

# Basics of a Safe Road

What we have learned after conducting  
Tribal Road Safety Audits for 2 ½ years

Northern Plains Tribal Technical Assistance Program

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# What is a Safe Road?

- Provides Warning Information
    - Advisory Information
    - Regulatory Information
  - Signs easily understood
  - Signs installed to provide information ahead of the situation
  - Signs easily visible
- (Under all weather and light conditions)

# What is a Safe Road?

- A Road that provides Directional Information (informs of changes in direction & elevation)
  - Signs that are easily understood
  - Signs installed to provide information an adequate distance ahead of the situation
  - Signs easily visible  
(Under all weather and light conditions)

# What is a Safe Road?

- A Road that provides Directional Information has:
  - Delineators on both sides of road with double reflectors
  - Chevrons installed on all curves
  - Stripes on all paved surfaces

# What is a Safe Road?

- A Road that maintains a Clear Zone
  - Trees outside of Right of Way
  - Vegetation cut to minimal height
  - Object Markers on Guard Rail Ends
  - Shield all immovable objects and delineate (place behind Guard Rails & use Object Marker)

# What is a Safe Road?

- A Road with appropriate Mail Boxes & Supports
  - Mail Boxes constructed to Federal Standards
  - Mail Box mounts constructed to Federal Standards
  - Mail Boxes installed outside of travel way

# What is a Safe Road?

- A Road with gradually sloping ditches
  - Ditches with 6 to 1 slopes up to 8 to 1
  - Ditches with Culvert Ends grated and sloped
  - Ditches with smooth surfaces and no obstructions or holes
  - Ditches with controlled vegetation

# What is a Safe Road?

- A Road with Approaches that can be driven over from the Ditch
  - Approaches with 8 to 1 up to 10 to 1 slopes
  - Approach Culverts grated and sloped
  - Approach sides with smooth surfaces and no obstructions or holes
  - Approach sides with controlled vegetation



# What is a Safe Road?

- A Road that has open visibility
  - Vehicle operators can see pedestrians & animals in ditches and along the roadway

# What is a Safe Road?

- A Road with well shaped road surface
  - On curved sections of roadway have proper super elevation to maintain vehicle stability
  - On straight sections of roadway allow vehicles to remain in their travel lane
    - 2% to 4% slope on gravel road surface
    - 1% to 2% slope on paved road surface

# What is a Safe Road?

- A Road without Shoulder Drop-offs
  - To allow vehicles to safely return to road
- A Road with sufficient grip
  - To allow vehicles to stop efficiently
  - To allow vehicles to change directions efficiently
  - To allow vehicles to accelerate efficiently

# How to get Safe Roads:

- Renew Signs
- Add Signs needed
- Add Delineators
- Add Chevrons to curves
- Add “No Passing” Signs to gravel roads as well as paved roads

# How to get Safe Roads:

- Add mile marker posts to all roads
- Have only one name for each street or road
- Renew stripes on paved roads
- Add Double Yellow stripes in No Passing Zones
- Control vegetation on shoulders
- Control vegetation in Recovery Zone

# How to get Safe Roads:

- Reshape gravel roads with proper crown
- Reshape Super Elevation on curves
  - Install Advisory Speed thru curves based on using Ball Bank Indicator
- Maintain straight cutting edges on Motor graders

# How to get Safe Roads:

- Reshape all ditches ; 6 to 1 slope ideal
- Reshape all Approaches; 10 to 1 slope ideal
- Extend culverts with flared and grated ends
- Renew top gravel surface with proper blend
  - Correct aggregate size
  - Correct plasticity

# How to get Safe Roads:

- Replace defective Guardrails
  - Make sure of proper clear distance behind guardrails
  - Updated end treatments and Object Markers
  - Add Cable Guardrails where ditches are too steep or obstruction cannot be removed.
    - Use Cable Guardrails where drifting snow is a problem.



# How to get Safe Roads:

- Repair paved roads cracks and potholes
  - Add Chip seal when possible
  - Add Edge line Rumble Strips if Asphalt Thick enough
  - Add Centerline Rumble Strips if Asphalt Thick enough

# How to get Safe Roads:

- Repair Potholes in gravel roads
  - Replace base material as needed
  - Use proper aggregate

# How to get Safe Roads:

- Replace substandard Bridge Guardrails
  - Use updated end treatments and Object Markers
- Replace Sub-standard Bridges
  - Obsolete because of Load Capacity
  - Obsolete because of narrow width
- Align Bridge approaches
  - Any Bridge replaced should have approaches aligned to the Bridge centerline.

