

Development of a Functional Classification System for Alberta Highways

CEA Conference

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Agenda

1. TEC Highway Classifications
2. Highway Geometric Design Guide – Chapter A Re-write (2017-18)
3. Development of the Functional Classification System
4. Summary and Future Work

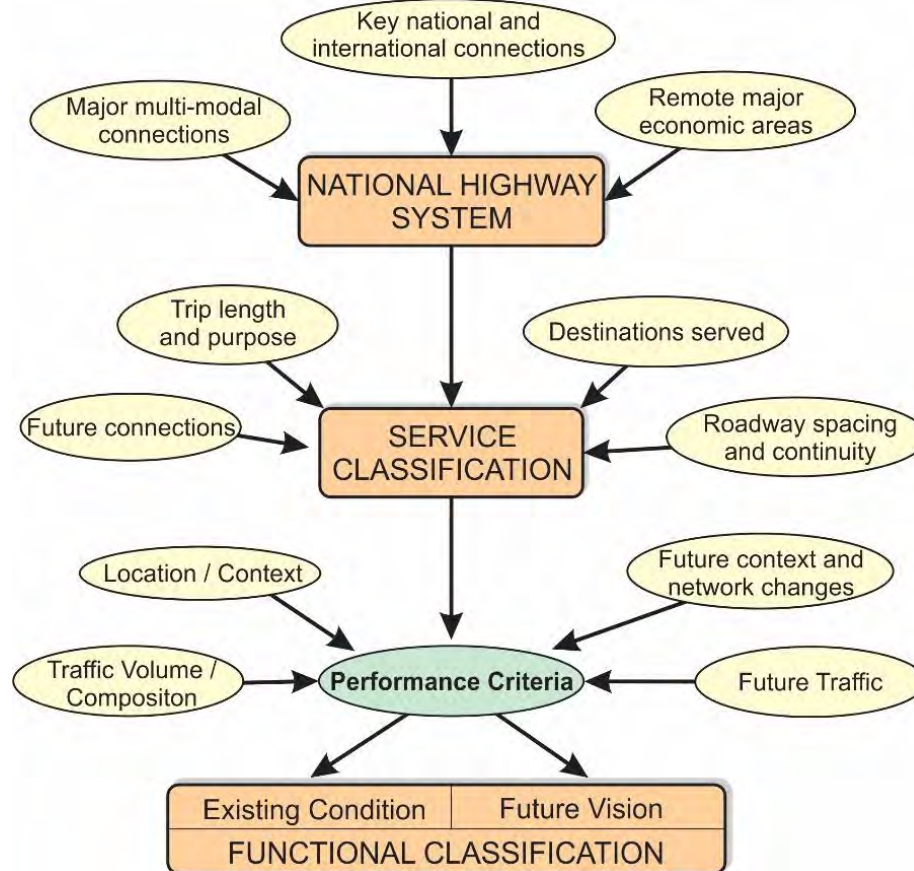
TEC

Highway Classifications

**Strategic
National
Interest**

**Strategic
Provincial
Importance**

**User
Experience**

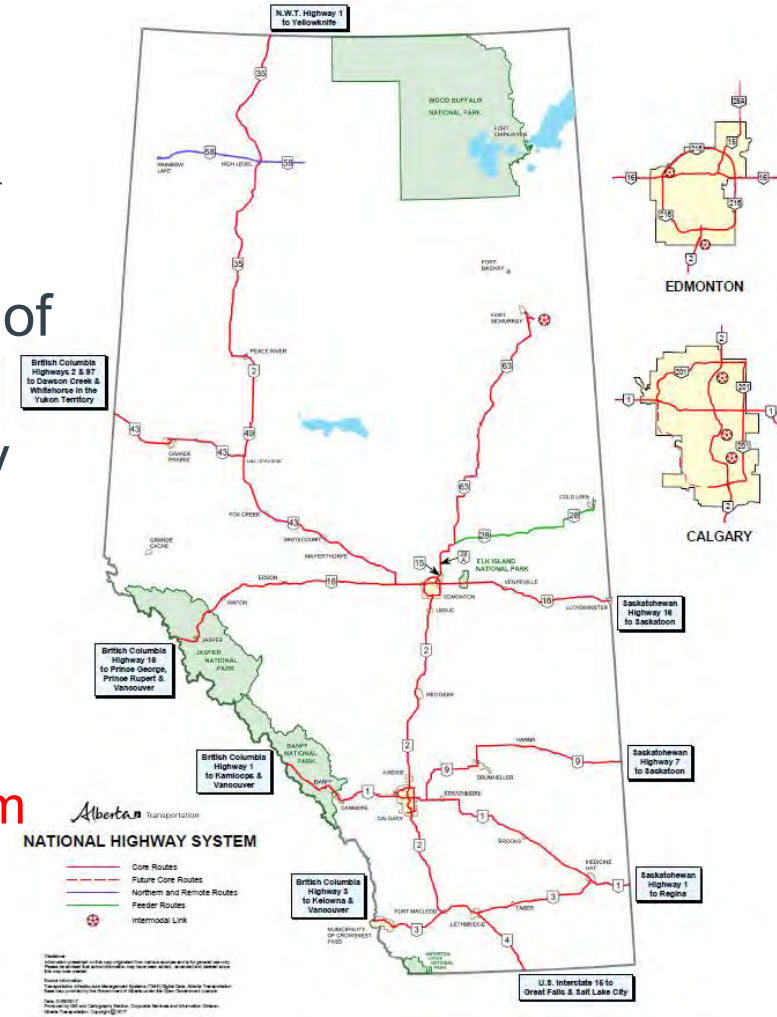


**+ 3 special
designations**

National Highway System

- Routes of **Strategic National Interest** as determined by Council of Ministers Responsible for Transportation and Highway Safety
- Three categories:
 - Core **4,036 km**
 - feeder **216 km**
 - northern and remote routes **197 km**

94% TEC jurisdiction



Service Classification

- Relative strategic provincial importance





