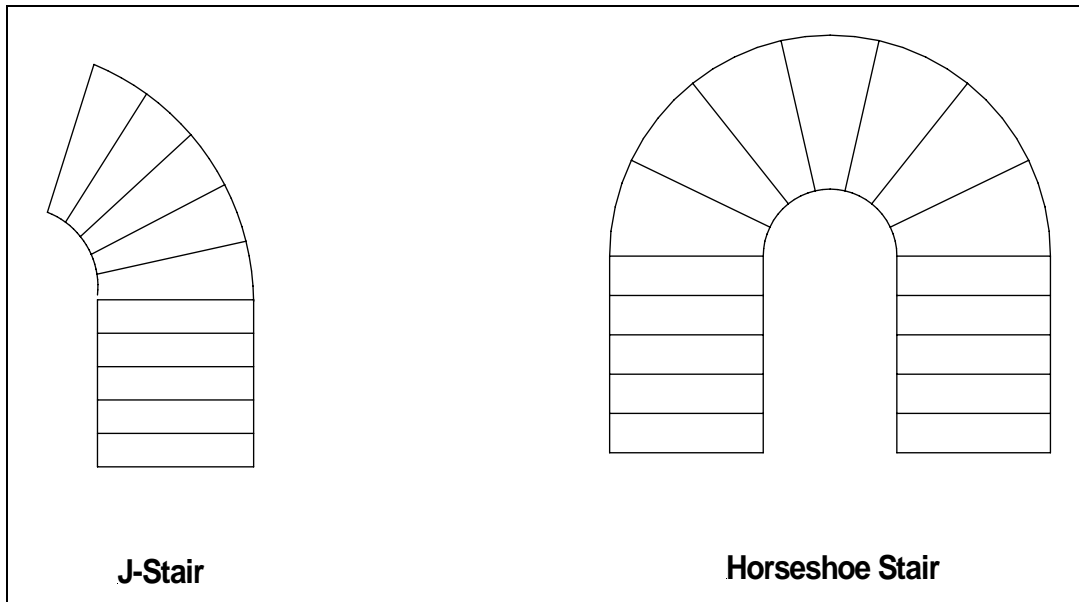


Figure 1 – Stair Configurations

LANDINGS IN GARAGES

Sentence 9.8.6.2.(2) clearly states that a landing is not required at the top of a *flight* of stairs if the stairs are within a dwelling unit and the door at the top swings away from the stairs.

Sentence 9.8.6.2.(3) then states that a landing may also be omitted on exterior stairs provided there are no more than 3 risers and the door swings away from the stair (unless there is a screen or storm door with a hold-open device). However, a change that was introduced to Sentence (3) in the Alberta Building Code 2006 makes it very clear that this exemption does not apply to a *flight* of stairs between an attached garage and the associated dwelling unit.

The rationale behind requiring the landing is that a door between a garage and an attached dwelling unit requires a self-closing device, as provided in Sentence 9.10.13.15.(1), and a hazard exists where such a door opens directly onto a *flight* of stairs. The door could swing closed and impact a child or an individual with impaired mobility, thereby causing the child or individual to fall down the stairs.

HANDRAILS

Sentence 9.8.7.5.(2) speaks to the ability of a person to be able to grasp the handrail throughout its length, without having anything on the handrail that would cause a person to lose their grip. Sentence (2) permits a handhold on the handrail to be broken only when the handrail is interrupted by newels at changes in direction, but there is no stated exception for landings. This has led some people to believe that a landing connected to a flight of stairs has to contain a handrail. However, the preceding requirement must be read in conjunction with Article 9.8.7.2., which speaks to the continuity of the handrail within the *flight* of stairs. Sentence 9.8.7.2.(2) permits a handrail to not be continuous

when the handrail is interrupted by a landing, so the concept of a continually graspable handrail from the *flight* of stairs to the landing would not apply in such a case.

