NDDOT TRansportation Innovation Program – TRIP

Presented to: NDACE

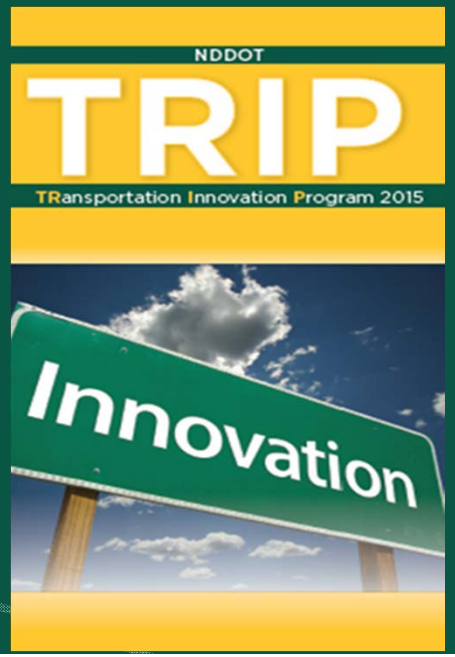
January 26, 2017

Holiday Inn

Fargo, ND

Tim Horner – NDSU-UGPTI

NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE



Transportation Innovation Program (TRIP)

- Objective of Initiative:
  - To identify and implement innovative ideas for transportation projects, processes and products.

- Focus Areas:
  - bridges and structures,
  - construction, operations and maintenance,
  - roadway surfacing,
  - planning, environmental, safety,
  - service delivery, transit, multi-modal,
  - innovative training, research

TRIP

- History:
  - Program Initiated by NDDOT in October 2014
  - Obtained FHWA STIC Incentive Grant to Administer
    - STIC – State Transportation Innovation Councils
  - NDDOT initially set aside $5 million for advancing ideas
  - Recently the budget set to $2.5 million/year
  - Current Plan is for 3 Fiscal Years
    - October 2014 to September 2015
    - October 2015 to September 2016
    - October 2016 to September 2017

TRIP

- History:
  - Past Calls for Ideas
    - April 20, 2015
    - May 29,2015
    - July 10, 2015
    - August 31, 2015
    - December 15, 2015
    - February 16, 2016
    - May 16, 2016
    - August 15, 2016
    - December 12, 2016
  - 86 ideas Submitted as of December 12, 2016
  - 27 ideas selected for advancement through August 2016
  - Still vetting December 12, 2016 submissions

TRIP

- Process
  - UGPTI Administers Call for Ideas and Subsequent Steps
  - Ideas Submitted to NDDOT TRIP Webpage
    - http://www.dot.nd.gov/business/innovate/
  - Ideas Reviewed by TRIP Team
    - Logan Beise – Programming Division
    - Tim Horner – UGPTI Program Director and Chair
    - Ben Birkemeyer – Motor Vehicle Division
    - Vacant – Driver's License Division
    - Kent Leysring – Fargo District Maintenance
    - Travis Lutman – Maintenance Division
    - Justin Ramsey – Environmental & Transportation Services Division, DOT Chair
    - Tyler Wollmuth – Bismarck District Construction,
    - Erv Zimprich – Information Technology Division,

TRIP

- Process (continued)
  - TRIP Team may ask for Presentation from submitter
  - TRIP Team makes recommendation to NDDOT Exec Team
  - Exec Team Agrees or Disagrees to Advance Idea
  - Submitters are notified of success or other-wise
  - Process takes 3 to 4 months

Status - TRip Ideas advanced through August 15, 2016

- Using a Texas Underseal on HBP Overlay projects
  - Project constructed in 2015 (ND 22 RP 0.00 to RP 12, Underseal on RP's 1.5 to 6.0).
  - The chip seal acts like super tack & a stress relief membrane
- Studying the use of Fiberglass Rebar & Dowels Bars in Bridges and Pavements
  - Review being conducted by NDDOT Materials & Research Division

