9th International Conference on MANAGING PAVEMENT ASSETS (ICMPA9)

MAY 18-21, 2015 • Washington D.C.

ICMPA9 • International Conference on Managing Pavement Assets

Development of a Sustainable Pavement Management Strategy for Resurfacing Low Volume Roads in New Brunswick

Shawn Landers *MSc.Eng., P.Eng*

Technical Principal – Asset Management

OPUS

AASHTO THE VOICE OF TRANSPORTATION

VirginiaTech Transportation Institute

TRB

U.S. Department of Transportation Federal Highway Administration

WORLD ROAD ASSOCIATION MONDIALE DE LA ROUTE 1909-2009

VDOT Virginia Department of Transportation

Acknowledgements

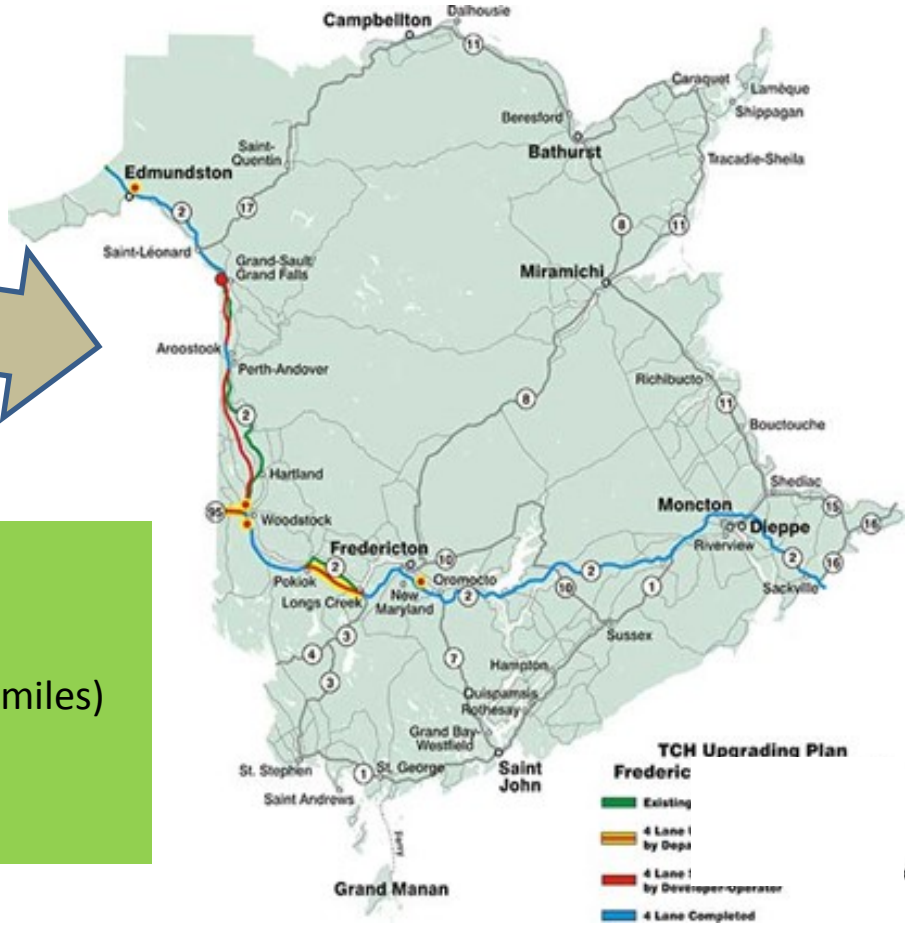
- Don Mason, MSc.Eng., P.Eng.
  Assistant Director – Asset Management
  New Brunswick Department of Transportation and Infrastructure

Outline

- **Low Volume Roads in N.B.**
- **What Others Do**
- **Decision Making Inputs**
- **Surface Selection Framework**
- **Evaluation**
- **Summary**

LOW VOLUME ROADS IN N.B.

Low Volume Roads in N.B.



- Total Paved – 16,500 km (9900 miles)
- 44% asphalt / 56% chipseals
- Arterial / Collector Hwys – 6050 km (3630 miles)
- Local Hwys – 3050 km (1825 miles)
- Local Roads – 6800 km (4080 miles)

Low Volume Roads in N.B.