LOADS ON GUARDS

Sentence 9.8.8.2.(4) is very explicit that a guard is permitted to be designed without considering the loads mentioned in Table 9.8.8.2., provided that the design of the guard has been shown to provide effective performance. The question of what constitutes “effective performance” is, however, very subjective and open to interpretation.

CLIMBING PREVENTION

With the release of the Alberta Building Code 2006, a new Sentence (2) was added to Article 9.8.8.6. to attempt to clarify what is meant by “facilitate climbing,” as mentioned in Sentence (1). It was felt that if a guard could be demonstrated to meet one of the conditions listed in Sentence (2), that it was deemed to comply with the concept of “not facilitating climbing.” However, some safety codes officers and designers have interpreted Sentence (2) to mean that a guard would have to meet all four conditions listed in Sentence (2).

Questions have also been raised as to whether or not a safety codes officer can still have the opinion that a guard could still facilitate climbing even though it has met one of the conditions listed in Sentence (2).

DEFINED TERMS

The words and terms in italics in this STANDATA have the following meanings that are specific to this STANDATA only and are not intended to be used in other contexts:

Flight means a continuous series of steps from one landing or floor level to the next landing or floor level, containing not less than three risers.

Normal tread means a tread that is constant in depth over its width.

Angled tread means a tread that increases uniformly in depth over its width and possesses a minimum required run (See also “Winder”).

Winder means a tread that increases uniformly in depth over its width but which does not meet the requirements for minimum run specified for a tapered tread.

CODE REFERENCES

1. Article 3.4.6.8. states:

3.4.6.8. Curved Stairs

- 1) Except as permitted by Sentence (2), tapered treads shall not be used in an *exit*.
- 2) A curved stair used as an *exit* shall have
 - a) a handrail on each side,
 - b) treads with a minimum run of 240 mm exclusive of nosings,
 - c) treads that conform to Article 3.4.6.7. where they are measured 230 mm away from the handrail at the narrow end of the tread, and
 - d) an inside radius that is not less than twice the stair width.

2. Sentence 9.8.2.1.(2) states:

9.8.2.1. Stair Width

...

- 2) At least one stair between each floor level within a *dwelling unit*, and exterior stairs serving a single *dwelling unit* except required *exit* stairs, shall have a width of not less than 860 mm.

3. Sentence 9.8.3.1.(2) states:

- 2) Stairs within *dwelling units* shall consist of
 - a) straight-run flights,
 - b) curved flights, or
 - c) straight runs with winders.

4. Sentences 9.8.4.4.(1) and (2) state:

9.8.4.4. Dimensions for Angled Treads

(See A-9.8.4. in Appendix A.)

- 1) Angled treads in required *exit* stairs shall conform to the requirements in Article 3.4.6.8.
- 2) Except as provided in Article 9.8.4.5., angled treads in other than required *exit* stairs shall have an average run of not less than 200 mm and a minimum run of 150 mm.

5. Sentences 9.8.6.2.(2) and (3) state:

9.8.6.2. Required Landings

...

- 2) Where a door at the top of a stair within a *dwelling unit* swings away from the stair, no landing is required between the doorway and the stair.
- 3) A landing may be omitted at the top of an exterior flight serving a secondary entrance to a single *dwelling unit*, not including entrances from attached garages, provided
 - a) the stair does not contain more than 3 risers,
 - b) the principal door is a sliding door or swings away from the stair, and
 - c) only a storm or screen door, if any, swings over the stair and is equipped with hardware to hold it open.

...

6. Sentence 9.8.7.2.(2) states:

9.8.7.2. Continuity of Handrails

...

2) For stairs or ramps serving a single *dwelling unit*, at least one required handrail shall be continuous throughout the length of the stair or ramp, except where interrupted by

- a) doorways,
- b) landings, or
- c) newel posts at changes in direction.

7. Sentence 9.8.7.5.(2) states:

9.8.7.5. Ergonomic Design

...

2) All handrails shall be constructed so as to be continually graspable along their entire length with no obstruction on or above them to break a handhold, except where the handrail is interrupted by newels at changes in direction. (See Appendix A.)

