

Internal Memo

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Subject: Technical Justification for Reducing Posted Speed from **90 km/h** to **70 km/h** on Whoop Up Drive

1. Introduction

This memorandum provides a technical justification for reducing the posted speed limit on the Whoop Up Drive from Scenic Drive to University Drive from 90 km/h to 70 km/h. The corridor is a six-lane divided expressway with three lanes per direction, narrow shoulders, concrete jersey barriers on both sides, limited roadside clearance, and grades up to 8%. Traffic volumes along the corridor are approximately 50,000 vehicles per day (ADT).

A review of corridor geometry, roadside design features, safety performance principles, and Transportation Association of Canada (TAC) speed-management guidance indicates that the current 90 km/h posted speed is inconsistent with the corridor's geometric constraints and roadside risk environment. A 70 km/h posted speed more appropriately reflects actual operating conditions, improves safety margins, and aligns with the Safe System approach.

2. Corridor Constraints and Safety Considerations

2.1 Narrow Shoulder Widths

Shoulder widths along the corridor range from 0.0 m to 1.2 m (in the narrowest sections), which is significantly lower than the shoulders typically associated with high-speed (90–100 km/h) expressways.

- TAC and Alberta Transportation guidelines generally provide for *significantly wider shoulders* than the existing 0.8–1.2 m on this corridor for high-speed (90 km/h) divided facilities
- The existing shoulders provide insufficient refuge space for disabled vehicles, maintenance activities, emergency response, or enforcement stops.
- Drivers who drift laterally have minimal recovery distance before encountering a rigid barrier.

These deficiencies are not consistent with 90 km/h operating speeds.

2.2 Concrete Jersey Barriers on Both Sides

The corridor uses concrete jersey barriers on both sides, immediately adjacent to the travel lanes.

Implications:

- The effective clear zone is essentially zero; there is no forgiving roadside area for errant vehicles to recover.
- Any run-off-road event becomes a barrier impact, not a recovery maneuver.
- With shoulders <1.2 m, disabled vehicles may partially occupy live lanes, increasing collision risk at high speeds.

At 90 km/h, barrier impacts carry high kinetic energy. Reducing the posted speed to 70 km/h reduces typical impact energy by approximately 40%, making barrier collisions significantly more survivable.

2.3 Steep Grades Up to 8%

The corridor includes vertical grades up to 8%, which increase operational and safety risks at higher speeds.

Safety implications of steep grades:

- On downgrades, vehicles require longer stopping distances due to gravitational acceleration. Under winter conditions, the required stopping distance at 90 km/h may exceed available sight distance.
- On upgrades, heavy vehicles slow significantly (often to 50–60 km/h). This creates large speed differentials with cars traveling near 90 km/h, particularly in the fast lane.
- Winter operations on 8% grades amplify risks of loss of control, rear-end collisions, and heavy-vehicle instability.

A lower posted speed of 70 km/h reduces stopping-sight-distance requirements, lowers speed differentials, and increases stability margins on both grades and curves.

2.4 Limited Roadside Clearance

Built-up conditions along the corridor restrict roadside recovery width. Adjacent development, barriers, slopes, and retaining structures limit the ability to retrofit a proper clear zone.

TAC and Alberta Transportation guidance indicate that when adequate clear zone cannot be provided, speed management becomes the primary tool to reduce crash severity.

2.5 High Traffic Volumes (≈50,000 ADT)

High volume increases the probability of:

- rear-end collisions on grades,
- lane-changing conflicts, specially when trucks decelerate on climbs,
- conflicts with slow-moving or stopped vehicles with no shoulder refuge,
- barrier impacts when drivers must make emergency avoidance maneuvers.

Exposure to these risk factors is substantial, making a lower posted speed an effective mitigation.

3. Safe System Rationale

Modern road safety practice accepts that drivers make mistakes, and the roadway environment should ensure that these mistakes do not result in severe outcomes if a collision occurs. On this corridor:

- Rigid barriers, narrow shoulders, and steep grades create an unforgiving cross-section.
- At 90 km/h, common driver errors (lane drift, misjudged braking on a downgrade, or reacting to a stalled vehicle) can result in high-severity crashes.
- Lowering speeds reduces crash energy, reaction-time requirements, and severity significantly.

A 70 km/h limit makes the corridor more consistent with Safe System design principles.

4. Mobility Impact

The mobility penalty of lowering the speed from 90 → 70 km/h is modest. On this 2.7 km 90 km/h limits on Whoop Up Drive, travel time will be:

- at 90 km/h: ~ 1 min 48 s
- at 70 km/h: ~ 2 min 19 s
- difference: ~ 31 s

This marginal travel-time cost is proportionally small relative to the expected reduction in collision severity and frequency.

