Functional Design Study of PTH 1 and PTH 5 Intersection Improvements

ROUND 3
RIGHTS HOLDER, STAKEHOLDER, AND PUBLIC MEETINGS

SPRING/SUMMER 2025

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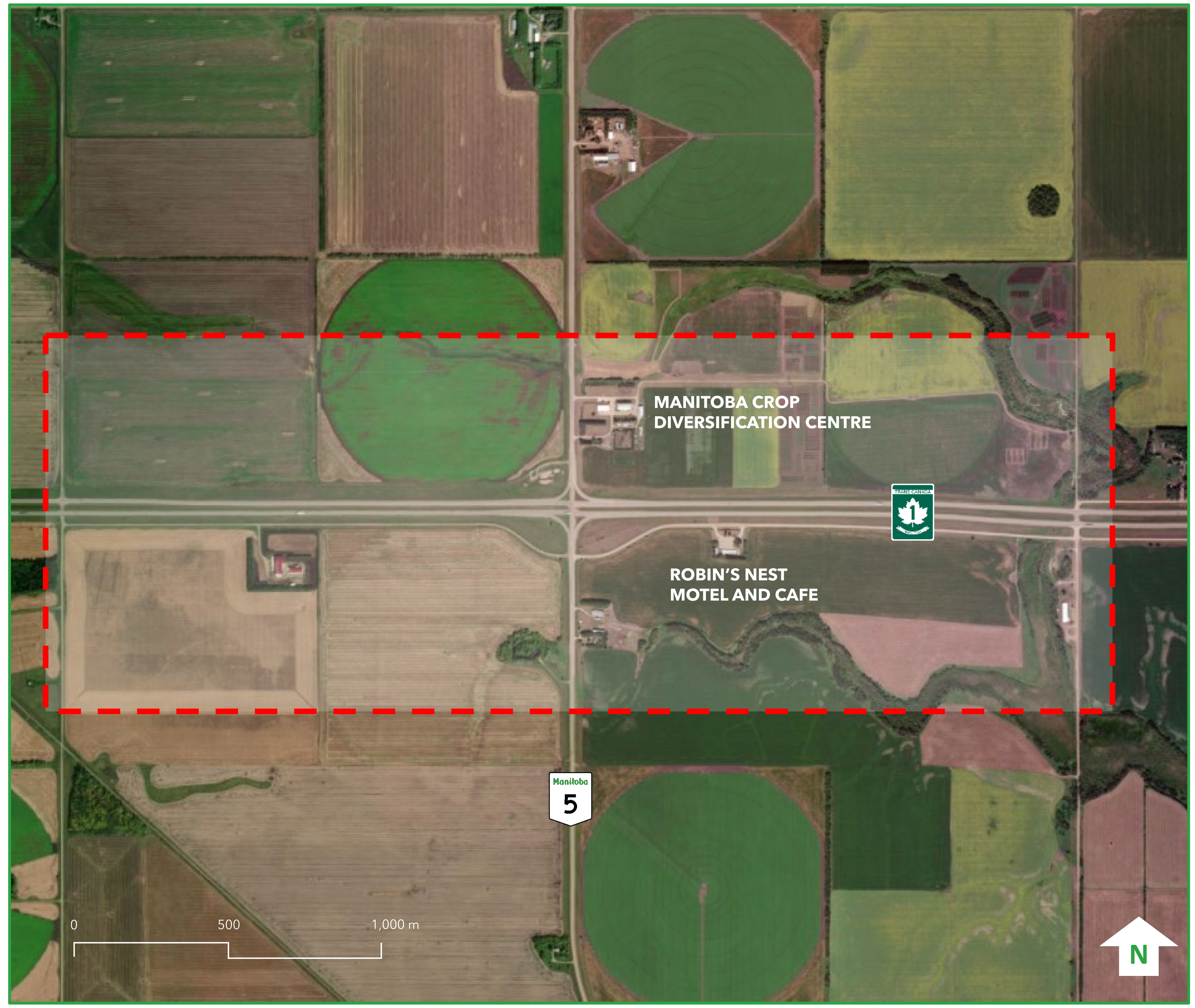
Project Intent

- Following the tragic collision in June 2023 at the PTH 1 and PTH 5 intersection near Carberry, the Manitoba government has been focused on supporting those affected by the collision and identifying preventative measures to avoid reoccurrences.
- The goal of this functional design study was to identify a design that will improve road safety at PTH 1 and PTH 5.
- Extensive engineering analysis and public consultation determined that a Reduced Conflict U-Turn (RCUT) intersection is the most effective design from both operational and safety perspectives. This will be the very first intersection of its kind in Manitoba.
- These slides will explain why the RCUT is the preferred option and outline the next steps for this significant project.



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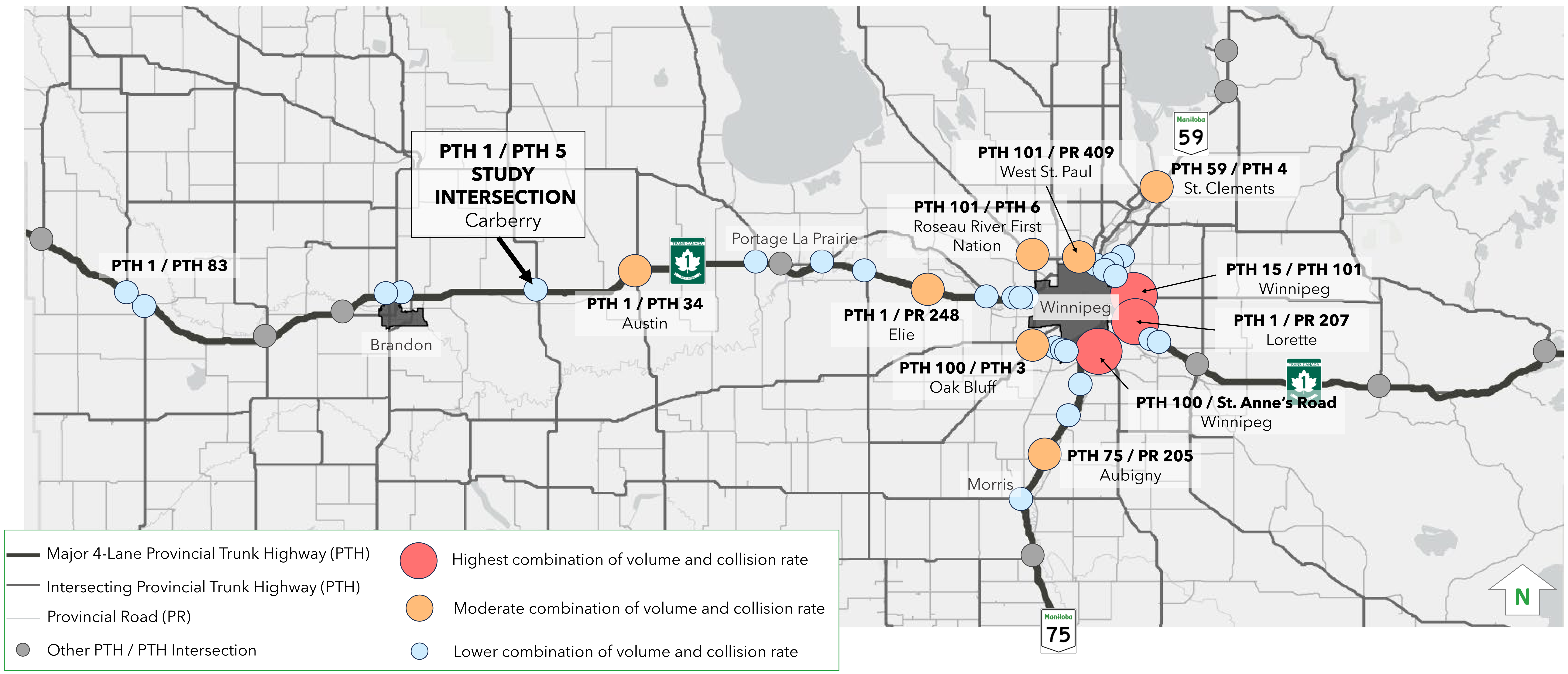
Regional Highway Context

The map below illustrates the regional highway context surrounding the PTH 1 and PTH 5 study intersection.

- This map illustrates intersections along PTH 1, PTH 75 and PTH 59
- Intersections are categorized based on collision rate relative to the traffic volumes
- Intersections that have a high combination of volume and collision rate are shown in red and orange
- MTI uses this information to help inform decisions about intersection improvements in each location



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Public Engagement

Engagement Process Timeline

The following diagram illustrates the engagement process:

ROUND 1
Summer 2024

Meetings with Rights Holders, key stakeholders, and general public

- Introduce the project
- Receive input
- Outline next steps

Develop Alternatives

ROUND 2A
Fall 2024

Meetings with Rights Holders, stakeholders and general public

- Project update
- Present high-level alternatives
- Share preliminary evaluation
- Gather feedback

Incorporate Feedback into Evaluation

ROUND 2B
Spring 2025

Meetings with Rights Holders, stakeholders and general public

- Project update
- Present shortlisted alternatives
- Share evaluation
- Gather feedback

Identify Preferred Alternative

ROUND 3
Spring/Summer 2025

Meetings with Rights Holders, stakeholders and general public

- Present preferred alternative

WE ARE HERE

Identified Rights Holders & Stakeholders

There were many people and groups interested in or affected by this project. The project team made sure to hear them all:

- Impacted families and communities;
- Local residents and landowners;
- Emergency service providers;
- Agricultural operations;
- Potato industry groups;
- Manitoba Trucking Association;
- Rights Holders including Swan Lake First Nation and Manitoba Métis Federation;
- Local municipalities including the RM of North Cypress-Langford and Town of Carberry;
- Business owners;
- Local school divisions;
- Utilities in the vicinity;
- Local Trail or Recreation Groups; and
- Other groups identified throughout the engagement process.