<p><u>Level 1:</u> Accommodate the movement of people, goods and services inter-provincially and internationally. (14%)</p>	<p><u>Level 2:</u> Accommodate the movement of people, goods, and services intra-provincially. (34%)</p>
<p><u>Level 3:</u> Serve traffic of an inter-regional or inter-county nature. (38%)</p>	<p><u>Level 4:</u> Serve traffic of an intra-regional nature or traffic within a municipality. (15%)</p>

Service Classification

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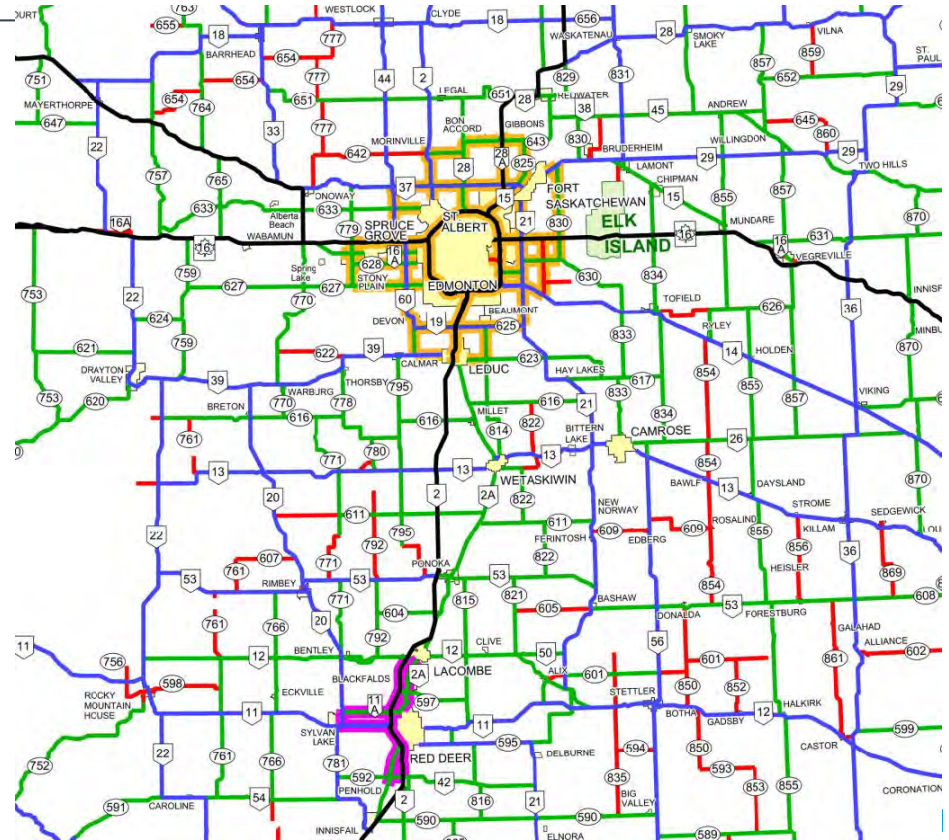
PROVINCIAL HIGHWAY SERVICE CLASSIFICATION MAP

Service Class

- Level 1 
- Level 2 
- Level 3 
- Level 4 

Metropolitan Area

- Large 
- Small 



Functional Classification

- Grouping of roadways of similar operating characteristics
 - describes roadway experience ... the “look and feel”
 - relates directly to user expectations (considers context)



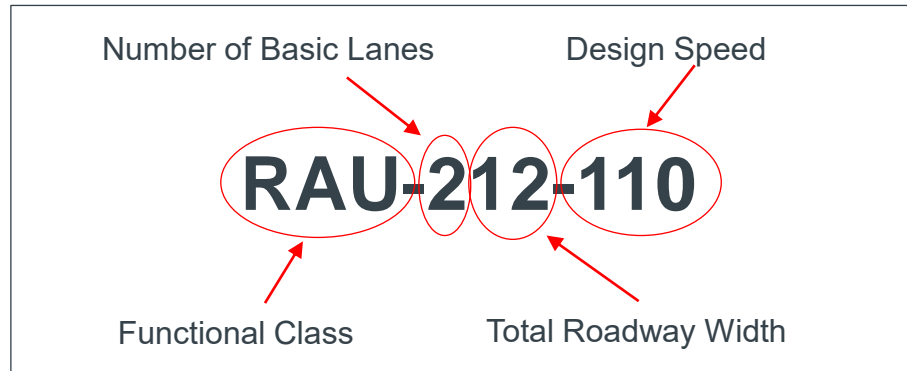
Rural Freeway (RFD)



