Maintenance and Management of Gravel Roads

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Introductions

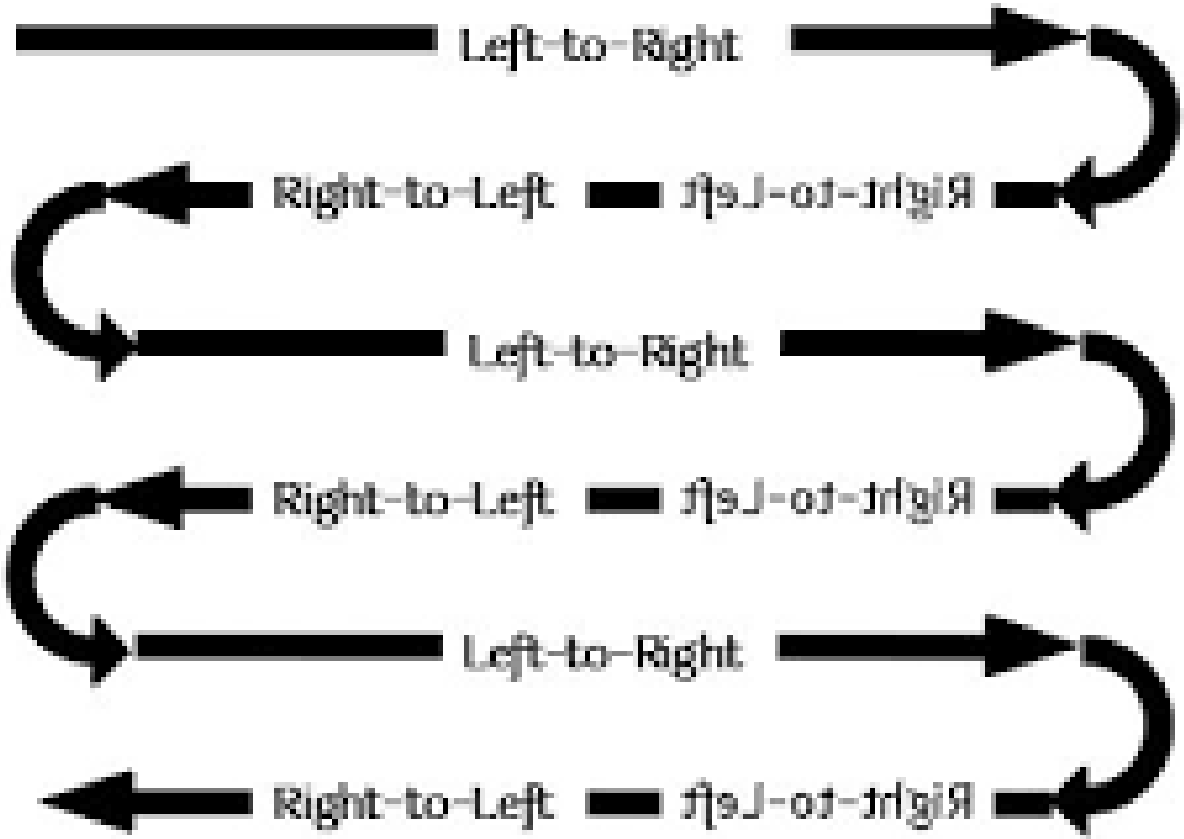
Who are you?

What you do and your role?

A bit about yourself that is interesting?

Boustrophedon

"turn like an ox (while ploughing)"



