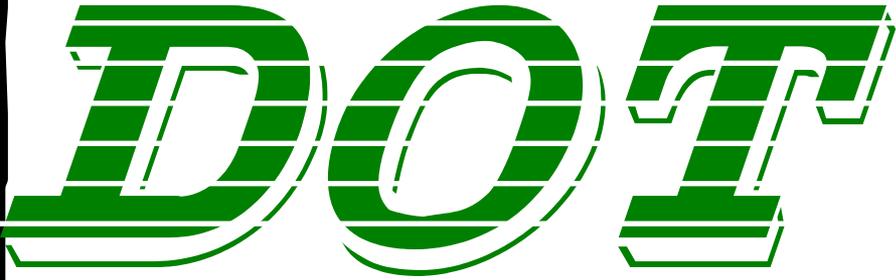
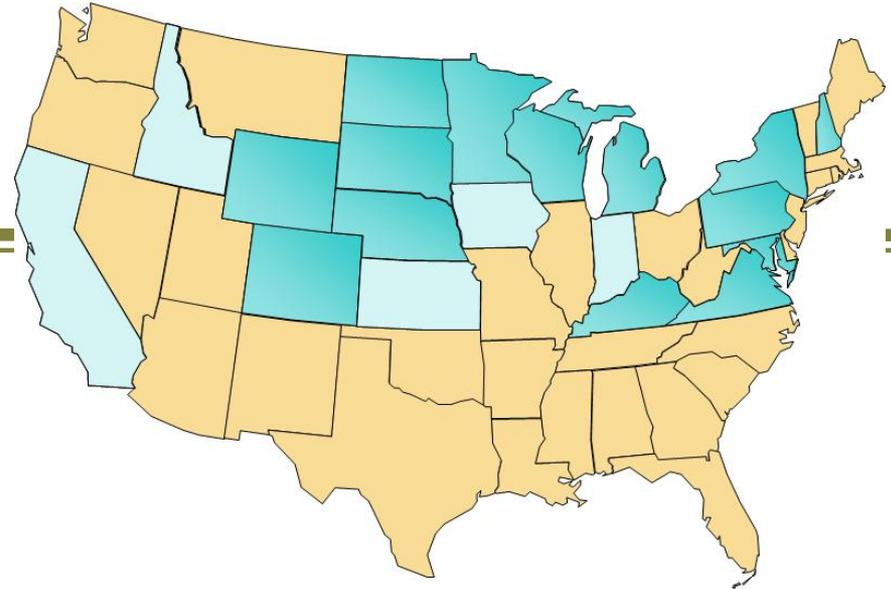