Rights Holder & Stakeholder Interests

The project team considered a number of factors in the design process, including:

- Safety and collision history;
- Traffic operations, including traffic flow;
- Local land use and access patterns;
- Impact to surrounding lands and residences;
- Existing infrastructure;
- Utilities;
- Environmental impacts;
- Cultural or heritage considerations;
- Emergency access and services;
- Capital and maintenance costs; and
- Other factors identified through the engagement process, including Rights Holder and stakeholder perspectives on these and other topics.

PTH 1 and PTH 5 intersection looking east.

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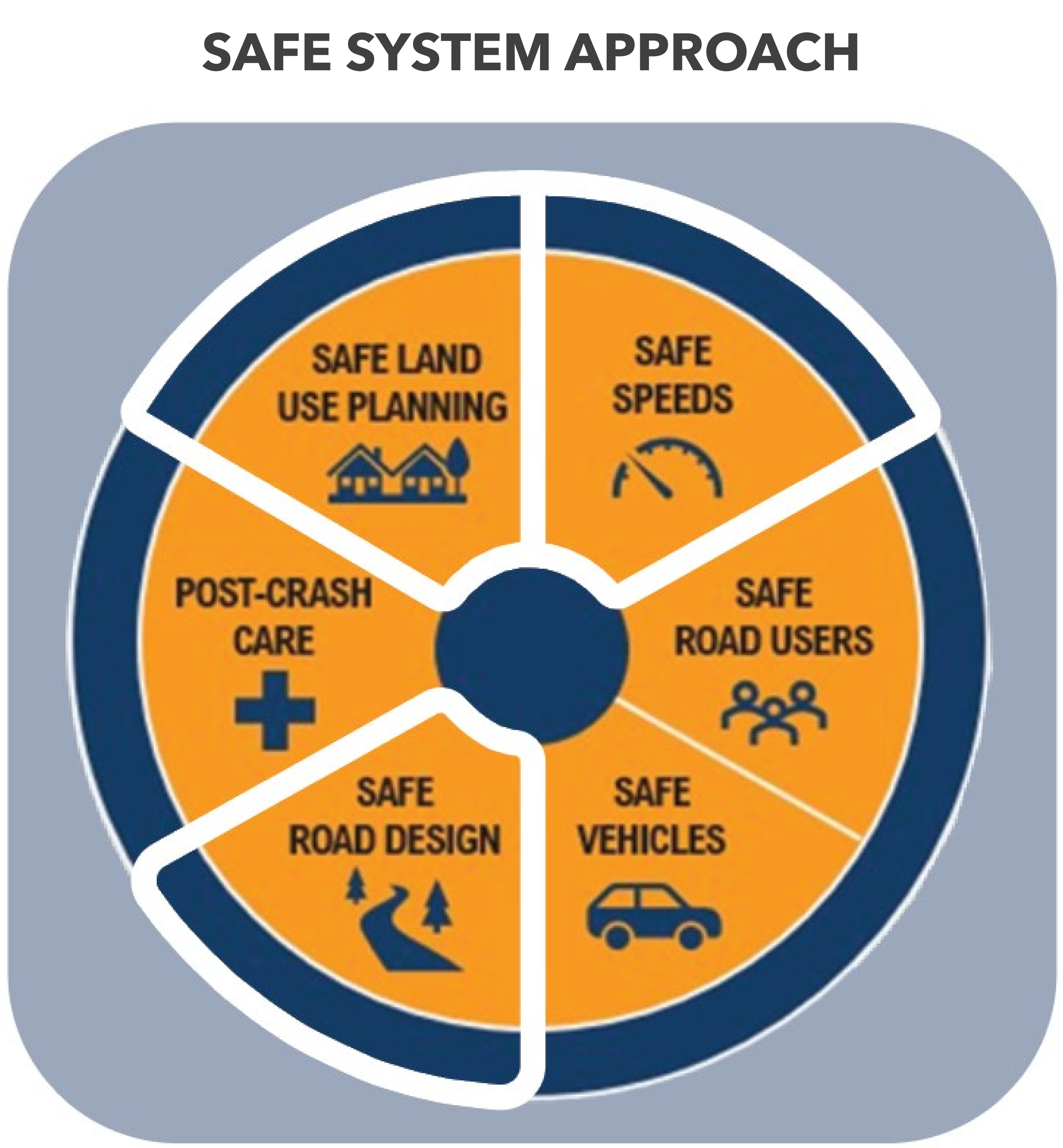
Safety and Operational Analysis

Safe System Approach

- The Safe System Approach is a framework adopted by the Transportation Association of Canada (TAC) to help improve road safety.
- Design alternatives for this intersection have followed the Safe System Approach to ensure best practice.
- The Safe System Approach recognizes people make mistakes and the roadway should be designed to help reduce the impact of those mistakes.

Safe System Approach

This slide provides information on key Safe System Approach elements related to highway design that have guided this functional study:

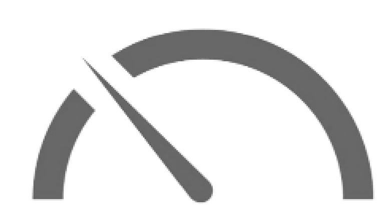


Safe Road Design

Designs should provide road users with a chance to:

- Make decisions
- React and recover from mistakes
- Survive collisions in the event of mistakes

GOAL: Designs that protect for mistakes



Safe Speeds

Speed is selected by drivers based on visual cues:

- Roadway cross section
- Presence of driveways and intersections
- Surrounding land use
- Speed limit signage

GOAL: Not too fast and not too variable

Safe Land Use Planning

Support development adjacent to highways while promoting safety through:

- Provincial land use planning
- Driveway and intersection management standards
- Traffic impact studies

GOAL: Reduce conflicts and control movements

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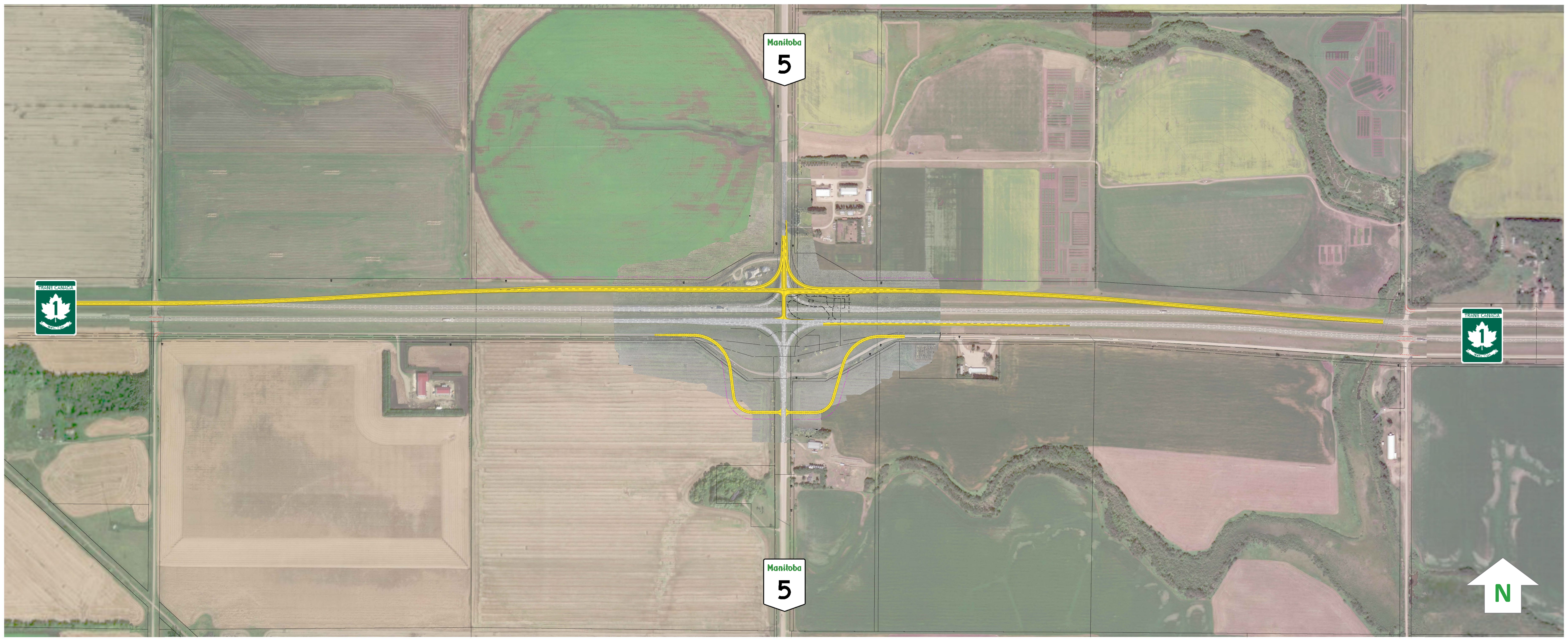
Shortlisted Intersection Alternatives

