

# Executive Summary and Research Readiness Level Assessment

## Remediating Soil for Successful Vegetation Establishment along Nebraska Highways

### Research Objectives

- Determined the effect of several soil remediation treatments that reduce bulk density (compaction) and sodium concentration at the soil surface on plant canopy cover, species composition, biomass, and soil physical and chemical properties;
- Compared the effect of seeding time (fall versus spring) on plant canopy cover, species composition, and biomass in response to the various soil remediation treatments; and
- Determined cost-effective remediation practices of vegetation establishment for recommendation to NDOT.

### Research Benefits

This project addressed the challenge of establishing acceptable vegetation cover on the compacted, sodium-affected soils of roadway shoulders.

The outcome of the project included recommendation to NDOT on potential solutions for improving vegetation establishment on roadside shoulders.

Successful completion of this project added to the knowledge base for developing solutions and improving vegetation establishment on roadsides and will benefit NDOT maintenance operations and motorist safety.

### Background

Vegetation along roadsides is important to prevent soil erosion, provide habitat, and filter water running off the road. Vegetation close to the pavement along highways in Nebraska does not readily establish and persist. It is thought that the sodium and bulk density are the driving factors behind the lack of vegetation.

### Conclusion

The purpose of the study was to determine if sodium and bulk density are the driving factors of vegetation cover. Soil properties and vegetation cover were examined in relation to shoulder type (paved or not paved) and time since seeding. The study was conducted by collecting soil samples and identifying vegetation cover from 53 sites in three different regions, the Panhandle, Southcentral and Southeast regions, in Nebraska, USA. The soil was analyzed for pH, electrical conductivity, sodium chloride and bulk density. At each site vegetation was designated into one of four categories, bare ground (>70%), annual vegetation (>70%), perennial vegetation (>50%), and bare ground-annual vegetation mix (~50-50%). We found that sodium and bulk density had little effect on the establishment and persistence of vegetation. Shoulder type and time since seeding showed limited effect on the soil variables measured. The researchers suggested that post seeding events and disturbances may be contributing to the lack of vegetation along highways.

### Principal Investigators

**Martha Mamo (P.I.),**  
**Walter Schacht (Co P.I.)**  
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University of Nebraska

### Lead TAC Member

**Carol E. Wienhold**

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### Quote

*The analysis “showed that no soil variable measured or combination of measured variables explained the type of vegetation cover found at the sampled sites.”* By P.I. and Co. P.I.

### NDOT Recommendations Based Off of Research Project

Results from this study conflict with results from the Phase 1 research. Methods used in Phase 1 controlled more variation compared to the subject study (alternative sampling methods had to be developed midway through the study). NDOT will refer to this study's results when local information is needed on particular highway roadsides.

- As provided by Carol Wienhold, Lead TAC Member

Interested in finding out more?

Final report is available:  
[HERE](#)

### Research Readiness Level (RRL) Assessment Level 4: Implementation

**RRL 4**

Research/Technology refined and adopted by the Department. Benefits of the implementation will be evaluated for a time frame of 5 years.

This brief summarizes Project SPR-1(18) M079  
“Remediating Soil for Successful Vegetation Establishment Along Nebraska Highways”  
Nebraska Department of Transportation Research Program