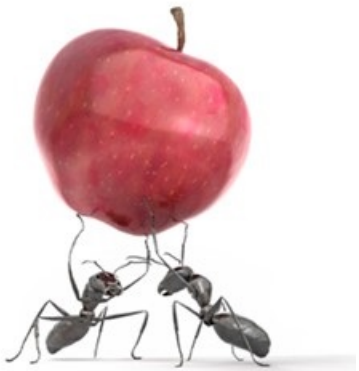
- Key Stats
  - ½ population lives in rural areas
  - 60% network is Local Class
  - Road network among highest density in the country
  - Almost all Local Roads <1000 vpd
  - 40% Local Hwys < 1000 vpd
  - 25% Collector Hwys < 1000vpd

Low Volume Roads in N.B

Low Volume Roads in N.B.

- Challenges
  - Deteriorating condition
  - Escalating rehabi… …osts
  - Maintainin…
  - Requ… …icant investment
  - Eco… …ic / fiscal constraints
  - Other competing demands

Unsustainable



Low Volume Roads in N.B.

- ***Sustainable Pavement Management Strategy for Road Surfaces***
  - Move Asphalt to Chipseal
  - Clearly defined and transparent criteria
  - Study:
    - What are others doing?
    - Decision inputs need?
    - Develop a framework?
    - Evaluate the framework?

WHAT OTHERS DO…

What Others Do…

- Agency Practices Review
  - Canadian DoT's and Selected US DoT's
  - Focus:
    - Policies
    - Factors with defined criteria
    - Decision making framework
  - Web-based & Consultations

What Others Do…

- Key Findings
  - Most did not have comprehensive guidelines
  - Decisions made on project basis
  - Policies focused on only low volume roads
  - Traffic volume predominant screening factor
  - Other factors:
    - Costs
    - Functional purpose, rural / urban setting
    - Impact on local business and long distance travel

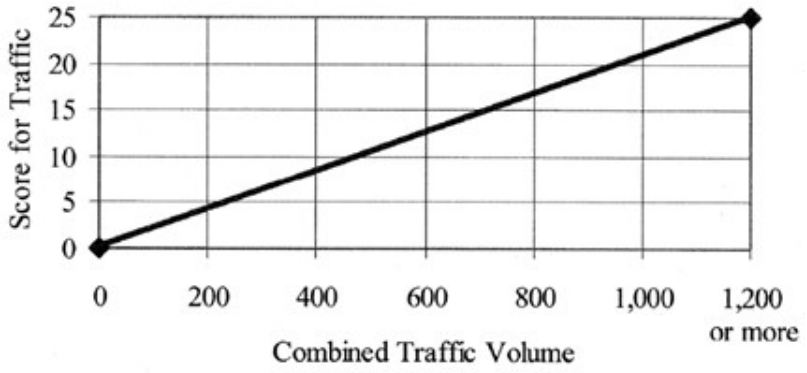
What Others Do…

- Nova Scotia
  - Network based
  - Factors / Criteria:
    - Traffic volume
    - Roadside development
  - Scored priority points
  - Treatment selection matrix
  - Spreadsheet tool

Existing Surface Type	Traffic AADT	Priority Points	Surface Treatments: Gravel Only	Black Gravel	Double Chip	Asphalt Paving
Gravel Surface	<300	<70	✓	✓		
Gravel Surface	300-500	70-100			✓	
Gravel Surface	>500	>100				✓
RAC Surface	<500	70-100			✓	
RAC Surface	>500	>100				✓
Chip Seal Surface	<500	70-100			✓	
Chip Seal Surface	>500	>100				✓
Sand Seal Surface	<500	70-100			✓	
Sand Seal Surface	<500	70-100			✓	
Asphalt Pavement	<500	70-100			✓	
Asphalt Pavement	>500	>100				✳