5. Conclusion and Recommendation

Based on a review of geometric constraints, roadside design, traffic operations, and TAC speed-limit guidance, the existing 90 km/h posted speed on Whoop Up Drive does not reflect the corridor's actual safety and operational environment. Key geometric deficiencies; including extremely narrow shoulders, rigid barriers adjacent to live lanes, limited clear zone, steep grades, and high traffic volumes can create a high-risk setting at the current speed limit of 90 km/h.

Reducing the posted speed to 70 km/h:

- aligns operating speeds with available stopping distance on grades,
- reduces barrier-impact energy by ~40%,
- mitigates the consequences of grade-related speed differentials,
- compensates for the absence of a forgiving roadside, and
- is consistent with TAC and Alberta Transportation speed-management principles.

I recommend adopting a posted speed limit of 70 km/h on Whoop-Up Drive, replacing the current 90 km/h limit, on a two-year trial basis. This adjustment offers a practical, low-cost, and technically supported approach to enhancing safety on this constrained urban expressway. It may also help reduce driver confusion by eliminating frequent speed changes along the corridor during the winter period.

If endorsed by the ELT, Traffic Operations will prepare a Traffic Control Device (TCD) plan and implement the revised speed limit. Successful implementation will require clear and proactive public communication. Traffic Operations will also conduct before-and-after data collection and provide annual evaluation reports throughout the two-year trial period.

Attached: Alberta Transportation Design Guide Reference Tables

Table A-2-3-2a New Roadway Functional Characteristics

Functional Classification Code	Functional Classification Description	Core User Function	Flow Characteristics	Connections with	Typical Vehicle Volumes Served (veh/day)	Typical Design Speed	Number of Basic Lanes	Right-of-Way Width (m)
RFD	Rural Freeway Divided	Mobility is the primary consideration	Uninterrupted Flow	Freeways Arterials Collectors	≥ 8,000	110 – 130	4 – 8	110 – 130
RAD	Rural Arterial Divided	Mobility is the primary consideration	Uninterrupted Flow	Freeways Arterials Collectors Locals	3,000 – 20,000	120	4 – 6	120 – 130
RAU	Rural Arterial Undivided	Mobility is the priority with some consideration of Access	Uninterrupted Flow	Freeways Arterials Collectors Locals Driveways	400 – 10,000	110	2	50 – 60
RCU	Rural Collector Undivided	Mobility and Access of equal importance	Uninterrupted Flow	Freeways Arterials Collectors Locals Driveways	100 – 2,000	90 – 110	2	40 – 50
RLU	Rural Local Undivided	Access is the primary consideration	Interrupted Flow	Arterials Collectors Locals Driveways	< 1,000	60 – 90	2	40 – 50
UFD	Urban Freeway Divided	Mobility is the primary consideration	Uninterrupted Flow	Freeways Expressways Arterials	≥ 10,000	90 – 110	4 – 8	80 – 90
UED	Urban Expressway Divided	Mobility is the primary consideration	Interrupted Flow	Freeways Expressways Arterials	10,000 – 60,000	80 – 90	4 – 6	70 – 80
UAD	Urban Arterial Divided	Mobility is the priority with some consideration of Access	Interrupted Flow	Freeways Expressways Arterials Collectors	5,000 – 30,000	70 – 80	4 – 6	40 – 50
UAU	Urban Arterial Undivided	Mobility is the priority with some consideration of Access	Interrupted Flow	Freeways Expressways Arterials Collectors	1,000 – 15,000	70	2 – 4	30
UCU	Urban Collector Undivided	Mobility and Access of equal importance	Interrupted Flow	Arterials Collectors Locals Alleys/Lanes Driveways	300 – 8,000	70	2	30
ULU	Urban Local Undivided	Access is the primary consideration	Interrupted Flow	Collectors Locals Alleys/Lanes Driveways	< 1,000	60	1 – 2	20

TABLE H3.1 Clear Zone Distances (in metres from edge of driving lane)