8. Article 9.8.7.6. states:

9.8.7.6. Projections into Stairs and Ramps

1) Handrails and constructions below handrails, including handrail supports and stair stringers, shall not project more than 100 mm into the required width of a stair or ramp. (See also Articles 9.8.2.1. and 9.8.5.2.)

9. Sentence 9.8.8.2.(4) states:

9.8.8.2. Loads on Guards

...

4) For *guards* within *dwelling units* and for exterior *guards* serving not more than 2 *dwelling units*, Table 9.8.8.2. need not apply where the *guard* construction used has been demonstrated to provide effective performance.

10. Article 9.8.8.6. states:

9.8.8.6. Design to Prevent Climbing

(See Appendix A.)

1) *Guards* required by Article 9.8.8.1., except those in *industrial occupancies* and where it can be shown that the location and size of openings do not represent a hazard, shall be designed so that no member, attachment or opening will facilitate climbing.

2) *Guards* shall be deemed to comply with Sentence (1) where any elements protruding from the vertical and located within the area between 140 mm and 900 mm above the floor or walking surface protected by the *guard*

- a) are located more than 450 mm horizontally and vertically from each other,
- b) provide not more than 15 mm horizontal offset,
- c) do not provide a toe-space more than 45 mm horizontally and 20 mm vertically, or
- d) present more than a 1-in-2 slope on the offset.

11. Sentence 9.10.13.15.(1) states:

9.10.13.15. Doors between Garages and Dwelling Units

1) A door between an attached or built-in garage and a *dwelling unit* shall be tight fitting and weather-stripped to provide an effective barrier against the passage of gas and exhaust fumes and shall be fitted with a self-closing device.

INTERPRETATIONS

STAIR WIDTH

The width of a flight of stairs shall be measured as the width of the narrowest tread in a stair or flight of stairs, as illustrated in Figure 2.

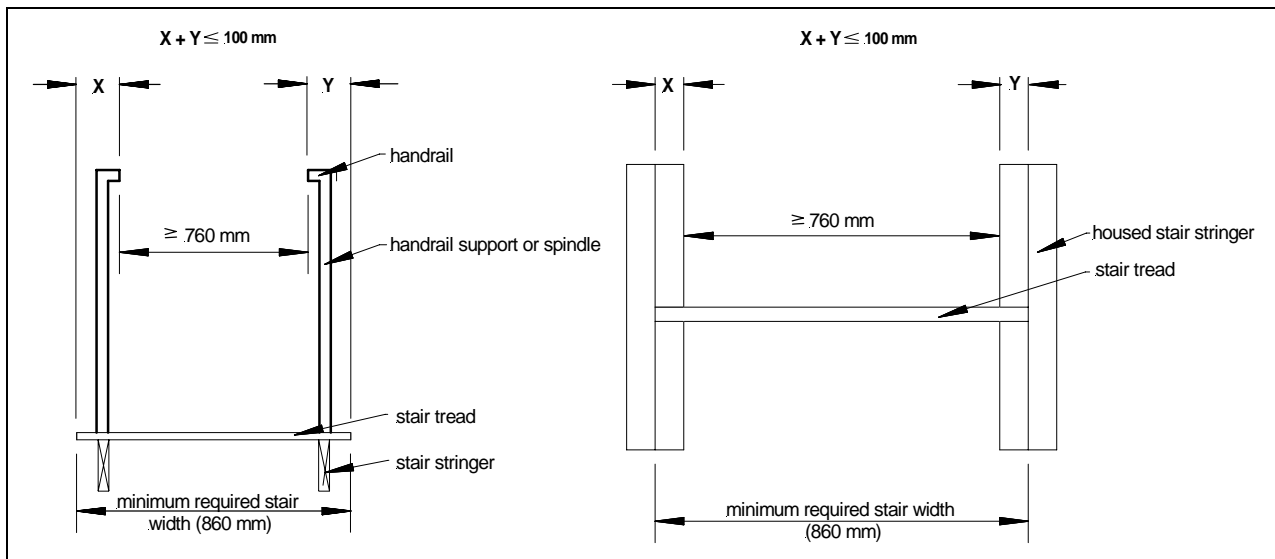


Figure 2 – Minimum Stair Width

Note that handrails and constructions below handrails are not allowed to project more than 100 mm into the required stair width ($X + Y \leq 100$ mm). Therefore, a stair with a projection on one or both sides must provide a minimum clearance width of 760 mm (860 mm – 100 mm).