Status - TRip Ideas advanced through August 15, 2016

- Using Fiber Reinforced HBP
  - Two projects will be built using this.
    - Hwy 200 near Dunn Center will have two sections with fiber.
      - Mile 109 to mile 113 will have a 1.5 inch overlay with fibers
      - Mile 113 to 116.5 will have a 2 inch overlay with fibers.
      - This project will look at two things
        - » 1) can we get longer service life out of the same thickness of pavement with fibers (2 inch section) 2) can we reduce pavement thickness and get the same service life as a thicker section (1.5 inch section).
        - » A control section will be built from mile 102.5 to mile 109 with a 2 inch lift with no fibers to serve as comparison
    - Highway 20 north of Jamestown
      - M&R using the thickness reduction concept to address Hwy 20 had width issues relating to the lane and shoulder widths.
      - A portion will be 3 inch mill with 2 inch overlay

Status - TRip Ideas advanced through August 15, 2016

- Installing Culvert Movement Monitoring/Instrumentation
  - Installation was scheduled to occur between 9/12 and 9/15
- Using URETEK Deep Polymer Injection on frost heaves
  - Installed on Hwy 57 near Ft Totten.
- Monitoring traffic flows with Distributed Acoustic Sensing
  - Project was bid in July and awarded. Contractor began install August 22. Demonstration was presented to Traffic Operations round table on December 14. Demonstrated sound through fiber optic cable could be used for vehicle count and length classification.

Status - TRip Ideas advanced through August 15, 2016

- Using Geogrid Reinforcement under aggregate base for flexible pavement
  - Project identified on US 83 W bypass
  - A monitoring plan will track performance
- Using a MIT Scan T2 for collecting concrete pavement thicknesses
  - Reduces coring of new concrete pavement
  - Received FHWA approval for purchase.
  - NDDOT is procuring and writing specification

MIT Scan T2

Status - TRip Ideas advanced through August 15, 2016

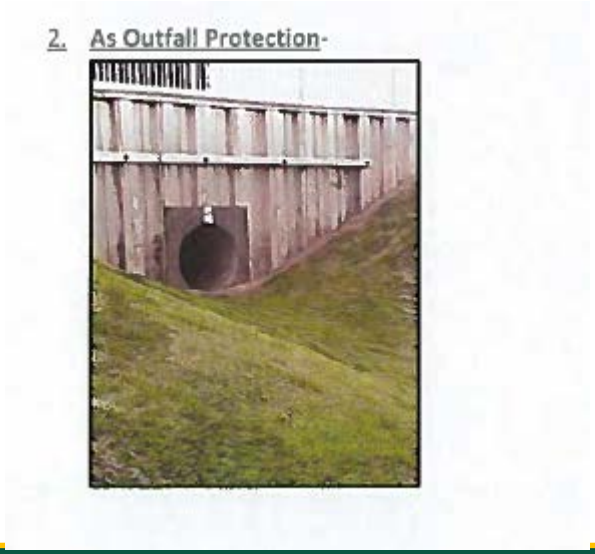
- Using Hydrated Lime as an anti-stripping agent in new full-depth HBP pavements
  - Still working on identifying a project using full depth asphalt
- Developing a digital driver's license applications process
  - Still under development
- Using TSC Smart Cone technology for security, work-zone safety and surveillance applications
  - Cones have been acquired –
  - implementation underway

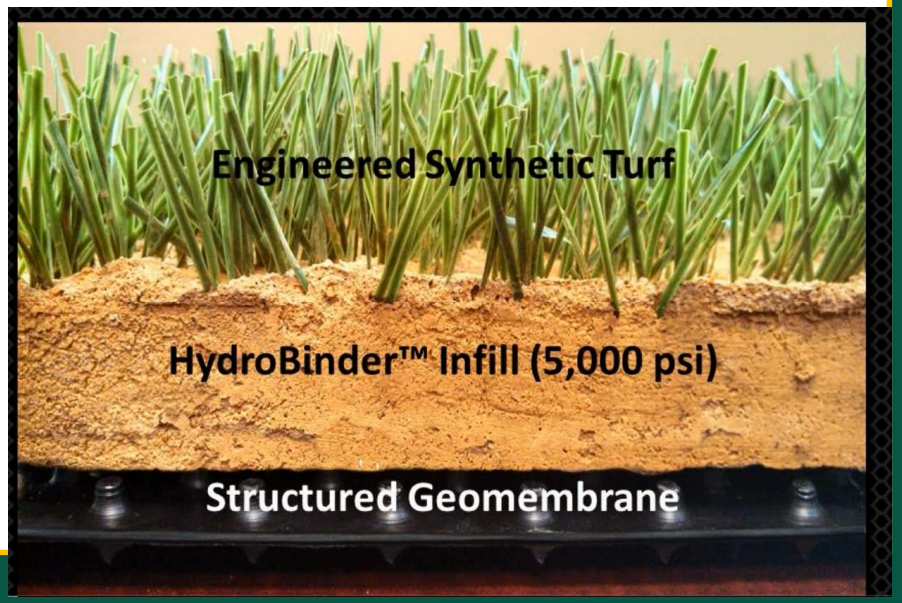
Status - TRip Ideas advanced through August 15, 2016