Design Speed (Km/h)	Design AADT ⁺	Fill Slopes			Cut Slopes		
		6:1 or Flatter	5:1 to 4:1	3:1	3:1	5:1 to 4:1	6:1 or Flatter
60 or less with barrier curb***	All	0.5	0.5	0.5	0.5	0.5	0.5
60 or Less	Under 750	2.0 – 3.0	2.0 – 3.0	**	2.0 – 3.0	2.0 – 3.0	2.0 – 3.0
	750 – 1500	3.0 – 3.5	3.5 – 4.5	**	3.0 – 3.5	3.0 – 3.5	3.0 – 3.5
	1500 – 6000	3.5 – 4.5	4.5 – 5.0	**	3.5 – 4.5	3.5 – 4.5	3.5 – 4.5
	Over 6000	4.5 – 5.0	4.5 – 5.0	**	4.5 – 5.0	4.5 – 5.0	4.5 – 5.0
70 –80	Under 750	3.0 – 3.5	3.5 – 4.5	**	2.5 – 3.0	2.5 – 3.0	3.0 – 3.5
	750 – 1500	4.5 – 5.0	5.0 – 6.0	**	3.0 – 3.5	3.5 – 4.5	4.5 – 5.0
	1500 – 6000	5.0 – 5.5	6.0 – 8.0	**	3.5 – 4.5	4.5 – 5.0	5.0 – 5.5
	Over 6000	6.0 – 6.5	7.5 – 8.5	**	4.5 – 5.0	5.5 – 6.0	6.0 – 6.5
90	Under 750	3.5 – 4.5	4.5 – 5.5	**	2.5 – 3.0	3.0 – 3.5	3.0 – 3.5
	750 – 1500	5.0 – 5.5	6.0 – 7.5	**	3.0 – 3.5	4.5 – 5.0	5.0 – 5.5
	1500 – 6000	6.0 – 6.5	7.5 – 9.0	**	4.5 – 5.0	5.0 – 5.5	6.0 – 6.5
	Over 6000	6.5 – 7.5	8.0 – 10.0 *	**	5.0 – 5.5	6.0 – 6.5	6.5 – 7.5
100	Under 750	5.0 – 5.5	6.0 – 7.5	**	3.0 – 3.5	3.5 – 4.5	4.5 – 5.0
	750 – 1500	6.0 – 7.5	8.0 – 10.0 *	**	3.5 – 4.5	5.0 – 5.5	6.0 – 6.5
	1500 – 6000	8.0 – 9.0	10.0 – 12.0 *	**	4.5 – 5.5	5.5 – 6.5	7.5 – 8.0
	Over 6000	9.0 – 10.0 *	11.0 – 13.5 *	**	6.0 – 6.5	7.5 – 8.0	8.0 – 8.5
110	Under 750	5.5 – 6.0	6.0 – 8.0	**	3.0 – 3.5	4.5 – 5.0	4.5 – 4.9
	750 – 1500	7.5 – 8.0	8.5 – 11.0 *	**	3.5 – 5.0	5.5 – 6.0	6.0 – 6.5
	1500 – 6000	8.5 – 10.0 *	10.0 – 13.0 *	**	5.0 – 6.0	6.5 – 7.5	8.0 – 8.5
	Over 6000	9.0 – 10.5 *	11.0 – 14.0 *	**	6.5 – 7.5	8.0 – 9.0	8.5 – 9.0
120 or More	750 – 1500 ⁺	8.0 – 9.0	9.0 – 12.0	**	3.5 – 5.0	6.0 – 6.5	7.0 – 7.5
	1500 – 6000 ⁺	9.0 – 10.0	10.0 – 14.0	**	5.5 – 6.5	7.0 – 8.0	8.0 – 9.0
	Over 6000 ⁺	10.0 – 11.0 *	11.0 – 15.0	**	7.0 – 8.0	8.5 – 9.5	9.0 – 10.0

* Where a site specific investigation indicates a high probability of continued crashes, or such occurrences are indicated by crash history, the designer may provide Clear Zone distances greater than the suggested range shown. Clear Zones may be limited to 9 m for practicality or to provide a consistent roadway template if previous experience with the subject roadway or similar projects or designs indicates satisfactory performance.

** Since recovery is less likely on the unshielded, traversable 3:1 slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of slope. Determination of the width of the recovery area at the toe of slope should take into consideration right-of-way availability, environmental concerns, economic factors, safety needs, and accident histories. Also, the distance between the edge of the travel lane and the beginning of the 3:1 slope should influence the recovery area provided at the toe of slope.

***On a curbed roadway, the Clear Zone distance should be measured from the edge of driving lane, e.g. on a 2-lane 10m road width from curb to curb, 3.5 m adjacent to centreline may be considered the driving lane and therefore, the curb is 1.5m from the driving lane. It is still prudent to place obstacles at least 0.5 m behind the curb.

+ The AADT used for this purpose shall be the daily volume on the roadway i.e. the full AADT on undivided highways and half of the AADT on divided highways.