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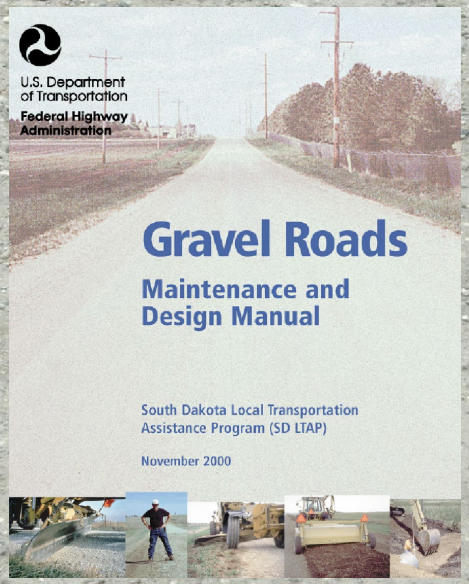
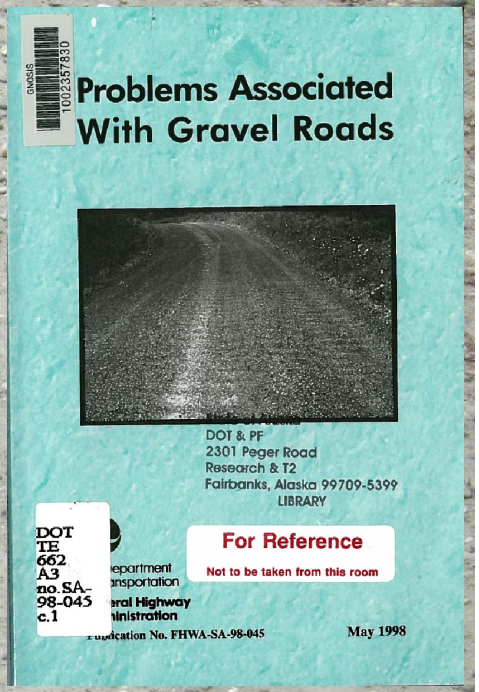
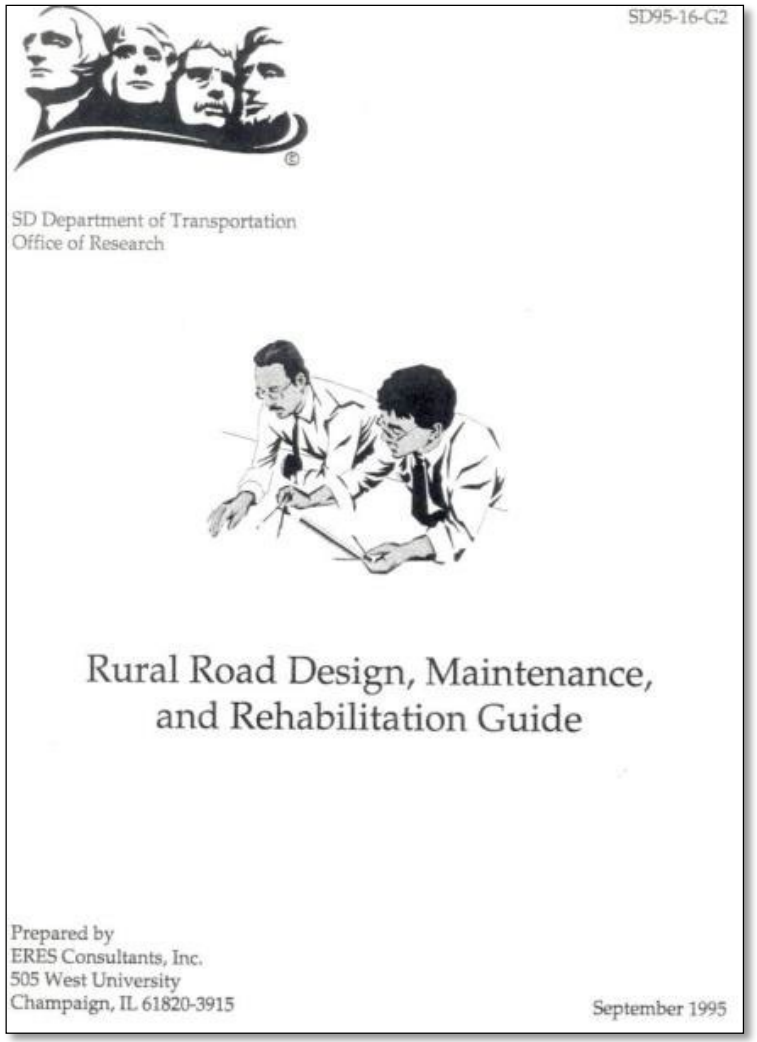
Gravel Road Most Have LIterature





Barnes and Connor, 2017

Good example of a Low Volume Rd Design Guide



Good guidance, non-technical, accommodates unpaved road design.

Resource: Maintenance and Management of Gravel Roads

Special Thanks To

Ken Skorseth, Program Manager (Retired)

South Dakota Local Transportation Assistance Program

South Dakota State University

Brookings, South Dakota, USA

Your best bet for a great resource:

The FHWA *Gravel Roads* manual – currently out of print, but is available online

Overview of the next 2 days

Day 1: Introductions and OPEN discussions

Design and Construction Topics

- Drainage concepts for unpaved roads
- Design and Coordination of horizontal and vertical alignments
- Good Gravel Roads
- Geometry and Typical Cross Section elements
- Signing our unpaved roads

Overview of the next 2 days

Day 2: OPEN discussions, stump the engineer!