Urban Arterial (UAD)

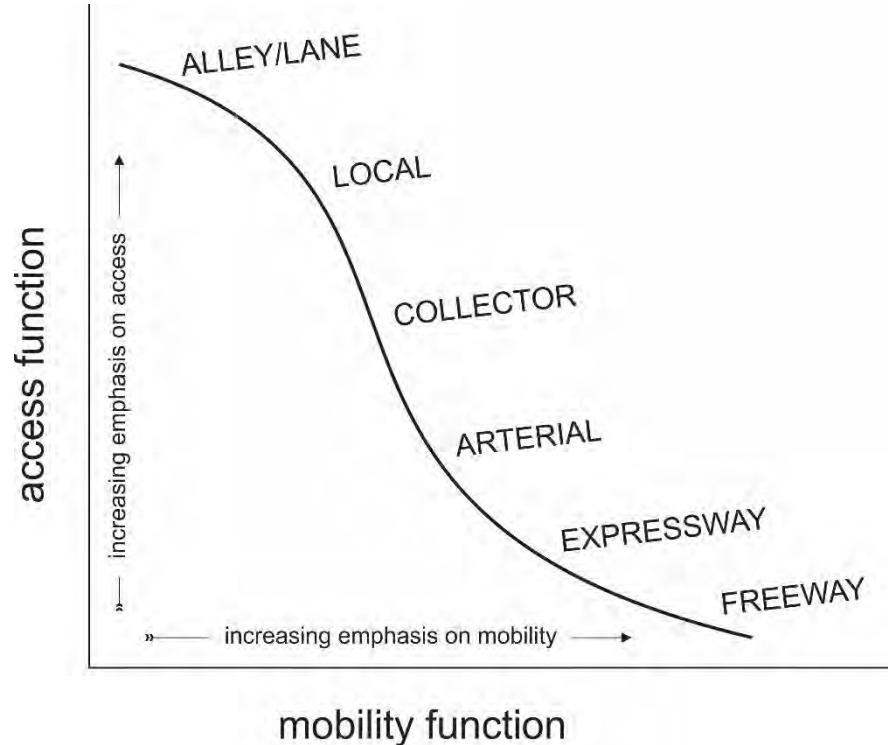
Functional Classification

- Three components:
 - surrounding context (**R**ural or **U**rbn)
 - core function (access to adjacent land or mobility)
 - physical form (**D**ivided or **U**ndivided)