What Others Do…

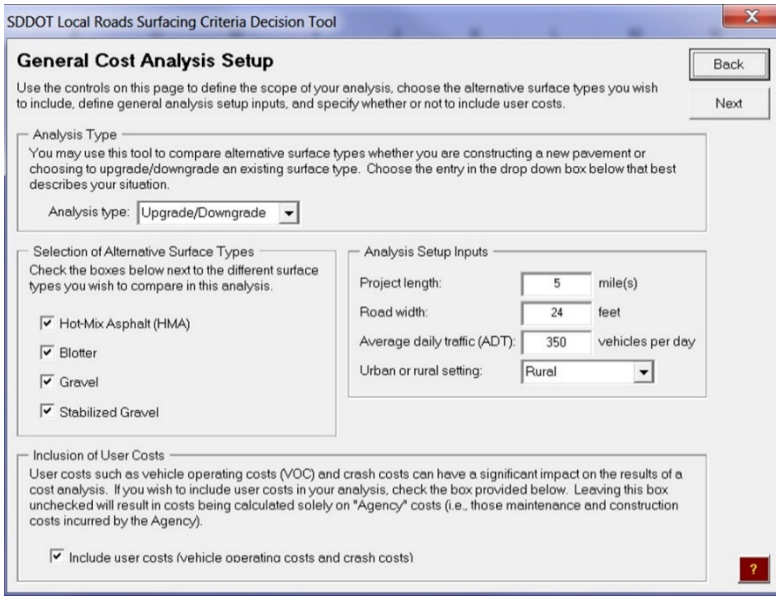
- Northern Ontario
  - Project based
  - Factors / Criteria:
    - Traffic volume
    - Impact on residents
    - Impact on business
    - Impact on long travel
    - DoT costs
  - Weighting methodology
  - Scoring process



Main Selection Factor	Relative Factor Weight	Selection factor Value	Selection Factor Score
Traffic volumes	25	430	10
Impact on local residents	10	10%	2
Impact on local business	10	3	3
Impact on long-distance travel	10	20%	4
Agency costs	45	$200,000	40
All Factors	**100**		**59**

What Others Do…

- South Dakota
  - Project based
  - Factors / Criteria:
    - Treatment costs
    - Agency costs
    - User costs
  - Life cycle cost analysis
  - Assess alternative treatments
  - Spreadsheet tool



What Others Do…

- Outcome
  - Existing frameworks + / -
  - None were ideal
  - Data intensive

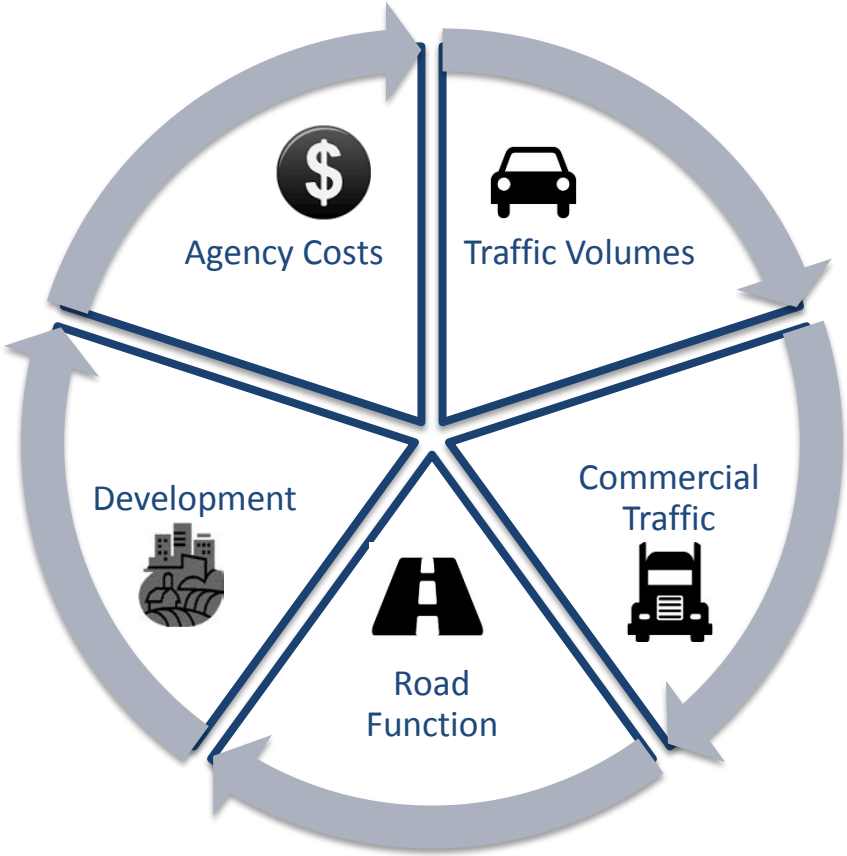
DECISION MAKING INPUTS

Decision Making Inputs

- NBDTI Guiding Principles
  - Simple & easy to explain
  - Upfront evaluation
  - No significant data collection
  - Objective and quantifiable
  - Definitive, but some flexibility
  - Consider agency costs
  - Consider site specific requirements