Gravel Roads Maintenance Topics

- Maintenance in permafrost
- Proper use of the Motor Grader
- Gravel Material Specifications
- Reading the Road
- Winter Maintenance topics
- Winter Safety topics

Key learning objectives

- Unpaved roads are a key part of our public transportation system.
- Clear communication is accomplished by use of correct terminology, and common understanding of some concepts we will discuss at length.
- Establishing and maintaining adequate drainage is critical to the short term and long-term health of our roadways.

Key learning objectives

- Maintenance is the primary way in which we take care of the significant capital investment in the roads we travel.
- Maintenance can significantly affect the performance of our roadways, in both positive and negative ways.

Key learning objectives

- Properly trained and supported maintenance staff is critical to the long-term success of all road departments, and the importance of day-to-day maintenance and operations are not to be underestimated.

Let's Get Started!

- Ten essential for Good Roads
- Cross Section Elements
- Basic Roadway Design and Maintenance Criteria

THE TEN ESSENTIALS FOR GOOD ROADS

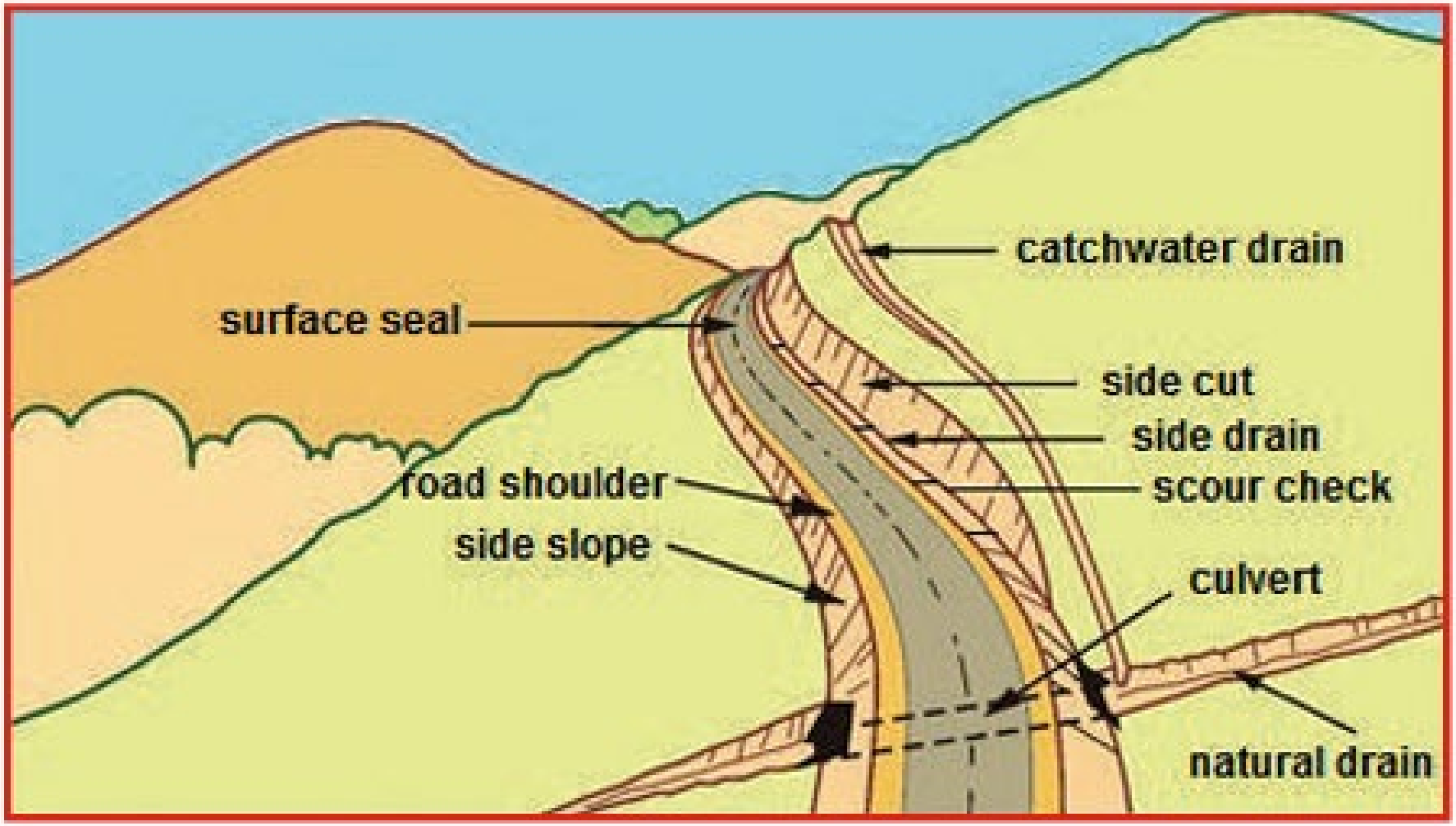
To build good roads and keep them in top condition, abide by the following rules;