Widened Intersection



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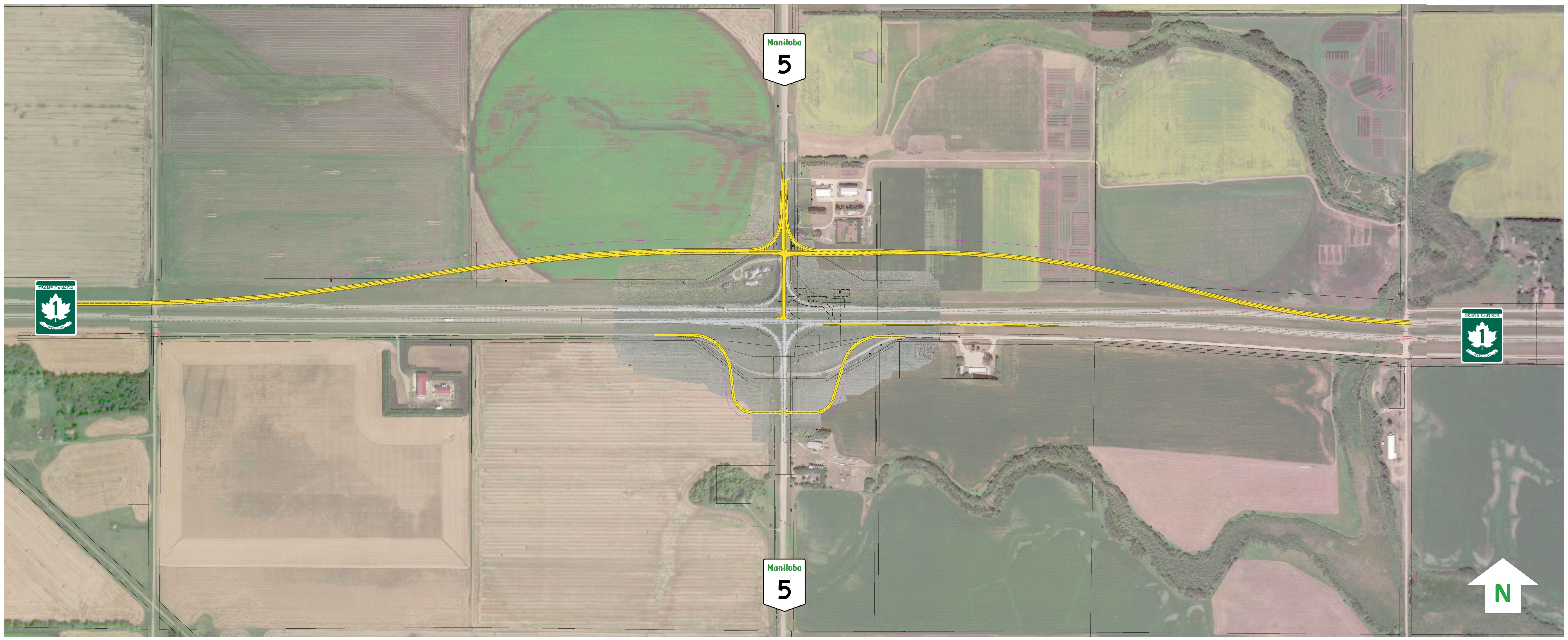
Shortlisted Intersection Alternatives

Split Intersection



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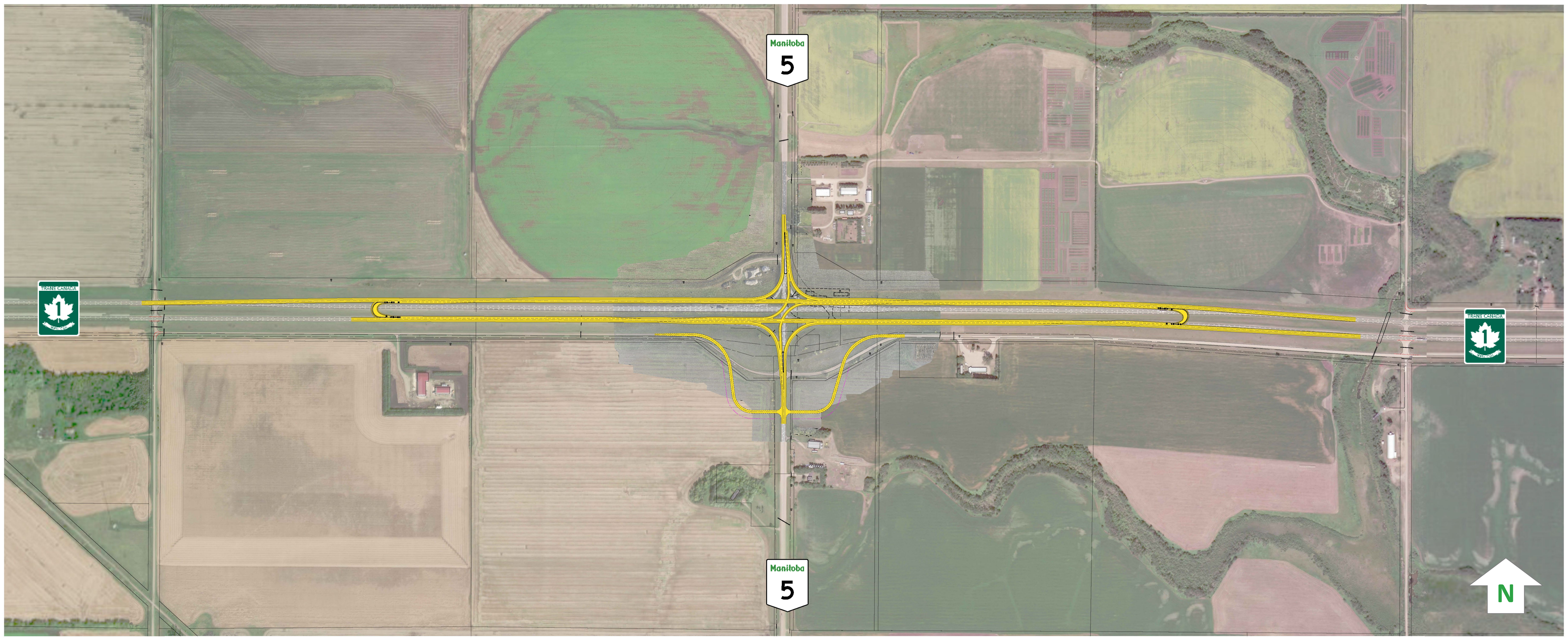
Shortlisted Intersection Alternatives

RCUT – Reduced Conflict U-Turn



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Safety Analysis

A safety analysis was completed to compare the safety performance of the three alternatives.

The safety analysis considered **predicted collisions** and **conflict points**; including merging conflicts, diverging conflicts, and crossing conflicts.

Predicted Collisions

- The study predicts fatal and injury collision rates for each intersection type over a 28-year period (2026 to 2054).
- The RCUT is expected to reduce fatal and injury collisions more significantly than the Widened and the Split.