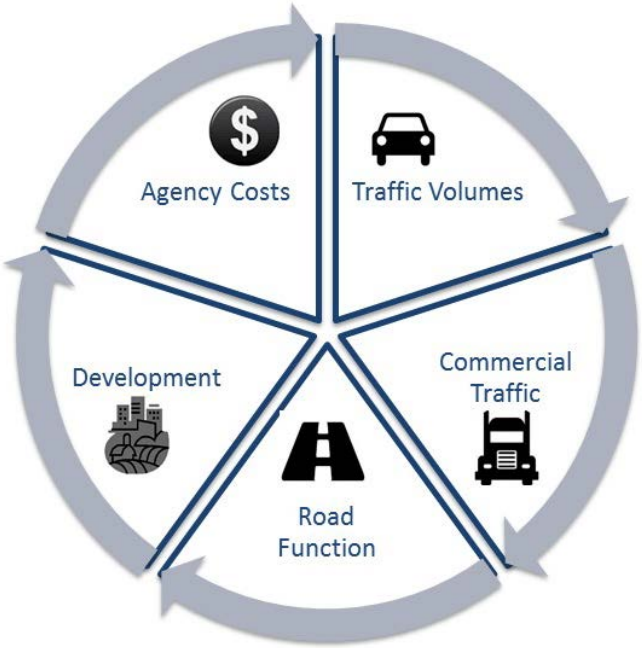
Decision Making Inputs

- What others do…



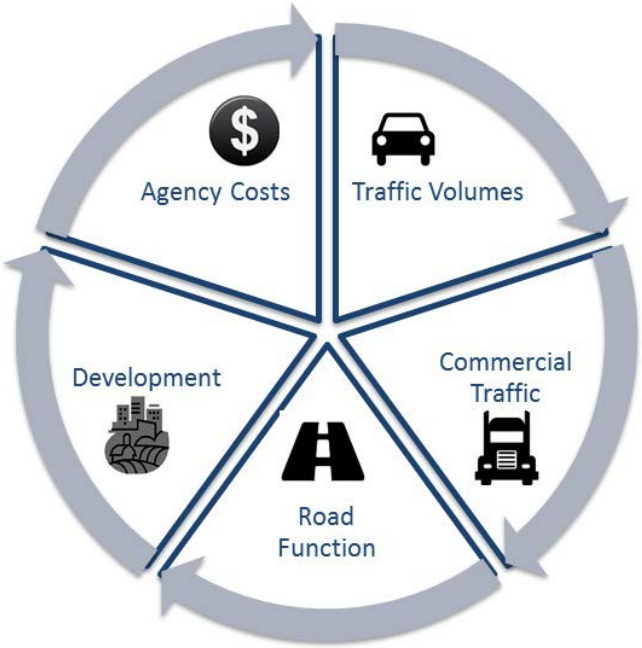
Decision Making Inputs

- Conducted Assessment
  - Benefits for inclusion?
  - What measures exist?
  - Data availability?
  - Data coverage?
  - Overlapping data?
  - New data?



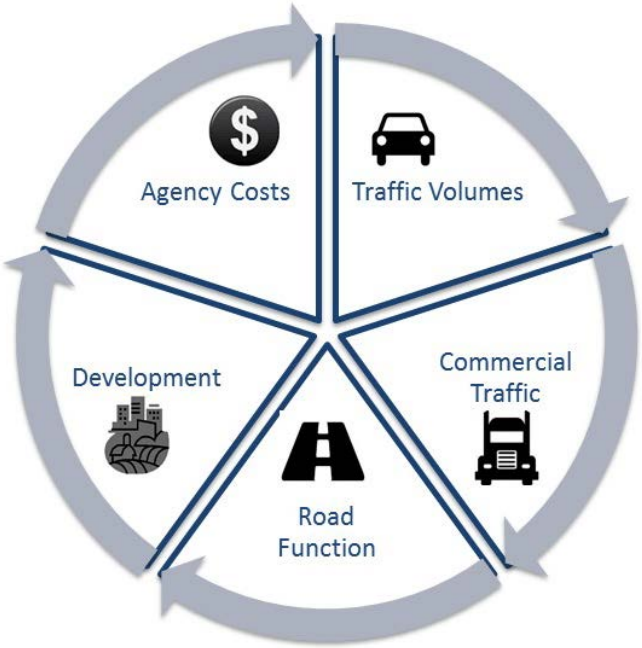
Decision Making Inputs

- Conducted Assessment
  - Benefits for inclusion?
  - What measures exist?
  - Data availability?
  - Data coverage?
  - Overlapping?