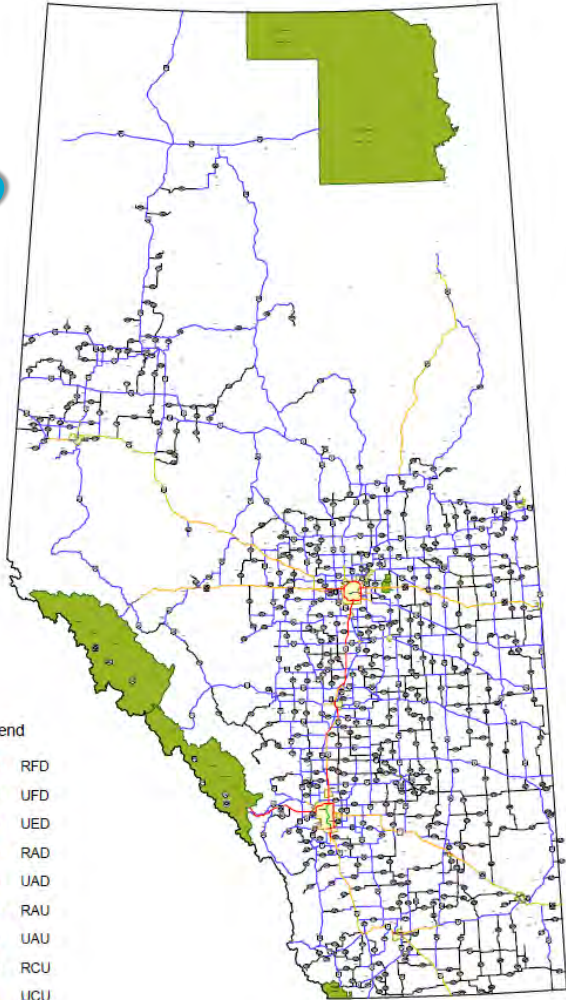


Functional Classification

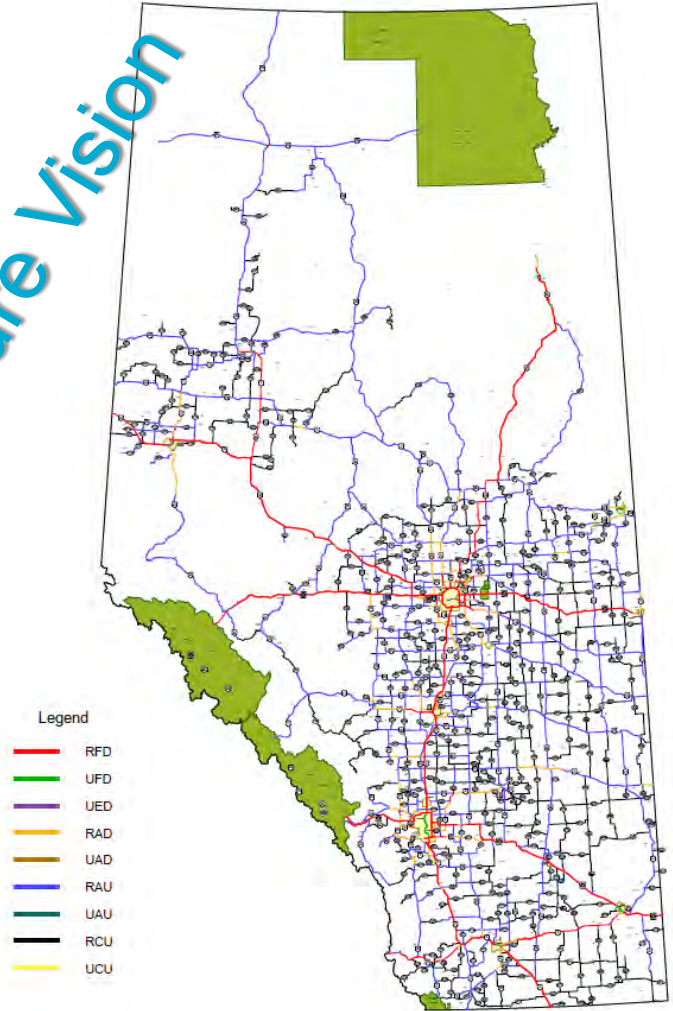
Core Function



Existing



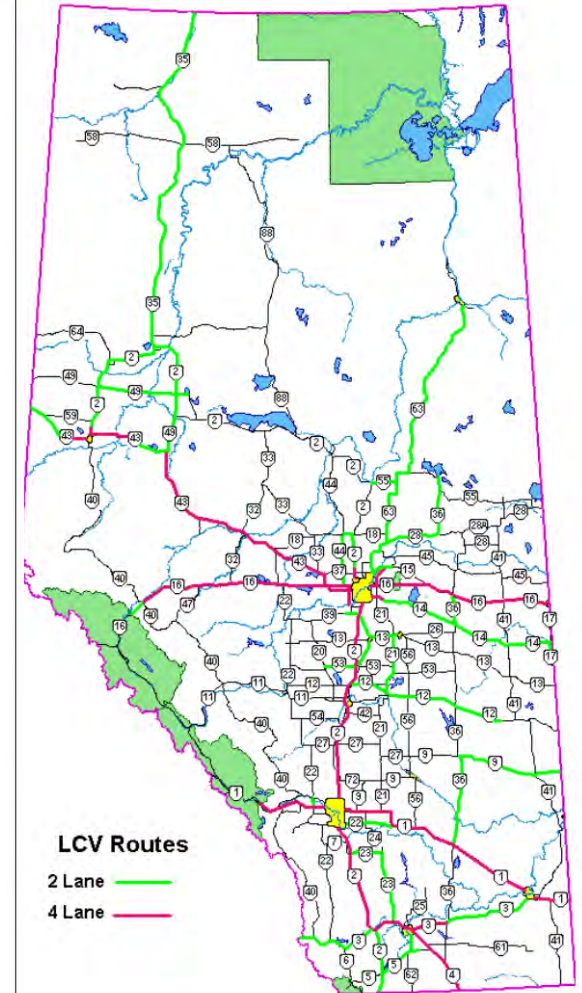
Future Vision



Special Designations

Three special designations

- High Load Corridors
- Long Combination Vehicle routes
- Log Haul routes



Service Class vs Functional Class

Service Class	Functional Class
Grouping by relative strategic provincial importance	Grouping by physical attributes
Specific to TEC viewpoint	Agency independent
Homogeneous over long distances regardless of context and conditions	Changes over distance based on traffic conditions and surrounding context
Stable over time (exceptions: new routes or bypasses)	Evolves over time as traffic conditions and context changes
Informs Level-of-Service targets, shoulder width, other policy and operational targets	Informs Design speed and associated design parameters, cross section and right-of-way, intersection spacing and flow characteristics

Highway Geometric Design Guide (HGDDG) Re-write of Chapter A 2017-18

Redefining Functional Classification

HGDG Chapter A re-write 2017-18

Identified the following issues:

- Functional classification elements (Freeway, Expressway, Arterial, Collector, and Local) not clearly defined
- Design designation determined at project level
- TEC highway classifications not well aligned with municipalities
- Roadside management classification and access management standards are geared to rural areas

HGDG Chapter A re-write 2017-18

Recommended changes:

1. Formalize the functional class component of the design designation.
 - First three letters of the design designation would become the functional class, e.g. “RAD” (Rural Arterial Divided)
 - Eleven functional classes to align with TAC design classification
2. Amalgamate the roadside management classes with the new functional class definitions.
 - Access spacing standards would be based on functional class as would all other design parameters.