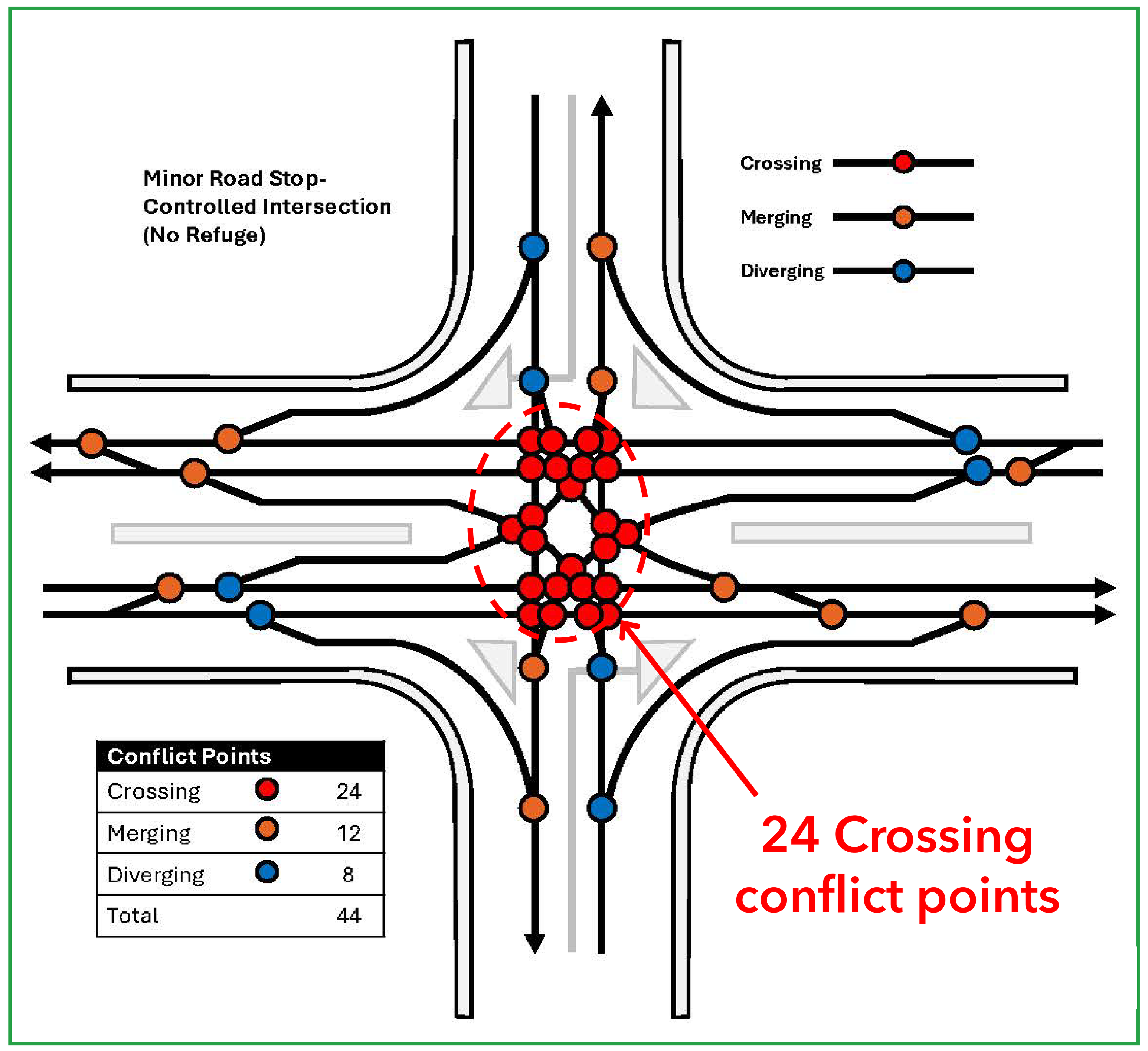
Conflict Points

- A conflict point is where two vehicle paths intersect, creating a point where vehicles might collide. Conflict points are useful for predicting where collisions may occur. The next slide provides more detail, including diagrams.
- There are different types of conflict points:
  - Crossing conflicts are more likely to result in severe collisions associated with right-angle collisions. Crossing conflicts are generally considered high-risk.
  - Merging and diverging conflicts may be low-, medium-, or high-risk depending on speed and angle.

Safety Analysis

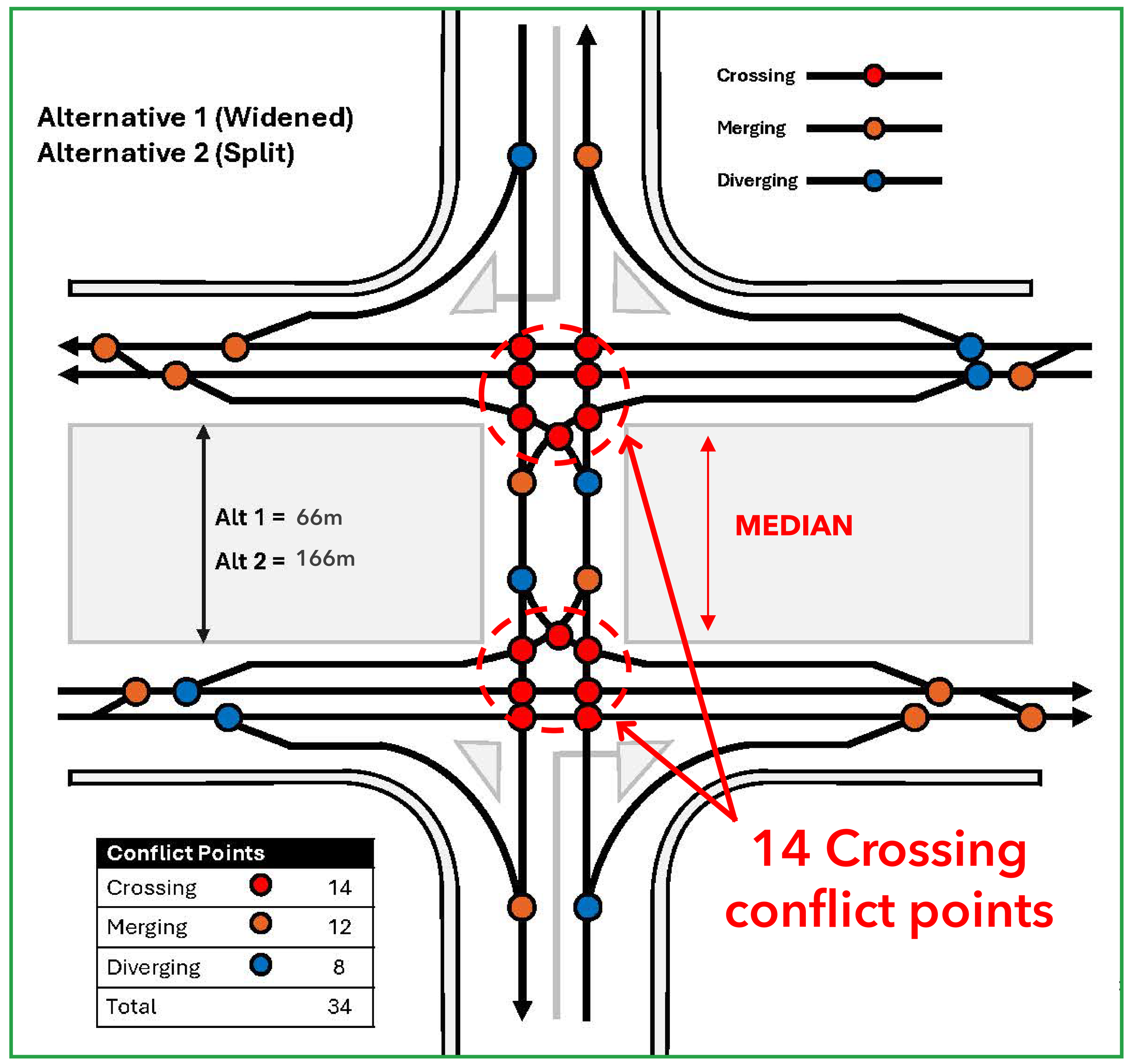
This slide visually compares conflict points of the existing intersection, Widened, Split, and RCUT alternatives. Each coloured dot represents a "conflict point".

The existing intersection has many severe crossing conflict points clustered in a small area.