*South Dakota*



Connecting South Dakota and the Nation



# Winter Maintenance Decision Support Pooled Fund Study TPF-5(054)

David Huft  
SDDOT Office of Research  
August 13, 2014

# Why Maintenance Decision Support?

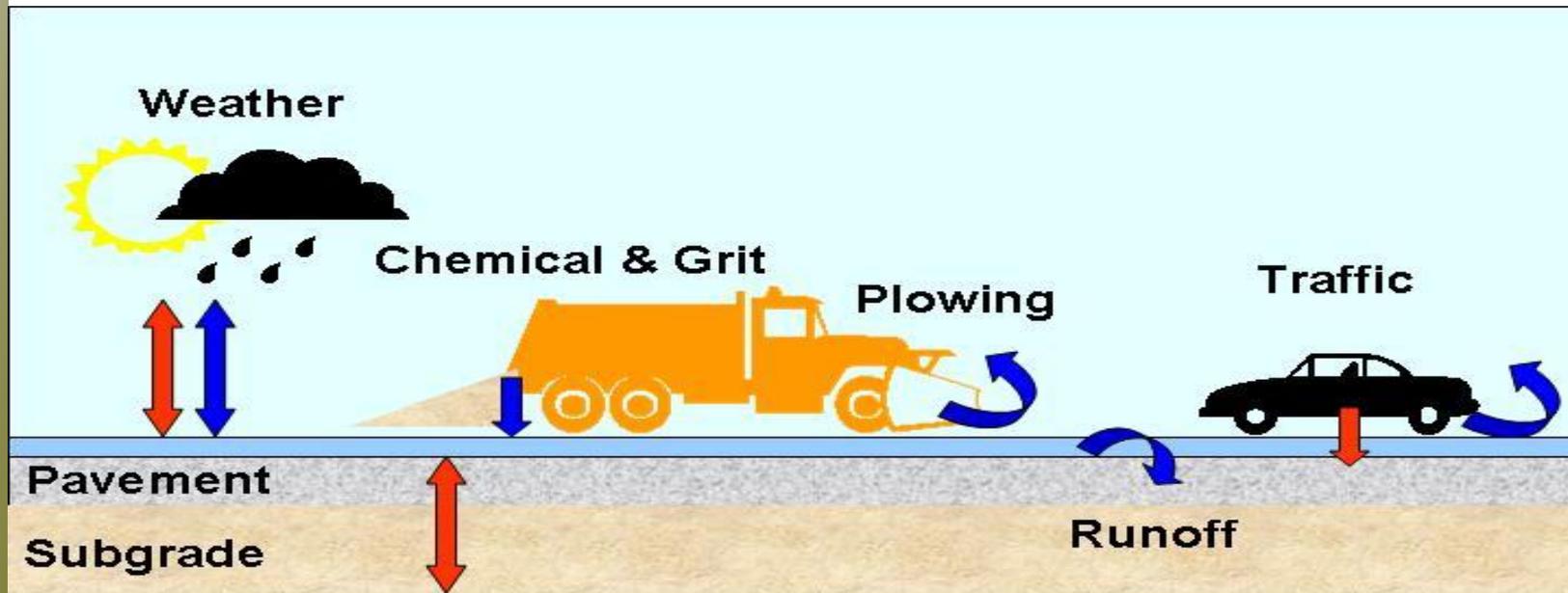
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- Rising demands of travelers & commercial carriers
- High labor, material, equipment & fuel costs
- Constrained funding
- Reliable, timely condition reports hard to get
- Some weather conditions difficult to forecast
- Complex pavement response to weather, maintenance
- New deicing chemicals & techniques
- Environmental concerns
- Staff size, turnover, and inexperience

## MDSS Concept

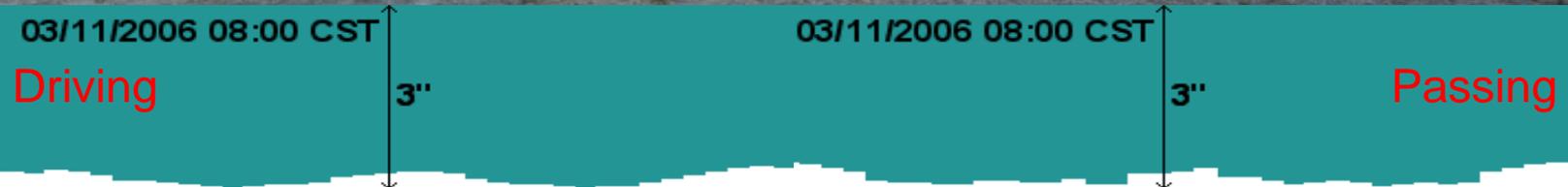
# How Does It Work?

- Predict weather and road conditions
- Track maintenance already applied
- Consider available resources
- Recommend treatment type, rate, timing
- Save material, fuel, labor costs
- Provide equal or better level of service
- Provide management tools