HGDG Chapter A re-write 2017-18

Recommended changes:

3. Map the Functional Classification System and use the map as a basis for determining design designation
 - Publish two time horizons: existing condition and future vision

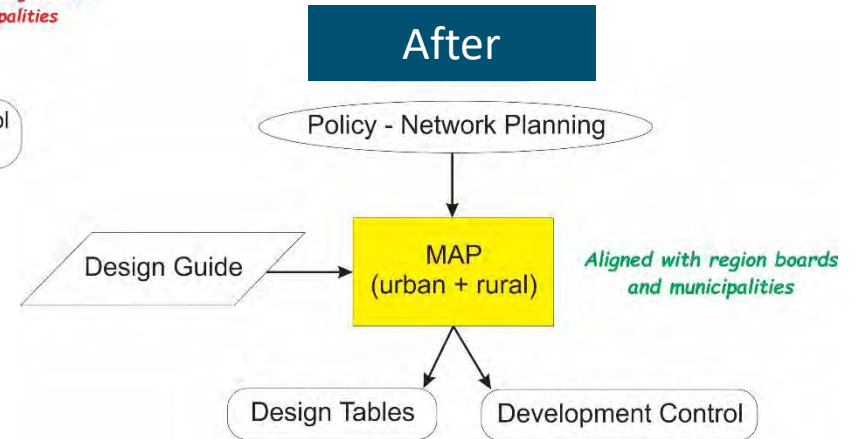
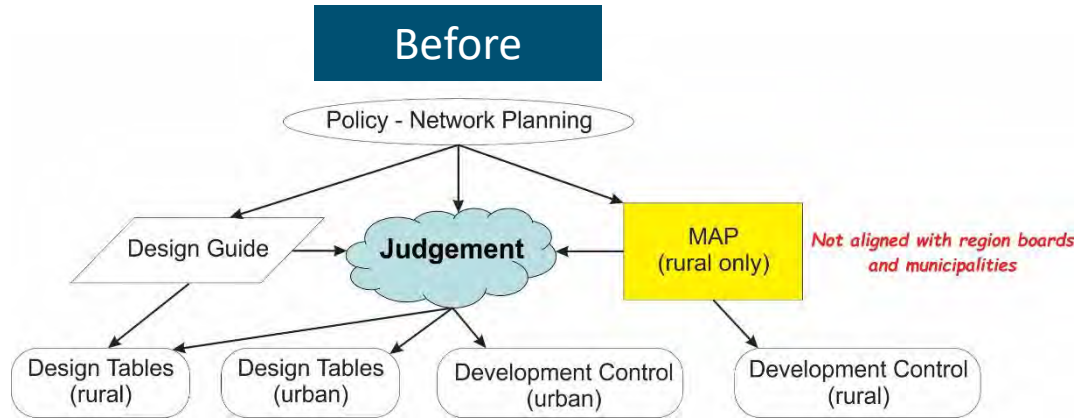
4. Formalize functional class changes through map updates
 - Determined within planning and network studies or project level decisions
 - Re-classifications should consider highway service classification and broader network impacts

HGDG Chapter A re-write 2017-18

Anticipated benefits:

- Clear definition of functional class elements, and consistency between planning, design, and roadside management terminology
 - better integrations of these processes
- Alignment with Transportation Association of Canada (TAC) design classification.
 - Allows direct comparison of plans across jurisdictions.
- Formal adoption of urban classes, and urban design standards
 - smoother interaction with municipalities and developers in suburban and urbanizing areas

HGDG Chapter A re-write 2017-18



Development of the Functional Classification System

Roadside Management Classification
and
Existing Conditions Map
2020

Development of Functional Classification

- Two functional classification maps developed:
 - *Existing Conditions*
 - *Future Vision* - incorporated into a revised Roadside Management Classification (RMC) Map*

*Dual naming for compatibility with existing legislation and guidelines

Roadside Management Class	Functional Class
Freeway	Rural Freeway Divided (RFD)
	Urban Freeway Divided (UFD)
Multi-lane	Rural Arterial Divided (RAD)
	Urban Arterial Divided (UAD)
	Urban Expressway Divided (UED)
Major	Rural Arterial Undivided (RAU)
	Urban Arterial Undivided (UAU)
Minor	Rural Collector Undivided (RCU)
	Urban Collector Undivided (UCU)
-	Rural Local Undivided (RLU)
	Urban Local Undivided (ULU)

Development of Future Vision Map

- Future Vision follows premise of previous RMC Map
 - Based on predicted highway expansion needs 50 years in the future



STEP 1

Classify all segments as if rural

Table A-6-1a Tolerable LOS Target for Alberta's Highways

Service Classification	Outside Metropolitan Area		Small Metropolitan Area (population > 50,000)	Large Metropolitan Area (population > 500,000)
	Rural Context	Urban Context	Rural & Urban	Rural & Urban
Level 1	B	C	C	D
Level 2	C	D	D	D
Level 3	D	D	D	D
Level 4	D	D	D	D