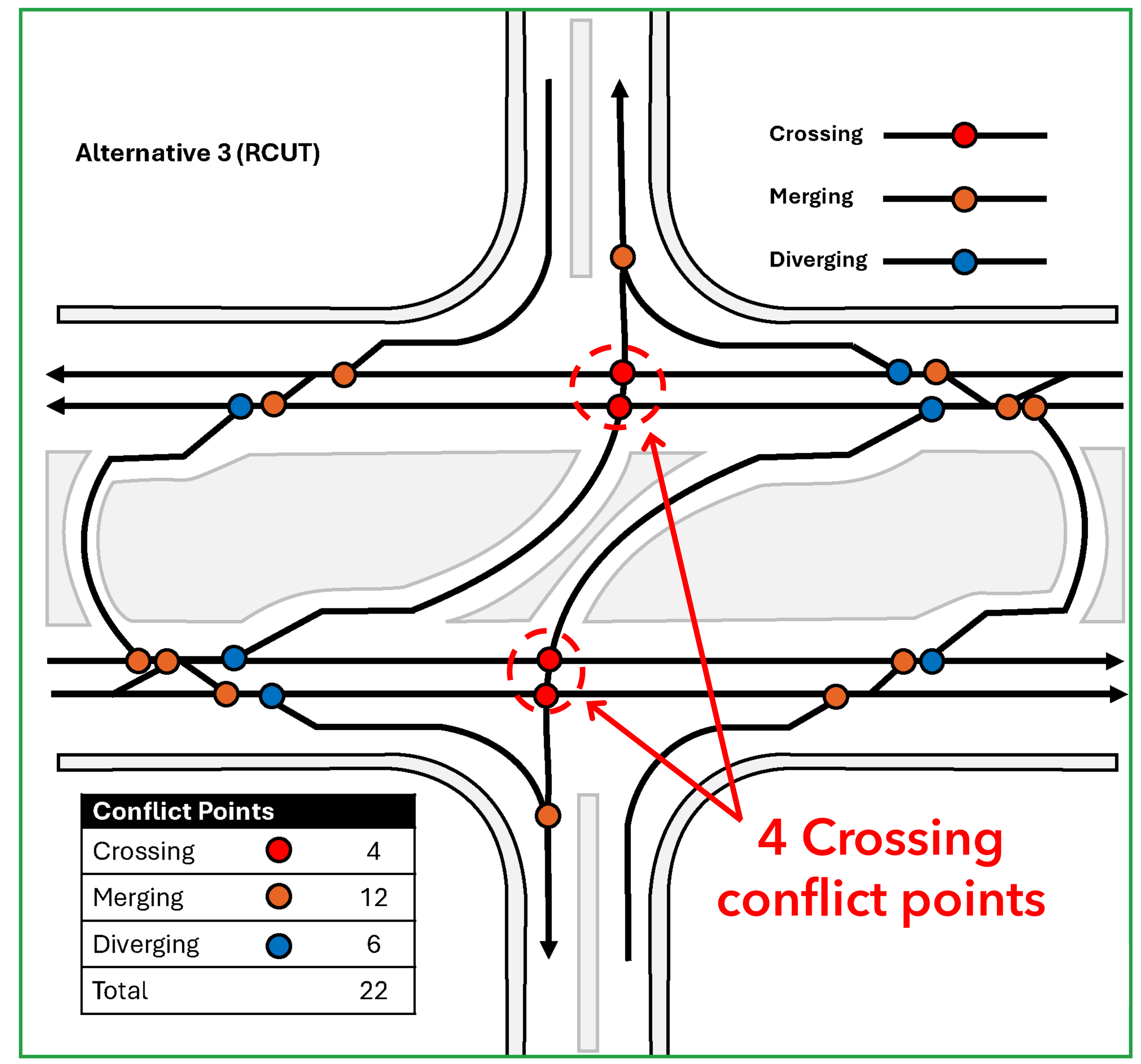
Existing Intersection

The Widened and Split intersections create a wider median, which reduces the number of severe crossing conflict points and spreads them out between the PTH 1 eastbound and westbound lanes.



Widened and Split Intersection

The RCUT intersection dramatically reduces the number of severe crossing conflict points to 4 and significantly spreads them out. It also reduces the number of total conflict points to 22.



RCUT Intersection

Note: *Diagrams are a schematic representation of the intersection and are not to scale.*

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Traffic Operational Analysis

A traffic operational analysis was completed to compare travel time for the intersection alternatives and the existing intersection configuration.

- The observations in the table below were calculated for a **future 2054 PM Peak Hour** scenario, when traffic volumes are expected to be the highest. The data shows:
- The RCUT provides the lowest average intersection delay (stop and wait time), at 0.4 seconds per vehicle.
- All travel times are either reduced or similar for all intersection types, except for two cases (see red box below):
  - **South on PTH 5:** on average, it will take about 49 seconds longer to go east towards Portage la Prairie.
  - **South on PTH 5:** on average, it will take about 67 seconds longer to continue south towards Carberry.

	Travel Time in 2054 (seconds)												Average Delay (seconds/vehicle)
	Northbound			Southbound			Eastbound			Westbound			Average for entire intersection (all movements)
	Left	Through	Right	Left	Through	Right	Left	Through	Right	Left	Through	Right	
Current Intersection Configuration	166	140	81	106	73	71	87	90	71	83	89	71	17.8
Alternative 1: Widened Intersection	109	73	66	89	58	69	90	90	70	85	89	67	7.9
Alternative 2: Split Intersection	108	71	66	96	67	64	89	90	70	96	89	62	8.1
Alternative 3: RCUT Intersection	157	140	66	155	140	70	91	90	71	85	89	71	0.4

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Evaluation Criteria

This slide illustrates the many considerations for evaluating options at a high level; all considerations are important.

Social

- Impacts to residences and agricultural land
- Property acquisition likelihood
- Community access
- Driver education and expectation
- Driver workload
- Enforcement
- Heritage resources
- Snowmobile trail
- Emergency services
- Implementation timeline

Cost

- Capital Cost
- Maintenance Cost

Engineering

- Safety
- Addresses severe conflicts
- Visibility
- Turning movement mobility
- Traffic flow
- Local access disruption
- Operating speed
- Large vehicle navigation
- Geotechnical
- Drainage
- Maintenance
- Construction staging
- Use of existing road infrastructure
- Greenhouse gas
- Environmentally sensitive site risks

Evaluation Summary

This slide summarizes details of the evaluation.

- Each alternative has strengths and weaknesses.
- Alternatives that have fewer weaknesses and more strengths are more favourable.
- The following points describe some notable differences among the options:
  - **Safety:** The RCUT is much safer than the other options. It reduces the number of places where vehicles can cross paths, helping to prevent serious collisions.
  - **Driver Workload:** The RCUT makes driving easier by spreading out decisions, giving drivers more time to react.
  - **Truck Turning Movements:** The Widened Median and Split options are more direct for truck turning, however the RCUT is designed to handle these movements well, even if they require a bit more maneuvering.
  - **Future Interchange:** The RCUT is the best option for accommodating a future interchange.
  - **Nuisance Impact:** The RCUT has fewer impacts on nearby residences and yards. Drivers on PTH 5 don't need to stop at a stop sign, reducing noise from rumble strips and braking.
  - **Agricultural Land:** The RCUT and Widened Median have less impact on agricultural land and require less property acquisition than the Split.
  - **Cost:** The costs of all three options are similar.

How does the RCUT work?

Preferred Alternative

The RCUT intersection design has been identified as the preferred alternative because it carries the most strengths and least weaknesses. This is an overview of the RCUT intersection.

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Preferred Alternative

This diagram shows more details of the RCUT intersection.