1. Get Water Away from the Road
2. Build on a Firm Foundation
3. Use the Best Soils Available
4. Compact Soils Well
5. Design for Winter Maintenance
6. Design for Traffic Loads and Volumes
7. Pave Only Those Roads That Are Ready
8. Build from the Bottom Up
9. Protect Your Investment
10. Keep Good Records

Roadway Element Terminology

Typical section, cross section, width, slope, superelevation, ditches, surfacing, layer depth and type, base, sub-grade or sub-base, aggregate, fines, PI, alignment, grade, etc.

Roadway Terminology



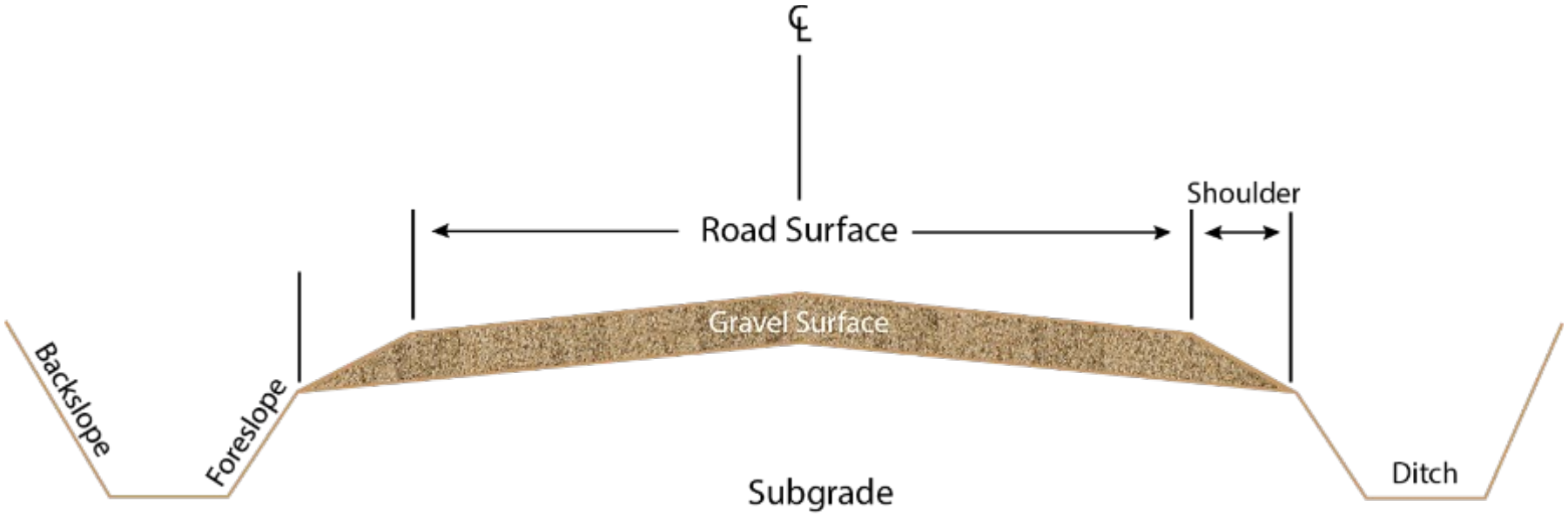
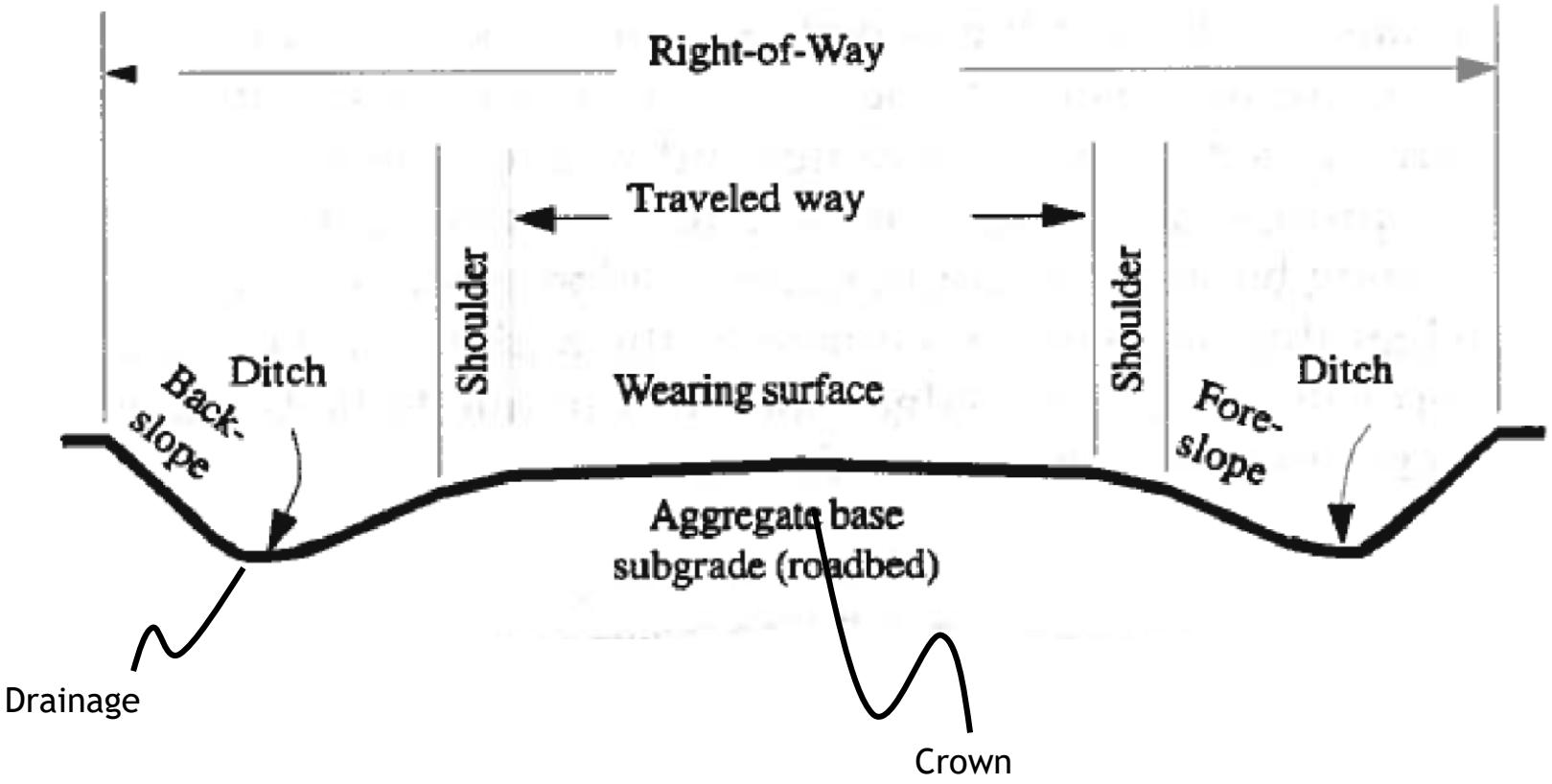


Figure 1: The components of the roadway cross section.