MDSS Concept

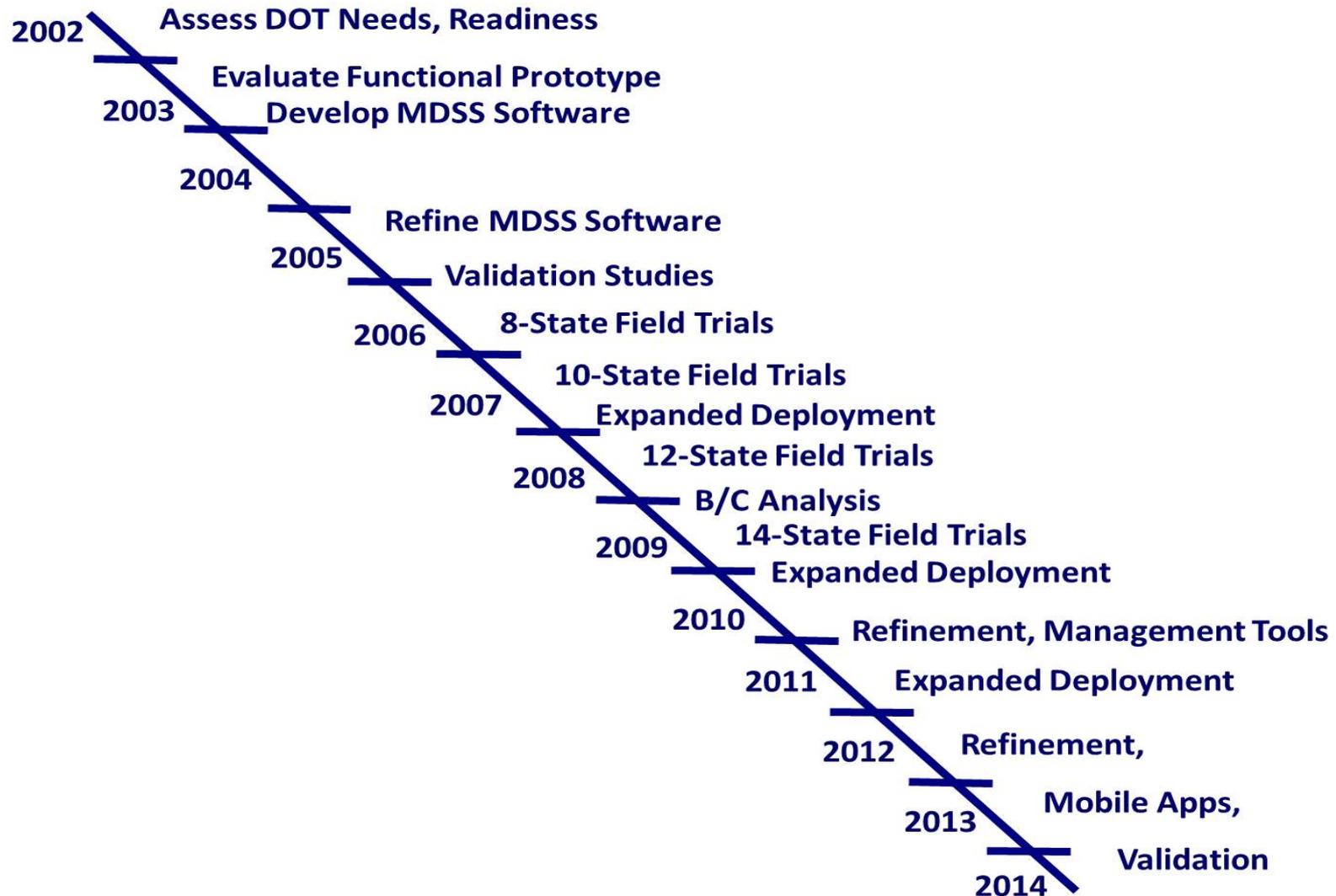
# Modeling Reality



Location	Pavement Temp (F)	Percent Ice	L/I/F/S Depths (in)	Materials Present
Shoulder	32.5	44%	0.019 / 0.000 / 0.000 / 0.15"	No Materials Present
Centerline	32.0	45%	0.020 / 0.000 / 0.000 / 0.17"	No Materials Present