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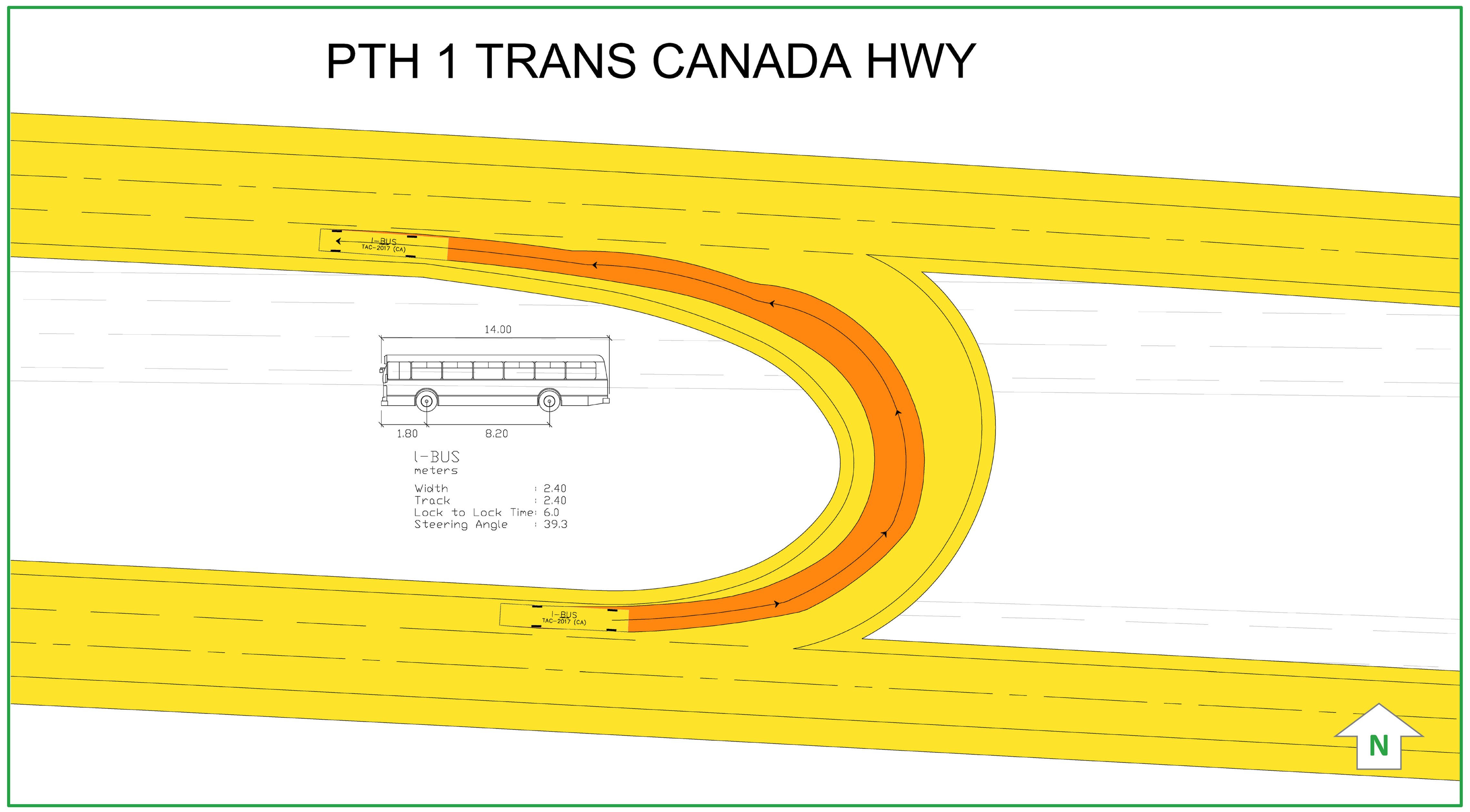
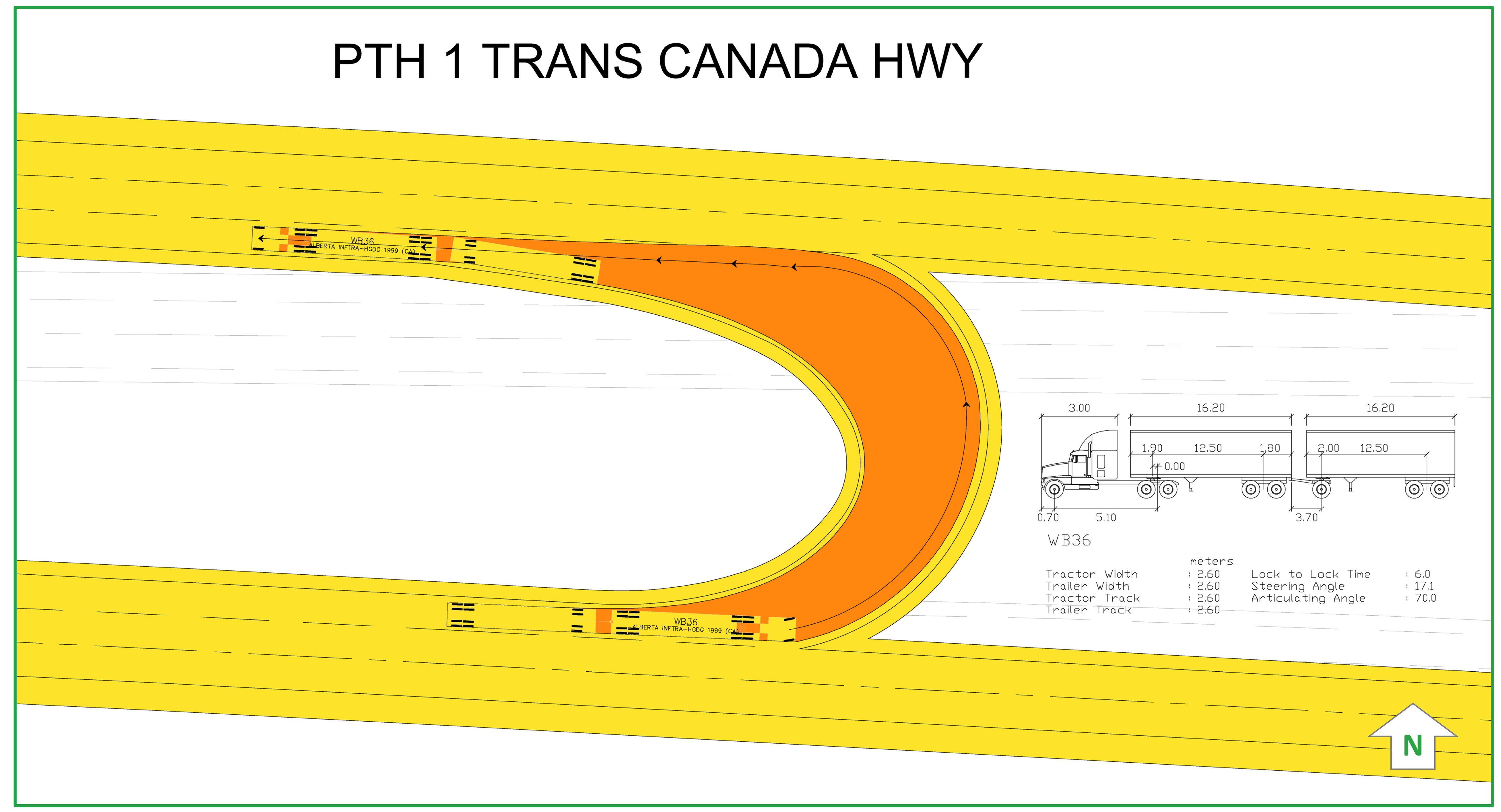
RCUT Turning Movements

These drawings show how a typical school bus and long combination vehicle with two 53' trailers navigate the U-turn of the RCUT.

The orange filled area represents the wheel path of each vehicle as it moves through the U-turn, demonstrating that these vehicles can safely complete the maneuver.