If the width of a stair exceeds the required minimum width of 860 mm as required by Sentence 9.8.2.1.(2), then the combined total of projection distances from both sides could then potentially extend beyond the 100 mm limit ($X + Y > 100$ mm), provided the 760 mm minimum clearance width is maintained.

STAIR CONFIGURATIONS

Stair configurations that combine normal treads and angled treads within a single flight are not permitted. However, as noted in Sentence (2), a combination consisting of *normal treads* and *winders* is permitted within a *flight* of stairs within a dwelling unit. It

would be possible to combine *normal treads* with *angled treads* by separating the two flights with a landing.

TREAD DIMENSIONS

Where a *flight* of stairs does not form part of a required exit stair, the *treads* are permitted to conform to Sentence 9.8.4.4.(2), as illustrated in Figure 3.

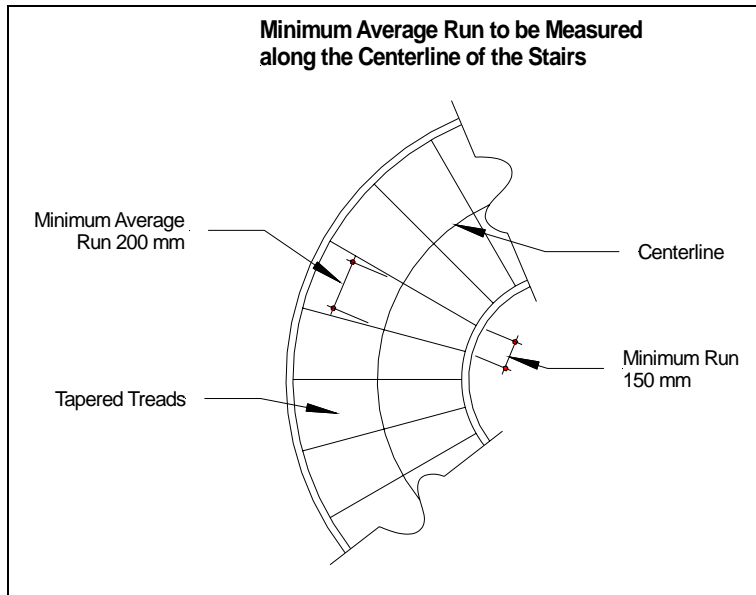


Figure 3 – Tread Dimensions

LANDINGS IN GARAGES

A stair configuration consisting of only one step (equivalent to two risers), as illustrated in Figure 4, does not require a landing between the stair and the doorway into the dwelling unit.