Decision Making Inputs

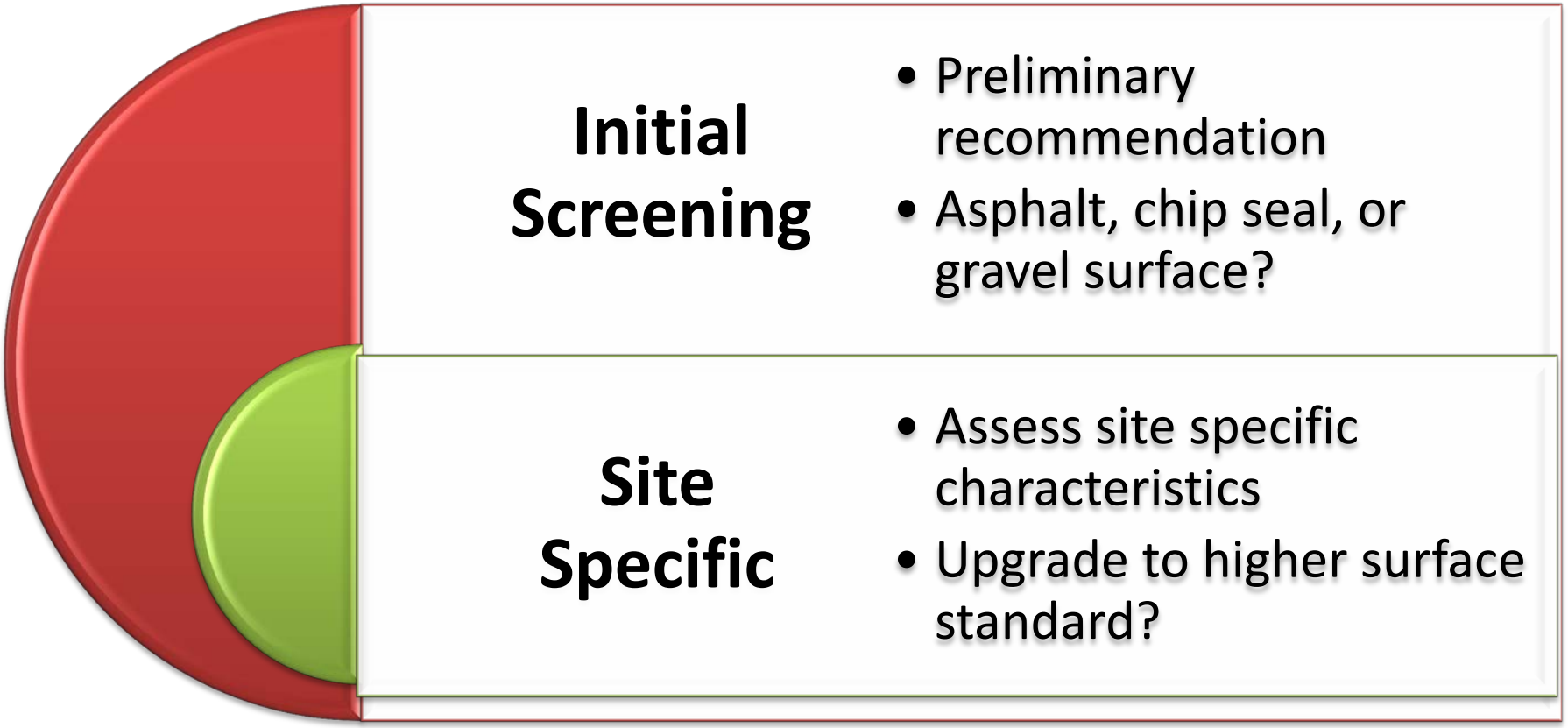
- NBDTI landed on:
  - Agency Costs
  - Road Class
  - Traffic volumes
  - Truck volumes
  - Road Grade
  - Tourism