School Bus Turning Movement

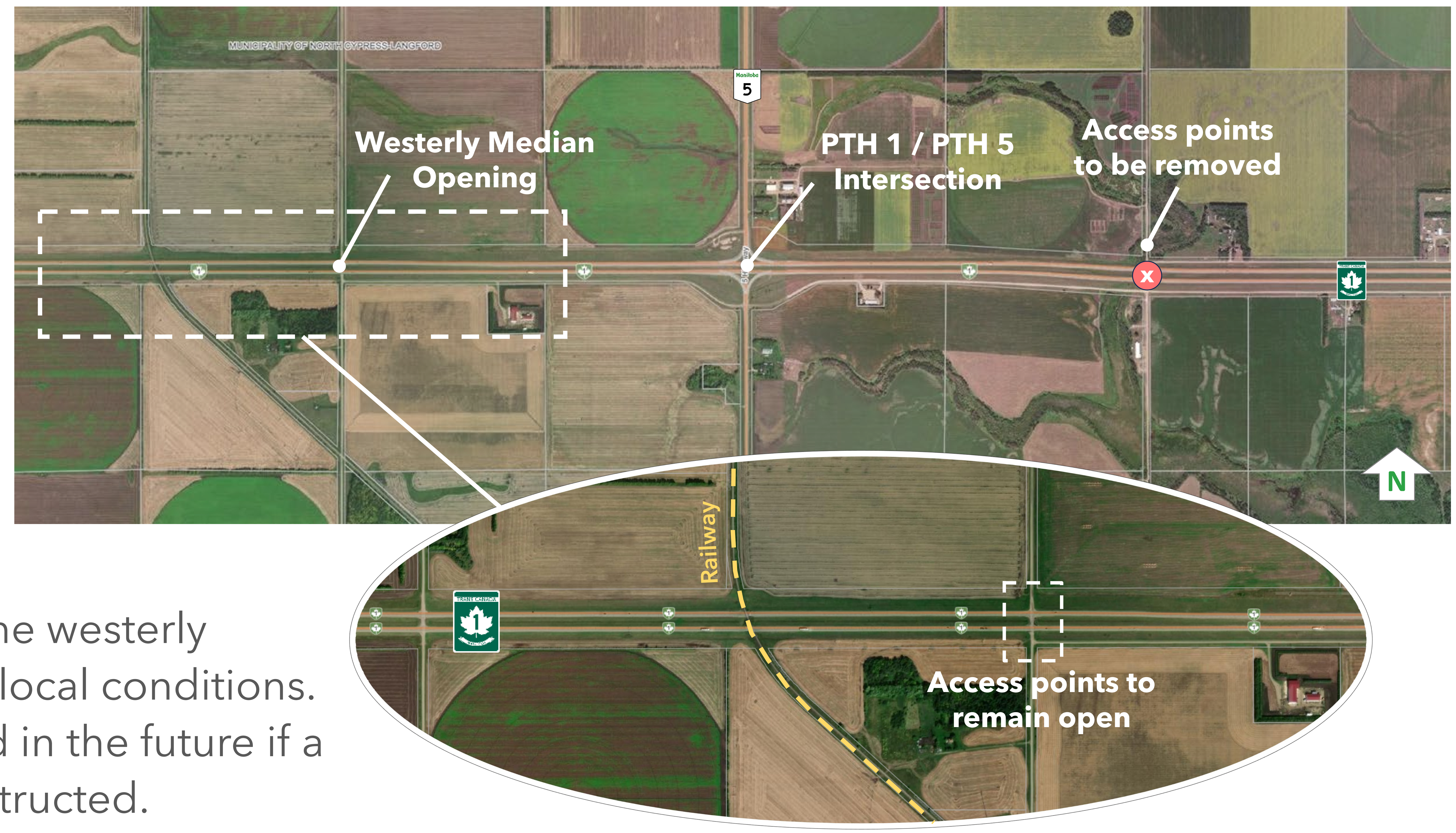


Long Combination Vehicle Turning Movement

Median Closure

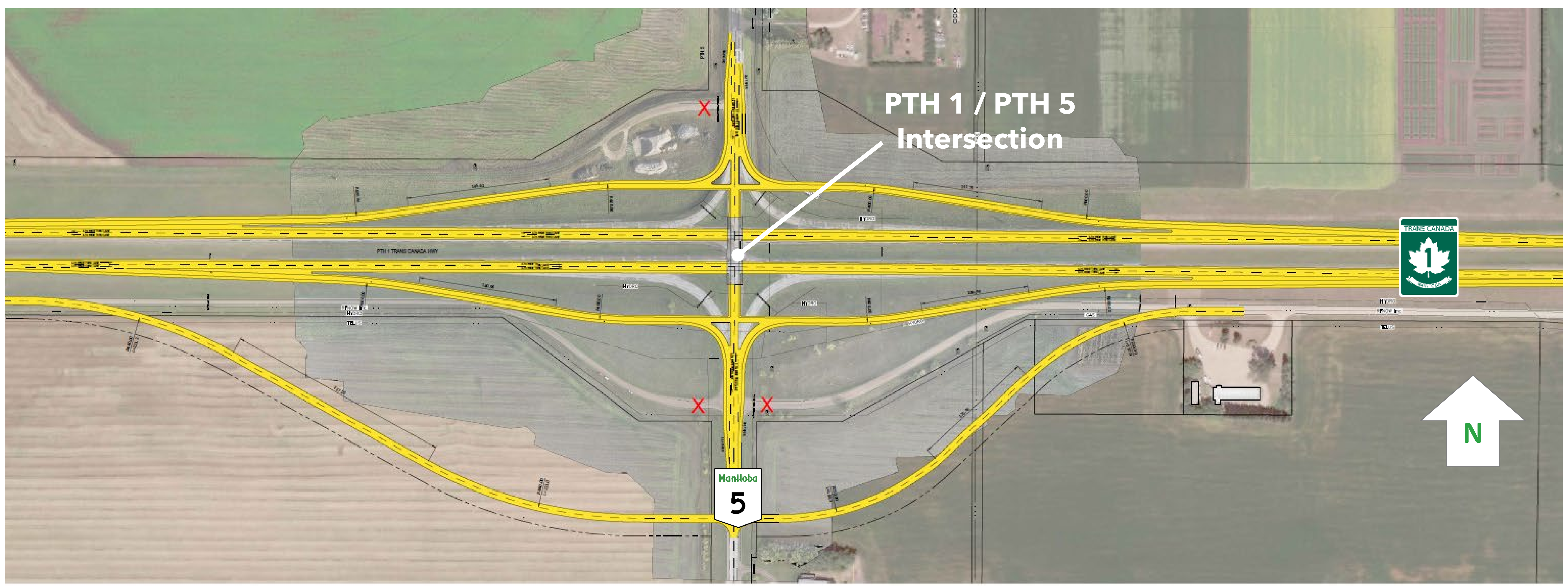
It is standard practice to assess median closures when intersection changes are implemented. This helps increase highway safety and to align with MTI long term plans for access spacing every two miles on PTH 1.

- At this location, the median one mile east of this intersection is recommended for closure to improve overall traffic safety and efficiency.
- The median one mile west of the intersection is frequently used for agricultural operations and is in close proximity to an existing railway.
- The study team recommends keeping the westerly median open for now to accommodate local conditions. Access to this median will be reassessed in the future if a service road crossing the railway is constructed.



Why Wasn't an Interchange Selected?

- An interchange is recognized as a safe solution for any intersection and was considered as part of this study.
- From a safety perspective, the RCUT can be just as effective as an interchange for intersections with low traffic volume at a fraction of the cost. The current low traffic volumes at PTH 1 and PTH 5 do not warrant the cost of an interchange.
- An interchange is expensive and can cost $100M or more. For comparison, Manitoba's annual capital budget for the entire highway network is approximately $515M.
- An interchange could become a more appropriate solution in the future if traffic volumes grow and vehicle delay increases.



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Why Weren't Traffic Signals Selected?

- Traffic signals were considered as a part of this study but fared poorly in safety performance compared to the three shortlisted alternatives.

- Collision data shows that traffic signals in isolated, rural, high-speed driving environments are expected to increase the risk of fatal or serious injury collisions.

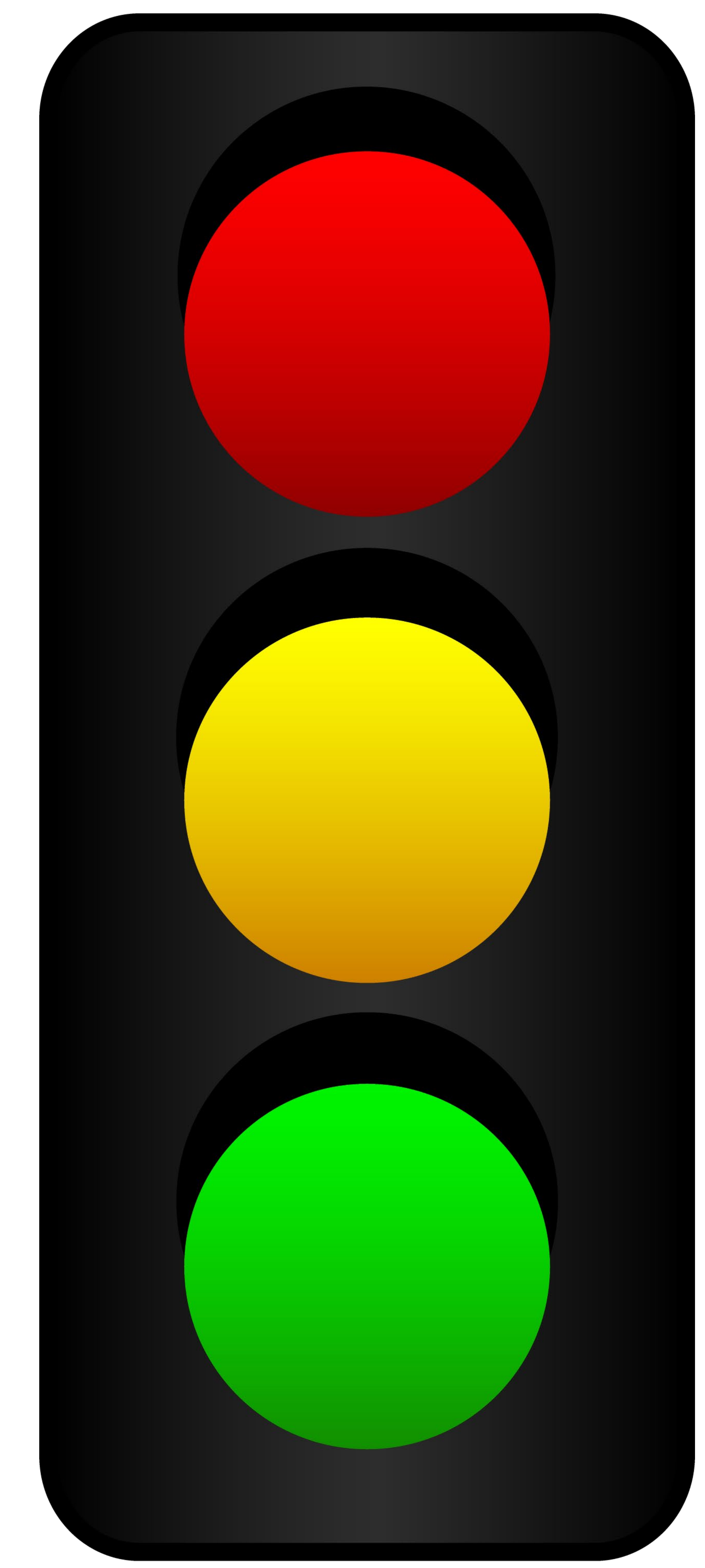
- In rural, high-speed driving environments, traffic signals can be unexpected or ignored by road users, and they do a poor job of managing driver error.

- While many drivers trust other people to use traffic signals properly, research and experience shows that drivers make mistakes at traffic signals regularly and at high-speed locations, the result is often a serious injury or fatality.

- Traffic signals also increase delay for all drivers and reduce mobility on the Trans Canada Highway.

- Traffic signals are most appropriate in urban or suburban areas where development is high because the device is expected by drivers and the speeds are generally lower.

- All Provincial and State agencies in North America tend to forgo traffic signals in high-speed, rural areas in favour of other options that do a better job of managing driver error.



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Construction Timelines

This slide illustrates project milestones to construction completion.

01 **Round 3 Engagement Preferred alternative**
Spring/Summer 2025

02 **Detailed design**
Fall 2025

03 **Construction tender advertised**
Fall 2025

04 **Aggregate production**
Winter 2025/Spring 2026

05 **Commence onsite construction**
Summer 2026
(Weather permitting)

06 **Traffic availability**
Fall 2026
(Weather permitting)

07 **Landscaping**
Spring 2027

Thank you for your attention

- The project team has carefully considered and evaluated several intersection treatment options at this location, each with its own advantages and disadvantages.
- In summary, the RCUT presents the greatest opportunity to increase safety in a timely and economic manner.
- We welcome your feedback on the safety rationale behind the project and how to navigate the proposed RCUT. Please fill out an online comment sheet at the following link:

https://www.surveymonkey.com/r/PTH1and5ImprovementsR3

If you have any further questions, please contact:

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References

Reduced Conflict U-Turn Intersection

The Reduced Conflict U-Turn (RCUT) intersection has been identified as the preferred alternative for the PTH 1and PTH 5 intersection because it will be most effective in improving safety. By spreading out decision points, the RCUT simplifies driving, gives drivers more time to react, and helps reduce the likelihood of severe collisions.

The RCUT intersection improves safety by re-routing through and left-turn traffic on PTH 5 to a U-turn located approximately 900 metres ahead. The design includes dedicated acceleration and deceleration lanes and a wide free-flow U-turn area. These features are all designed to provide large vehicles and trailers ample space to navigate the intersection safely and smoothly.

How does an RCUT work?