“Laddered” approach where strategic highways “graduate” sooner

AADT Thresholds	Functional Class (rural)			
Service Class	Collector (RCU)	Undivided Arterial (RAU)	Divided Arterial (RAD)	Freeway (RFD)
Level 1	-	0 - 3,000	3,000 - 5,000	> 5,000
Level 2	0 - 400	400 - 6,000	6,000 - 20,000	> 20,000
Level 3	0 - 1,500	1,500 - 9,000	9,000 - 30,000	> 30,000
Level 4	0 - 3,000	3,000 - 12,000	12,000 - 40,000	> 40,000

STEP 2

Find Urban Segments

- Low speed segments flagged and determined to be either “urban” or “rural”
 - Appropriate urban functional class (UAD, UAU, or UCU) assigned to urban segments
- Some roadways may exhibit characteristics of both rural and urban roads
 - Best match to Design Guide used to determine appropriate class (speed, cross-section, intersection spacing)
 - Further refinement of urban/rural classes needed over time

STEP 3

Add Proposed Highways

- Add proposed (designated but unbuilt) highways
 - Functional class determined from planning study

STEP 4

Adjust as needed

- Consider:
 - Scale and continuity
 - Additional traffic pattern considerations
 - High-Load Corridors
 - Approved network or functional planning studies:
 - Area Structure Plans
 - Municipal plans

Final Future Vision

Changes from 2013 RMC Map

		Functional Class - Future Vision									TOTAL
		RFD	RAD	RAU	RCU	UFD	UED	UAD	UAU	UCU	
2013 RMC	Freeway	3,094	490	2	0	62	6	9	0	0	3,662
	Multi-lane	170	704	367	8	6	197	71	7	3	1,532
	Major	2	567	9,995	946	0	21	59	194	48	11,830
	Minor	8	0	2,322	9,727	0	0	1	34	85	12,176
	undesignated	45	19	16	0	0	0	0	0	0	80
TOTAL		3,319	1,779	12,702	10,680	68	225	139	234	135	29,281