## MDSS Pooled Fund Study

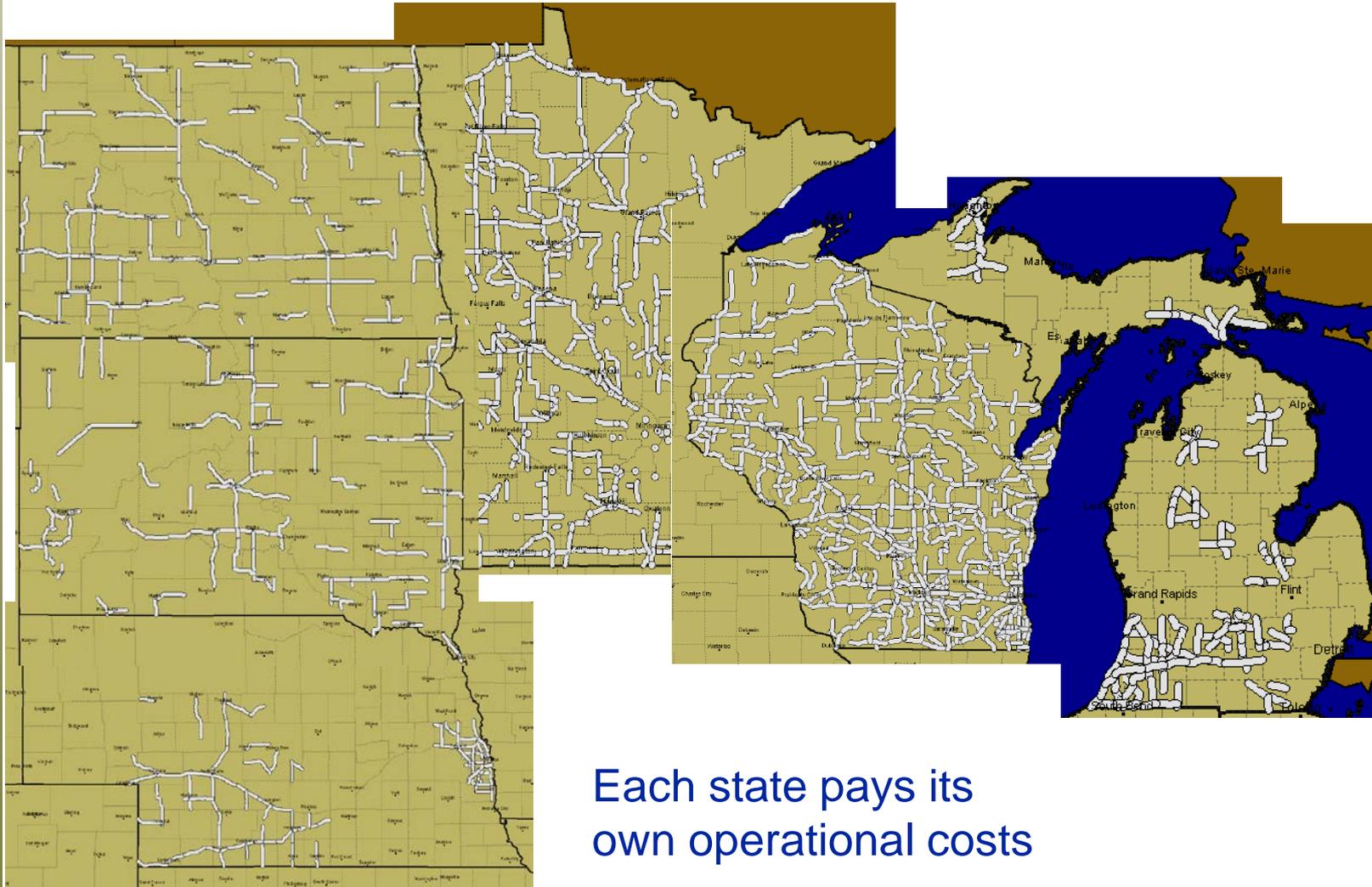
# MDSS is New...but Maturing





## MDSS Pooled Fund Study

# Example Deployment Levels



# Benefit/Cost Studies

- 3:1 to 8:1 b/c ratio estimate by Western Transportation Inst.
- Indiana 1<sup>st</sup>-year deployment 2008/2009
  - \$12M reduced salt use
  - \$1.3M overtime & fuel
  - \$11M overall after normalizing for winter conditions
  - ~27% of normal winter maintenance budget
- SD can't estimate savings because of change to "salt only" at same time

- MnDOT savings winter 2009-2010

The graphic features a blue header with the Minnesota Department of Transportation logo. The main body is dark blue with white text. At the bottom, there is a light blue bar with icons for various transportation modes: bus, train, airplane, car, bicycle, and another bus.

**Annual Salt Savings with Statewide MDSS / AVL Deployment**

**\$ 8,129,872.46**  
(savings based on data from winter FY2010)

*Thank you....*

# MDSS Current Focus Areas

# MDSS Mobile Apps



Map View



PAGOSA SPRINGS	
Air Temperature	71 degF
Dew Point	43 degF
Winds	N 10 miles/hr
Visibility	10.00 miles
Cloud Cover	ovc
Weather	vcts ra

Observations

# MDSS Current Focus Areas

# MDSS Mobile Apps



Camera Views

Verizon 1:44 PM  
Map MP 144.5 to 157, Wolf Cr...  
1 2 3  
MDSS Roadway

13 7:40:00 PM	57	Dry
13 6:40:00 PM	59	Dry
13 5:40:00 PM	61	Dry
13 4:40:00 PM	63	Dry
13 3:40:00 PM	65	Dry
13 2:40:00 PM	68	Dry
13 1:40:00 PM	78	Dry
13 12:40:00 PM	103	Dry
13 11:40:00 AM	96	Dry
13 10:40:00 AM	83	Dry

Table Current

Time Slider



Observations and Forecasts

# Assessment of Recommendations

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## MDSS Step

- Predict Weather
- Predict Road Conditions
- Recommend Treatment
- Predict Treated Conditions

## Validation

- Predicted=Observed?
- Predicted=Observed?
- Treatment Reasonable, Appropriate?
- Predicted=Observed?