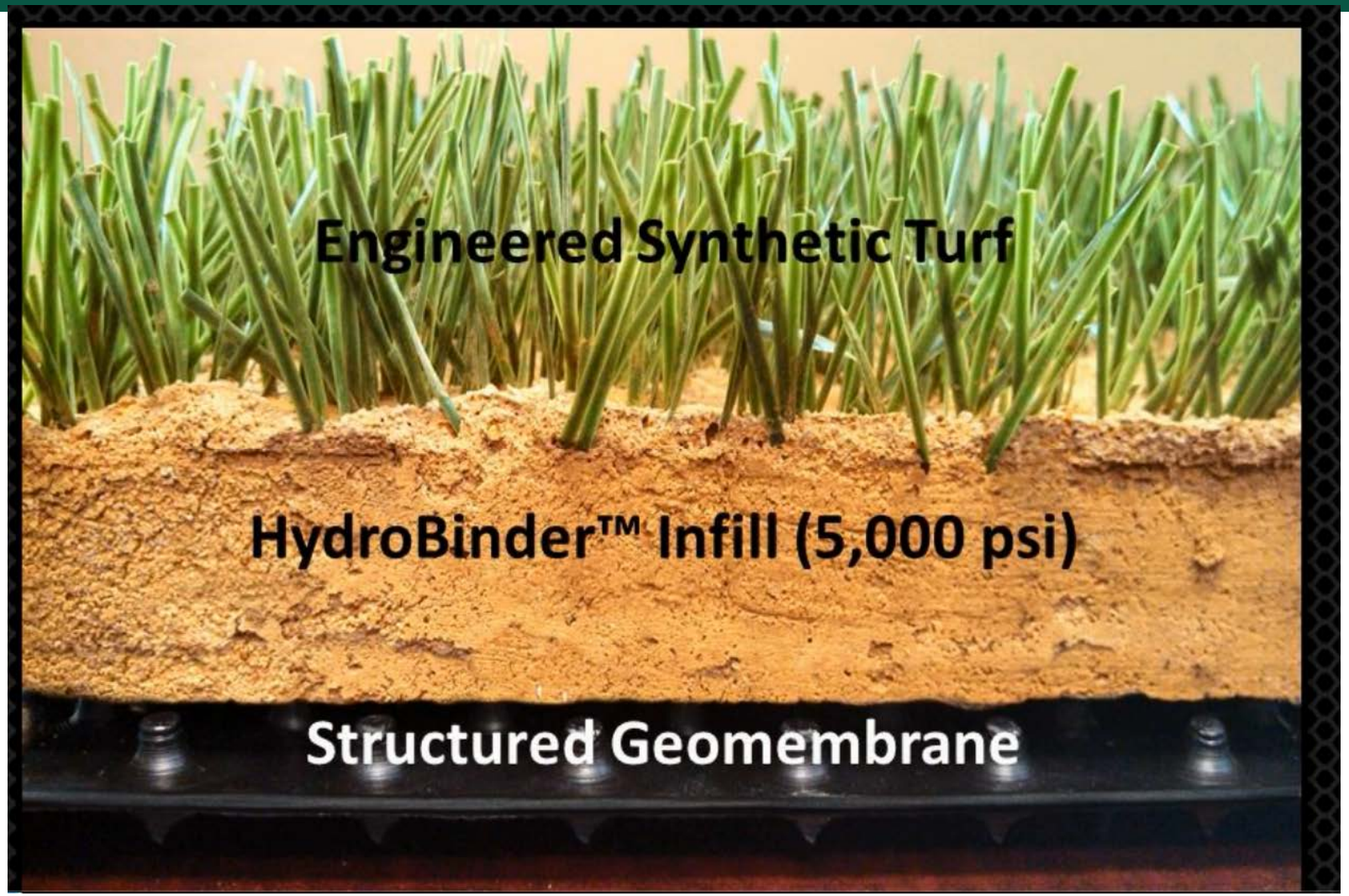
- Using Jointbond to address longitudinal HBP joint deterioration
  - Was used on Hwy 83 (September).
  - Implemented a monitoring plan.