Basic Cross Section

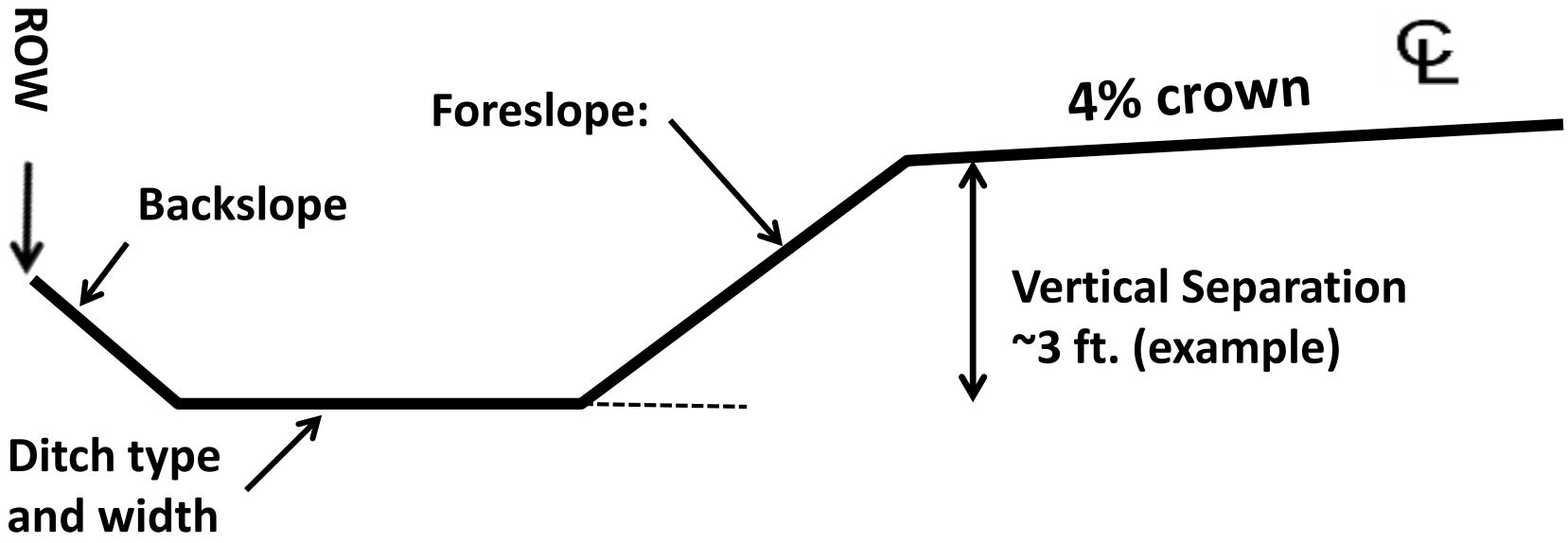


Basic Cross Section

Barnes and Connor, 2017

FHWA, 1998

Drawing showing one half of roadway (from center to left)



A flat bottom ditch is recommended, but hard to build at less than eight feet.

The challenge is often working in a confined R-O-W.

Roadway crown shape is critical!

Crown should be straight like the roof of a house, NOT arched like a loaf of bread.

Crown should be at or near ½ inch per ft (or 4%), but not to exceed 6%.

Example:

24 ft roadway should have….approx. 6 inches of crown. (vertical difference between the shoulder and centerline)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Minimum Roadway Widths

From AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)

US Customary						
	Total roadway width (ft) by functional subclass					
Design speed (mph)	Major access	Minor access	Recreational and scenic	Industrial/ commercial access	Resource recovery	Agricultural access
15	–	18.0	18.0	20.0	20.0	
20	–					
25	18.0					
30	18.0					
35	18.0					
40	18.0					
45	20.0					
50	20.0					
55	22.0					
60	22.0	–	–	–	–	–
Note: Total roadway width includes the width of both traveled way and shoulders.						

What minimum roadway width needed? Speed and classification (use) dependent.

Exhibit 1. Guidelines for Total Roadway Width for New Construction of Very Low-Volume Local Roads in Rural Areas

Minimum Roadway Widths

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	Major access	Minor access	Recreational and scenic	Industrial/ commercial access	Resource recovery	Agricultural access
15	–	18.0	18.0	20.0	20.0	22.0
20	–	18.0	18.0	20.0	20.0	24.0
25	18.0	18.0	18.0	21.0	21.0	24.0
30	18.0	18.0	18.0	22.5	22.5	24.0
35	18.0	18.0	18.0	22.5	22.5	24.0
40	18.0	18.0	20.0	22.5	–	24.0
45	20.0	20.0	20.0	23.0	–	26.0
						–
						–
						–

rs.

Very Low-Volume

Agricultural Access Classification: Minimum roadway width is 24 ft at 20 to 40 mph design speed, increases to 26 ft if design speed is 50 mph

From AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)

- Are we providing widths on our roads that are in line with AASHTO guidelines?
- Are we maintaining our roads to that width?
- Do we have roads that are too wide or too narrow or both?