# Other Efforts & Concerns

- Intellectual Property
  - IP generated within the Pooled Fund Study
  - Regarding MDC
- Mobile Data Collection
  - Next generation MDC
  - Expand routes & vehicles
- Management Reports
  - By route, vehicle, storm, season, area
- Route Configuration
  - Pavement
  - Treatments
  - Route and Cycle Times
  - Level of Service

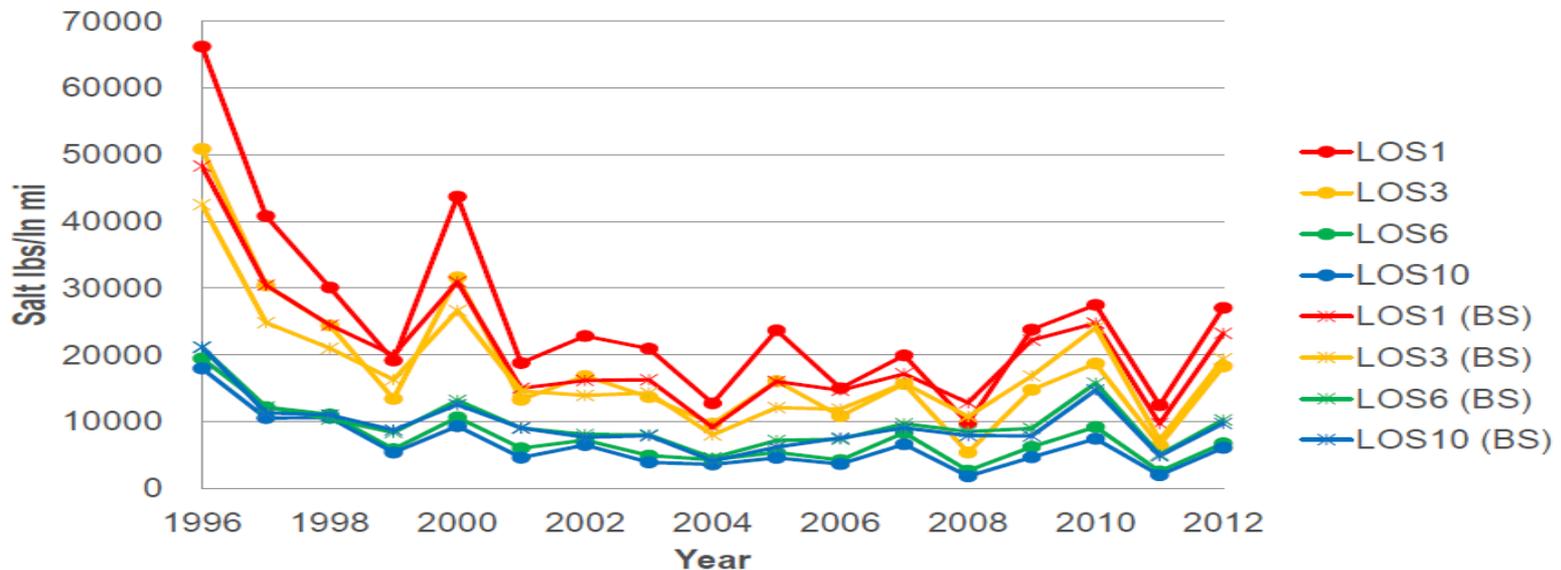


# Level of Service Analysis

## ➤ Two-Part Simulation

- Use baseline configuration on all sites varying weather and LOS
- Use agency-specific configurations and vary LOS

- Compare to actual agency records to identify need to adjust configuration



## MDSS Pooled Fund Study

# Benefits of Membership

- Jointly led leading-edge R&D
- Convenient funding mechanism
- Low-risk opportunity to deploy
- Learning
  - State to State
  - Vendor to State
  - State to Vendor
- Intellectual property: open but not public domain
- Nationally prominent forum for advancing MDSS and related technologies



# Questions?

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1.

Please contact:

2.

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Research

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4.

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Thank you!

5.