Status - TRip Ideas advanced through August 15, 2016

- Using WatershedGeo HydroTurf® for drainage way armoring
  - Uses sand/cement mixture with hydro turf and water to create composite concrete hydro turf mat
  - Working on selecting a Federal Aid eligible location.






Engineered Synthetic Turf
HydroBinder™ Infill (5,000 psi)
Structured Geomembrane

Status - TRip Ideas advanced through August 15, 2016

- Using a Technical Analysis Process to Review Contract Award/Bid Analysis
  - Quickly identify potential unbalanced bid items and other bidding anomalies – has been implemented

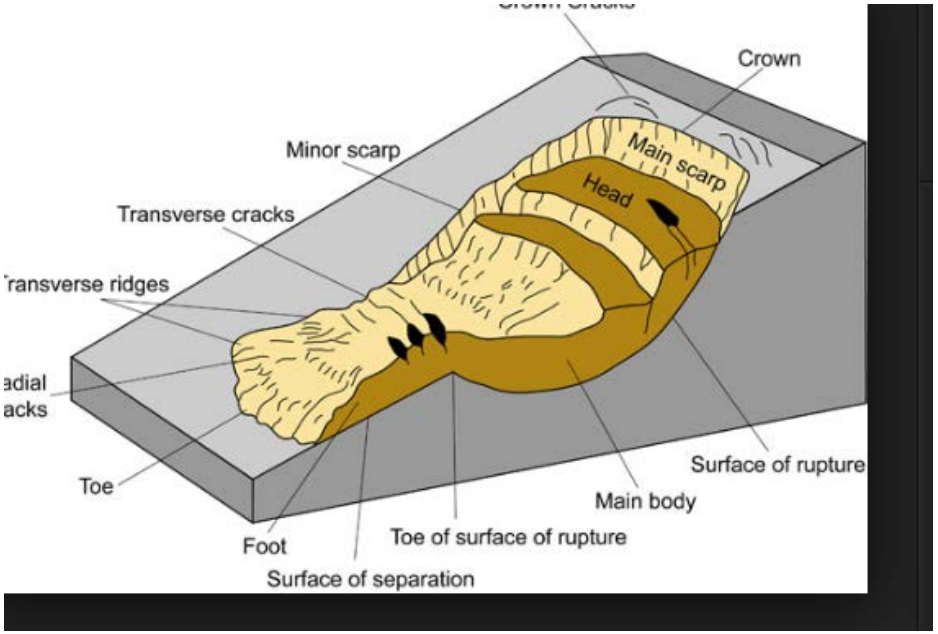
Spec No	Quantity	Engineer Estimate		Engr Contract %	Contractor 1		Bid/Engr	Contract %	Normalized Contract % = Engr Contract* (Bid/Engr)	Contractor 2		Bid/Engr	Contract %	Normalized Contract % = Engr Contract* (Bid/Engr)
		Price	Amount		Price	Amount				Price	Amount			
103	1	10000	10000	1.1%	4500	4500	0.45	0.4%	0.5%	11500	11500	1.15	1.0%	1.3%
202	139	13.3	1848.7	0.2%	35	4865	2.63	0.5%	0.5%	26	3614	1.95	0.3%	0.4%
202	1919	15	28785	3.2%	35	67165	2.33	6.3%	7.5%	23	44137	1.53	3.8%	4.9%
202	1029	7	7203	0.8%	4.75	4887.75	0.68	0.5%	0.5%	12	12348	1.71	1.1%	1.4%
202	802	6	4812	0.5%	20	16040	3.33	1.5%	1.8%	9	7218	1.50	0.6%	0.8%
202	500	6	3000	0.3%	35	17500	5.83	1.6%	2.0%	16	8000	2.67	0.7%	0.9%
202	157	4.5	706.5	0.1%	4.75	745.75	1.06	0.1%	0.1%	12	1884	2.67	0.2%	0.2%
202	2	350	700	0.1%	1250	2500	3.57	0.2%	0.3%	950	1900	2.71	0.2%	0.2%
202	135	20	2700	0.3%	40	5400	2.00	0.5%	0.6%	58	7830	2.90	0.7%	0.9%
203	382	20	7640	0.9%	45	17190	2.25	1.6%	1.9%	43	16426	2.15	1.4%	1.8%
203	167	20	3340	0.4%	40	6680	2.00	0.6%	0.7%	36	6012	1.80	0.5%	0.7%
216	30	25	750	0.1%	25	750	1.00	0.1%	0.1%	24.5	735	0.98	0.1%	0.1%
302	1321	21	27741	3.1%	25	33025	1.19	3.1%	3.7%	34	44914	1.62	3.9%	5.0%
410	298	185	55130	6.2%	162	48276	0.88	4.5%	5.4%	162	48276	0.88	4.2%	5.4%
411	289	22	6358	0.7%	30	8670	1.36	0.8%	1.0%	35	10115	1.59	0.9%	1.1%
550	2175	100	217500	24.3%	155	337125	1.55	31.4%	37.7%	85	184875	0.85	16.1%	20.7%