SURFACE SELECTION FRAMEWORK

Surface Selection Framework

- 2 Stage LOS Screening Process



Surface Selection Framework

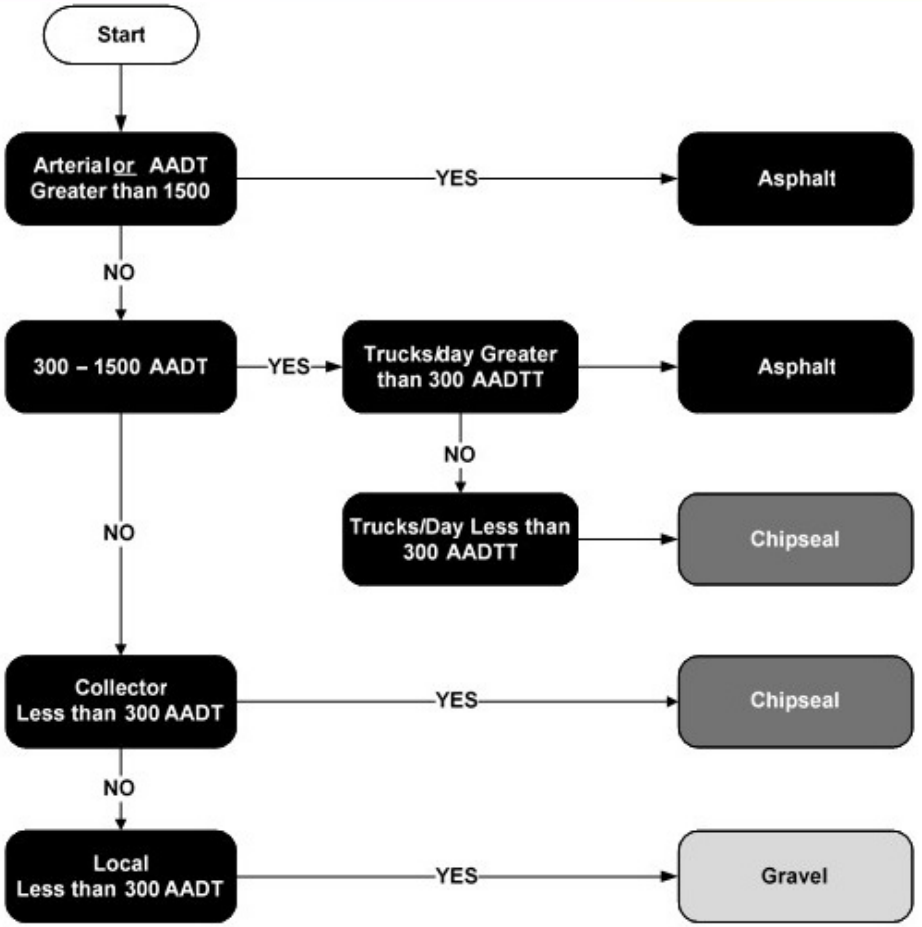
- Stage 1 -Initial LOS Screening Factors
  - Functional Class – Arterial, Collector, Local
    - Higher functional purpose generally expected to have a higher standard of surface treatment
  - Daily Traffic – AADT
    - Highest usage should provide the better level of service to minimize road user costs
  - Truck Traffic – AADTT
    - Heavy vehicles require additional strength to prevent accelerated surface damage

Surface Selection Framework

- Agency Costs
  - Several approaches
  - Goal - minimize data inputs
  - Life cycle cost analysis to compare chip seal and asphalt treatments over a 30 year timeframe based on different scenarios
  - ~300 to 400 trucks per day $ chipseal > asphalt

Surface Selection Framework

- Stage 1 Initial LOS Screening



Surface Selection Framework

- Stage 2 –Site Specific Upgrading Factors
  - Collector Highways
    - > 7% road grade
    - Existing pavement structure results in lower life-cycle cost (e.g. pulverization)
  - Local Highways and Roads
    - As above
    - Gravel surfaces upgraded to chipseal if road connect two designated highways or provides direct access to a significant tourist destination

EVALUATION

Evaluation

- Scope
  - Estimate the potential reduction in future rehabilitation
  - Applied the initial screening criteria over the existing road network
  - Roads > 1km in length
  - Sensitivity analysis of the traffic and truck volume thresholds also completed

Evaluation

- Identified Candidates
  - Asphalt to Chipseal
  - 880 km (530 miles)
  - 13% of asphalt inventory

Road Class	Existing Asphalt km	Candidate for Conversion to Chip Seal	
		km	%
Arterial Highways	2,900	0	-
Collector Highways	2,400	430	18%
Local Numbered Highways	885	275	31%
Local Named Roads	420	175	41%
Total	**6,605**	**880**	**13%**

Evaluation

- LCC Analysis
  - 20 year period
  - Treatment costs / timing
  - Reduce $4.6 million annually @ 1000 vpd
  - Increase to 1500 vpd + $1.7 million

SUMMARY

Summary

- Two-staged screening
- Incorporated both network and local conditions
- Relatively simple solution
- Objective and transparent
- Very easy to communicate
- Potential to reduce future rehabilitation costs and spending savings elsewhere

Thank you

- Simple sometimes works…