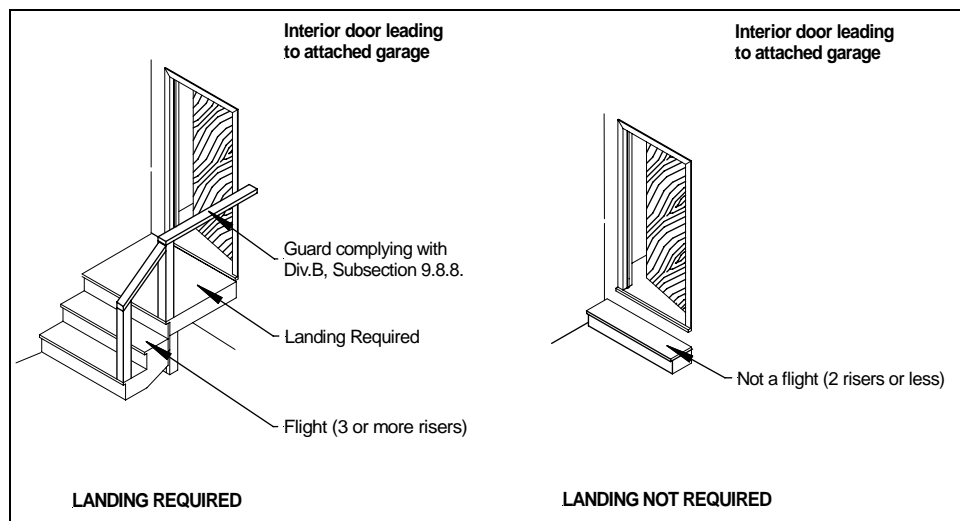


Figure 4 – Landings in Garages

Where a landing is required between the dwelling unit and the attached garage, the landing must be not less than 900 mm in length and at least as wide as the stairs.

HANDRAILS

Where a flight of stairs contains a set of winders, required handrails must be continually graspable at the transition from the straight-run stairs to the winders. If the handrail attached to the outer wall is not deemed to be a required handrail, then it is permitted to be discontinuous within the *flight*, therefore a gap in the handrail at the junction between the straight-run stairs and winders would be permitted. However, Article 9.8.7.5. still requires that there be nothing on the handrail that would cause a user to lose their grip.

See Figure 5 and Figure 6 for clarification.