Expressed as single-line km based on 2017 network

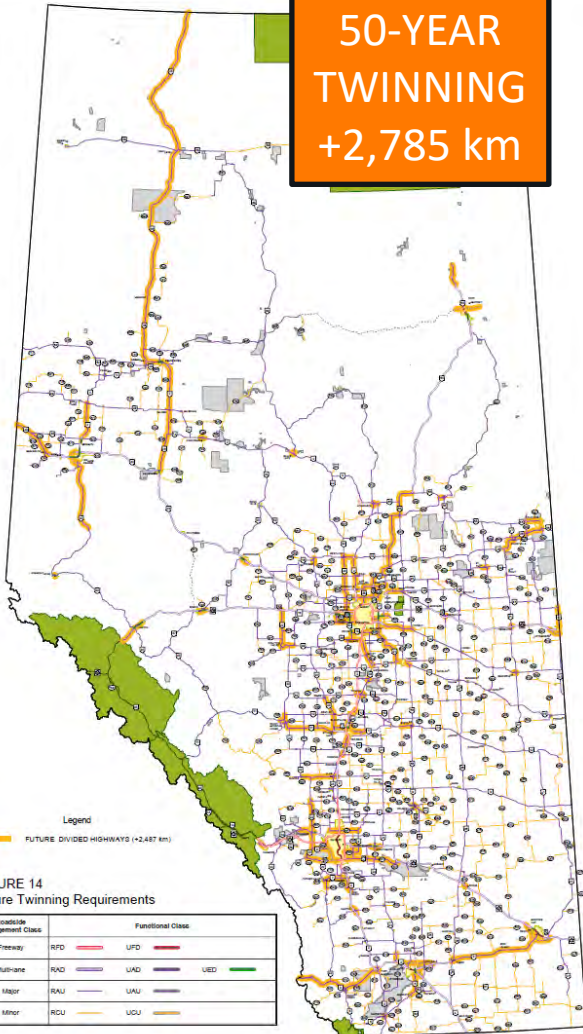
Analysis

Comparison of Existing Conditions and Future Vision

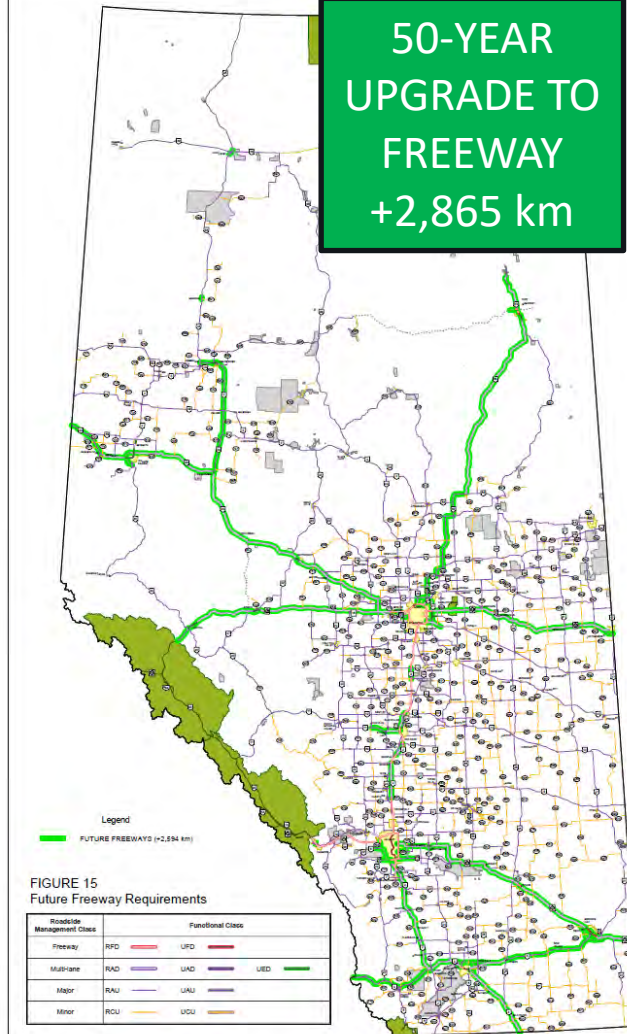
			Future Vision						TOTAL
			Divided Highways			Undivided Highways			
			Freeway	Non-Freeway	All	Arterial	Collector	All	
Existing Conditions	Divided Highways	Freeway	521	0	521	0	0	0	521
		Non-Freeway	1,924	299	2,223	0	0	0	2,223
		All	2,445	299	2,744	0	0	0	2,744
	Undivided Highways	Arterial	670	1,814	2,484	12,607	11	12,617	15,102
		Collector	0	3	3	7	10,780	10,786	10,790
		All	670	1,817	2,487	12,613	10,791	23,404	25,891
	<i>Proposed</i>		271	26	297	323	25	348	645
	TOTAL		3,386	2,143	5,529	12,936	10,816	23,752	29,281