- Drivers on PTH 1 are able to turn right or left through dedicated turning lanes.
- Drivers on PTH 5 make a right turn onto PTH 1 then make a U-Turn 900 metres ahead to turn right on PTH 5 or continue on PTH 1.
- Dedicated acceleration and deceleration lanes ensure drivers have time and space to merge safely.

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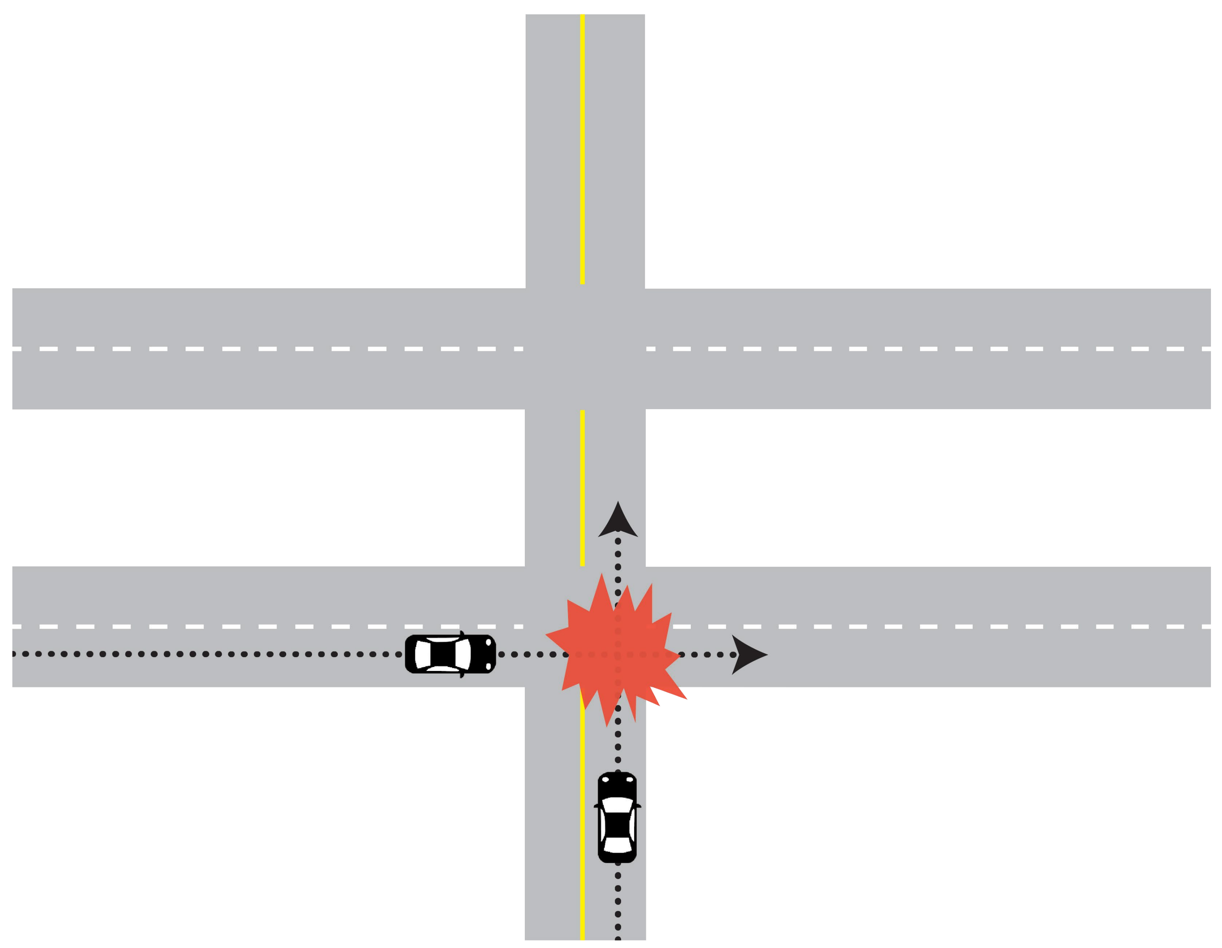
How is an RCUT safer?

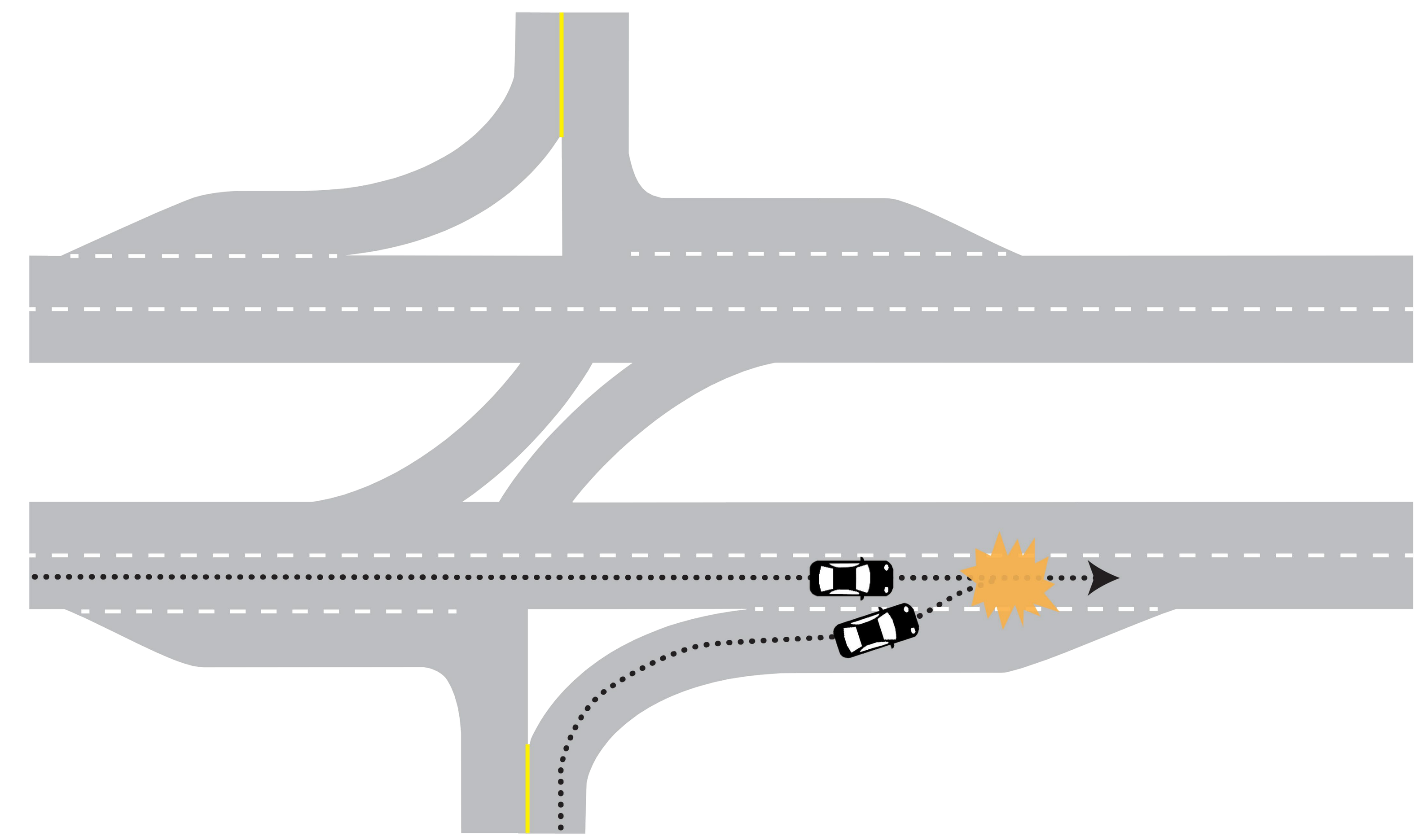
Different types of intersections have varying numbers and types of conflict points. Conflict points are locations where vehicle paths intersect, and collisions can occur. The risk at each conflict point depends on factors like the angle and speed of crossing vehicles.

Conventional Intersection



1. Conventional intersections have many high-risk conflict points.
2. Drivers on the minor road are required to cross multiple lanes of high-speed traffic.
3. Drivers on the major road have limited time to respond to vehicles entering the intersection.
4. Drivers approach this intersection type at very different speeds (100 km/h or more difference).
5. Collisions at this type of intersection can involve right-angle impacts, which are often severe.
6. In the event of a collision, due to the speed and angle of impacts, there is a greater likelihood of a fatal or serious injury.

RCUT Intersection



1. RCUT intersections have over 40% fewer conflict points than conventional intersections, significantly lowering the potential for severe outcomes.
2. Drivers on the minor road navigate through the intersection one lane of traffic at a time, focusing only on one direction of traffic.
3. Drivers on the major road have time to respond to merging vehicles by moving over, slowing down, or speeding up.
4. Drivers approach this intersection type with more moderate speed differences (20-50 km/h difference).
5. Collisions at this type of intersection typically involve sideswipes and similar speed rear-ends, which are generally low severity.
6. In the event of a collision, there is a much lower likelihood of severe injury.