# How to get Safe Roads:

- Align intersecting roads 90 degrees to each other
- Provide proper line of sight distance at intersections
- Limit Approach installation
  - Provide frontage roads where necessary

# How to get Safe Roads:

- Provide Advanced Warning for Rail Road Crossings
- Updated Cross-buck signs with reflectors on posts installed by Railroad
- Provide proper road surface shape and material at RR Crossing Approach
- Provide adequate vehicle que length

# How to get Safe Roads:

- Write a Safety Improvement Project Tribal Resolution
- Incorporate Safety Improvements into the Tribal Transportation Improvement Plan  
(TIP)

# Who does the work to get Safe Roads?

- Tribal Transportation Planner must have a Safety Improvement Plan on TIP
  - Each year the Tribal Transportation Planner should have a Safety Improvement Project
    - Signs
    - Delineators
    - Chevrons
    - Stripes
    - Clear Zone object removal and/or shielding
    - Re-slope ditches and approaches –re-do culverts with sloped ends and grates

# Who does the work to get Safe Roads?

- Road Maintenance Departments whether operated by the BIA Agency, the Tribe or a combination of the two must place safety improvement items on their work plans each year.
  - Sign inspections and replacement
  - Delineator inspection and replacement
  - Vegetation control
  - Road surface repair / reshape



# Who does the work to get Safe Roads?

- Communications!
  - The Tribal Transportation Planner must reach an understanding with the Road Maintenance Department on Road Maintenance Priorities.

# Who does the work to get Safe Roads?

- The Tribe and BIA must work together to make Safety happen!!!
  - Regional and Agency managers must be aware of the Tribal Priorities. Safety Projects should be included in the work plans that will be performed by the Maintenance and the Construction Personnel.

# Who does the work to get Safe Roads?

- Planning
  - Tribal Transportation Planners must include Safety Projects on the Tribal Transportation Improvement Plan.
  - Tribal Transportation Planners must communicate with Transportation Maintenance the Tribes goals for Safety Improvements the Maintenance Department is expected to accomplish.

# Who does the work to get Safe Roads?

- You Do.....Do Something!
  - Order and install Delineators on one mile of road.
    - The cost will be between \$200 to \$1000 and the effect will get you advocates for change.
  - Order and install Chevrons on one dark curve.
    - The cost will be between \$1000 to \$2000 and the effect on a dark road is remarkable.
  - Make some Noise. Let people know what you have done and why. Ask for input and evaluation. Let everyone know that your roads can be safer for everyone.
  - Keep doing something every year to make your roads safer. Do not let your roads become less safe than they are today.
  - Demand quality work on your roads.

# When to Implement Safety Improvements?

- During daily road reviews
- During routine maintenance functions
- During comprehensive maintenance
  - As a part of Crack sealing project
  - As a part of a Chip sealing project

# When to Implement Safety Improvements?

- As an identified Maintenance Safety project
- As part of a Construction Project
- As part of a Re-construction Project
- As a Safety Construction Project

## **Where should Tribes begin to address road safety issues?**

- Where crashes and near misses have occurred
- Where changes in road use are anticipated

## Where should Tribes begin to address road safety issues?

- Where crashes and near misses have occurred:
  - Look at crash locations and crash reports
    - Develop improvement suggestions that may prevent a future crash
  - Look at reported near miss locations
    - Is there improvements needed that may prevent a future crash
  - Note skid marks and broken glass, plastics
  - Note hit or damaged signs, sign posts, fences and trees



## **Where should Tribes begin to address road safety issues?**

- Where changes in road use are anticipated:
  - New housing developments
  - New Pedestrian / Bike Paths
  - New Bus Stops
  - New Hospitals
  - New Recreation Centers / Senior Centers

## **Where should Tribes begin to address road safety issues?**

- **Where changes in road use are anticipated:**
  - New Fire Stations / Ambulance Service
  - New Schools and Daycares
  - New Businesses
  - New Museums / Historical Markers
  - New Parks / Golf Courses / RV Campsites
  - Dump Grounds / Recycling Centers

# Why are specific components and characteristics needed to have a safe road?

- To keep vehicles on the road:
  - Provide road surface with a proper shape and surface material to allow the vehicle to remain on the road under all conditions
  - Provide drivers visual aids that help drivers see the path the road is taking early enough for the driver to react to changes
    - **then there will be less Run Off The Road (ROR)**

# Why are specific components and characteristics needed to have a safe road?

- Intersection safety:
  - Provide drivers notice of upcoming Intersections early enough to stop
  - Provide enough visibility to make decisions needed to avoid other vehicles or Pedestrians while traveling through the intersection

# Why are specific components and characteristics needed to have a safe road?

- Recovery Zone Safety
  - Provide safe travel surface for vehicles that have left the road
    - Shoulder drop-offs
    - 6:1 Shoulder slopes with smooth surface and flared and grated culverts
    - 10:1 Approach sides with smooth surface and flared and grated culverts

# Why are specific components and characteristics needed to have a safe road?

- **Recovery Zone Safety** (continued)
  - Provide unobstructed area for vehicles that have left the road to slow and stop
    - Remove trees, poles, guide wires, fences, rocks
  - Provide Guardrails that will shield vehicles from unsafe objects and / or drop-offs
    - Shield Bridges
    - Shield steep slopes and water
    - Shield structures

# Countermeasure Effectiveness

- CRASH REDUCTION FACTORS

# Roadside Dangers

- Guardrail
- Mail Boxes
- Shoulder Drop Off



# Cost of Improvements

- South Dakota Delineator
  - \$10.00 per Double Delineator with post
- Low Cost Safety Improvements

Photos from the field

Questions????

THE END