Expressed as single-line km based on 2017 network

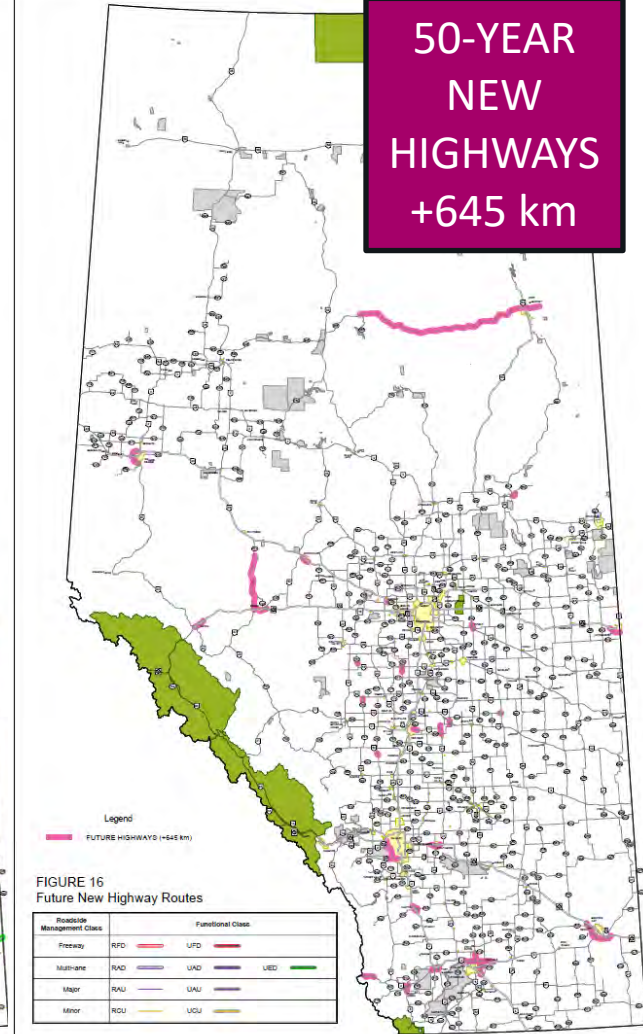
**50-YEAR
TWINNING
+2,785 km**



**50-YEAR
UPGRADE TO
FREEWAY
+2,865 km**

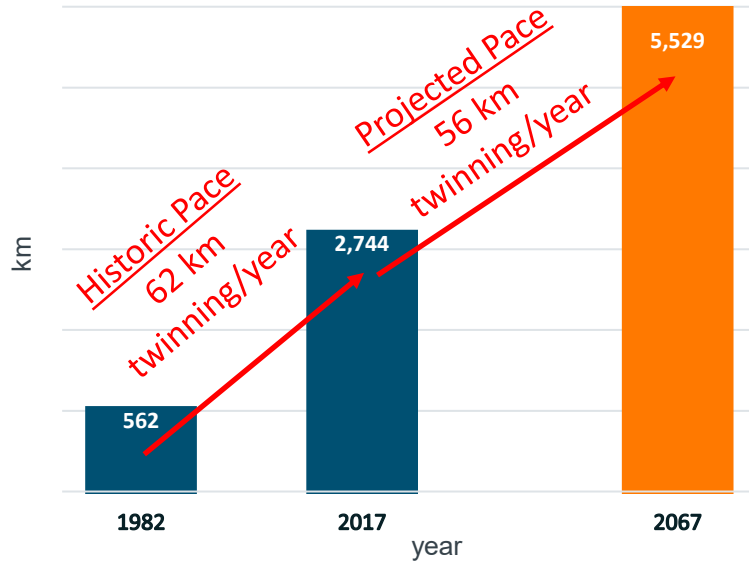


**50-YEAR
NEW
HIGHWAYS
+645 km**

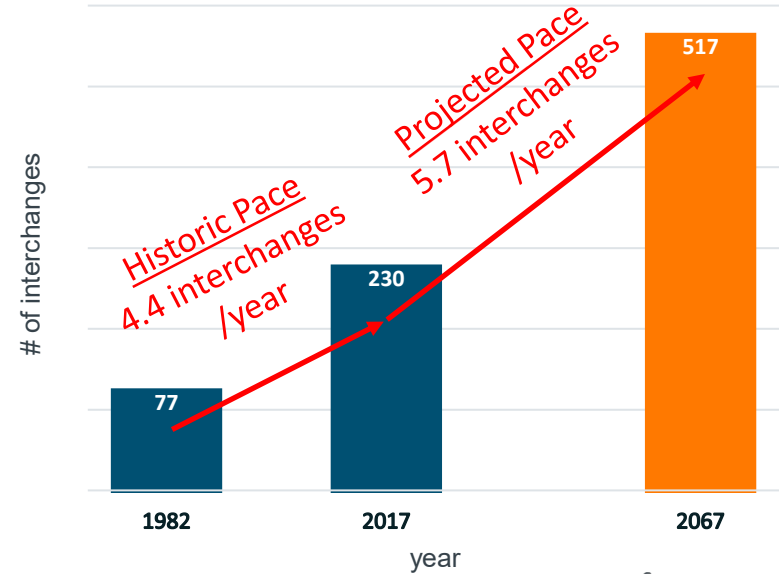


Analysis

Length of Divided Highways



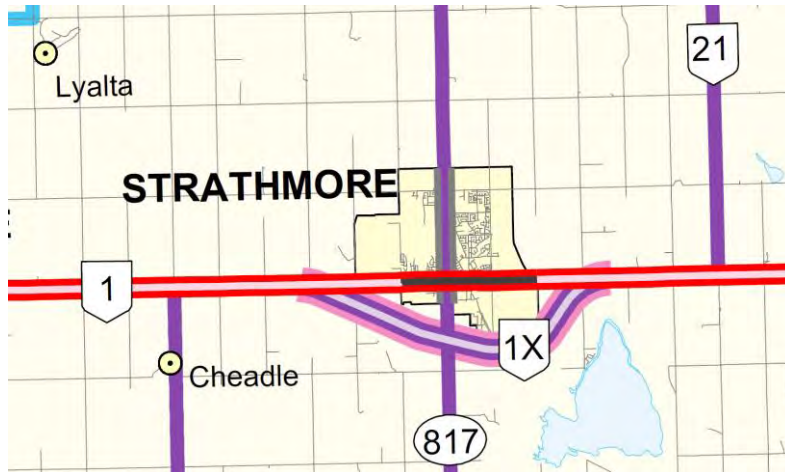
of Interchanges



Final Adjustments

Published Roadside Management Classification Map 2020

- Adjusted freeways to match 2009 freeway designation order
- Recommended new freeways identified as “Potential Freeways”



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Roadside Management Classification

Roadside Management Classification

Functional Classification

Freeway	RFD	UFD	
Multi-Lane	RAD	UAD	UED
Major	RAU	UAU	
Minor	RCU	UCU	

Potential Freeway

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Summary and Future Work

Summary

- Functional Classification System developed to:
 - Closely integrate TEC planning and design processes
 - Ensure network-wide considerations are incorporated at project level through use of RMC Map as a common reference point
 - Enable direct comparison of roadway plans between TEC and other jurisdictions using terminology that is consistent and familiar to consultants, municipalities, and developers

Summary

- Two functional classification maps were developed:
 - *Existing Conditions*
 - *Future Vision* - incorporated into a revised Roadside Management Classification (RMC) Map
- Revised RMC (Future Vision) Map
 - Based on predicted highway expansion needs 50 years in the future
 - Represents ambitious but realistic snapshot of future provincial highway network

Future Work

- Publish incremental revisions to Existing Conditions and RMC Maps
 - as conditions change, plans are completed, and classification decisions are made
- Network-wide review should be undertaken every five years based on latest traffic forecasts
 - Future versions should incorporate travel models to improve accuracy of projections, particularly in metropolitan areas and where new links will be constructed

Resources

Roadside Management Classification Map (published July 2020)

<https://open.alberta.ca/publications/roadside-management-classification-map>

Functional Classification – Existing Conditions Map (published July 2020)

<https://open.alberta.ca/publications/functional-classification-existing-conditions-map>

Highway Geometric Design Guide

<https://www.alberta.ca/highway-geometric-design-guide>

Development of the Functional Classification System for Alberta Transportation

(report available on request)



Questions?