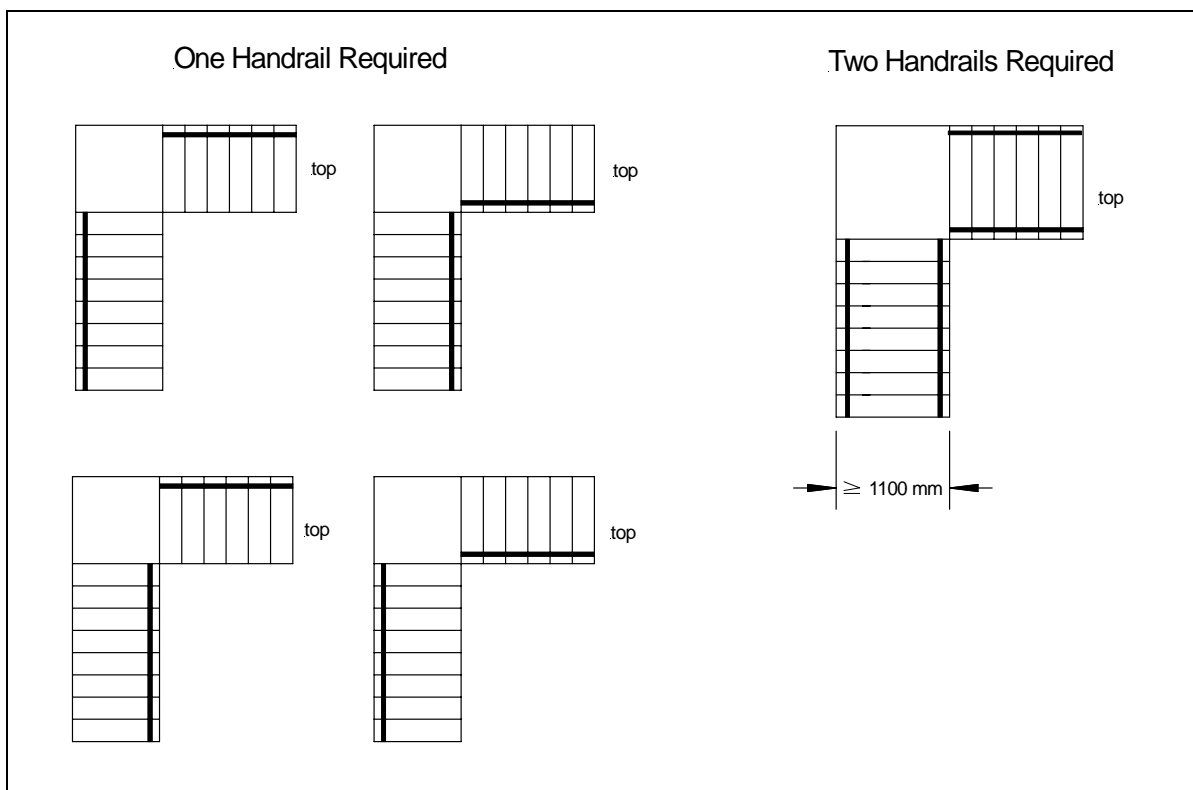


Figure 5 – Handrails on Stairs with Landings

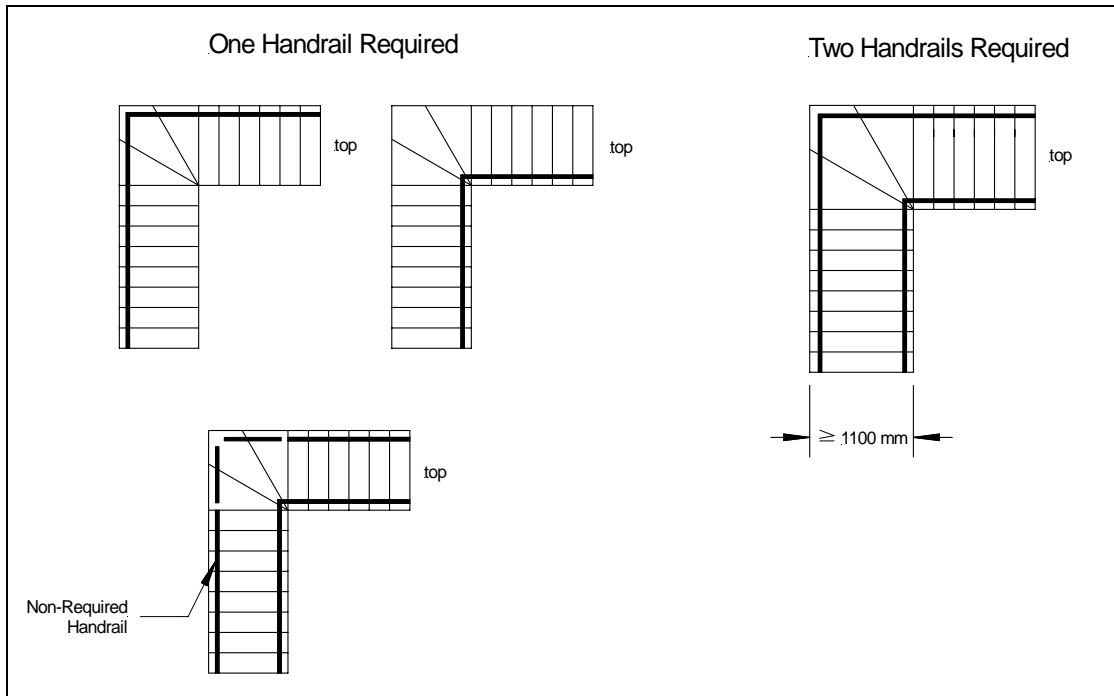


Figure 6 – Handrails on Stairs with Winders

LOADS ON GUARDS

It shall be left to the discretion of the safety codes officer whether a guard demonstrates “effective performance.” If it is the opinion of the safety codes officer that the guard does not provide effective performance, then he can request that the guard complies with Table 9.8.8.2.

CLIMBING PREVENTION

The inclusion of “or” at the end of Sentence 9.8.8.6.(2)(c) means that a guard that complies with at least one of the clauses in Sentence 9.8.8.6.(2) shall be considered to not facilitate climbing. However, if a safety codes officer is of the opinion that a guard could still facilitate climbing, even though it has complied with one of the conditions in Sentence (2), he can require that the guard be modified to remove the potential for climbing based on Sentence (1).

Additionally, Clause 9.8.8.6.(2)(c) not only applies to any given element, but also pertains to any two adjacent, separate spindles whose protrusions are close enough together to inadvertently create a toe space that is more than 45 mm horizontally and 20 mm vertically.

These INTERPRETATIONS are applicable throughout the province of Alberta.