Status - TRip Ideas advanced through August 15, 2016

- Using ULTRA Guard™ Safety Enhancement System on existing guardrail
  - Paint and bead marking for barriers and guardrail
  - Locations identified and have received a price quote
  - Setting up the project, getting it Federal Aid Eligible, and writing sole source documentation.

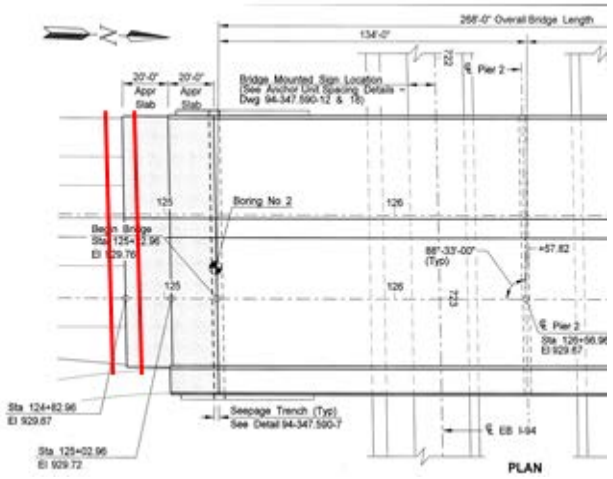
Status - TRip Ideas advanced through August 15, 2016

- Using Terrestrial Laser Scanning for High Accuracy As-Builts and Design Models
  - Identified slide repair on Hwy 46 (Mile 67) as candidate project for pre and post quantity surveys.



Status - TRip Ideas advanced through August 15, 2016

- Using Flexible Hoses to repair the "Bump at the Ends of Bridges"
  - Place hoses with construction to lift approach slabs when settlement occurs
  - Can be done without drilling and from side of road

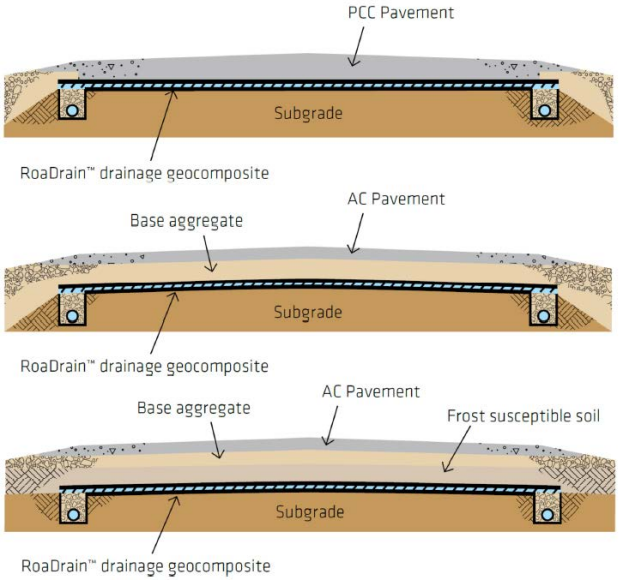


Status - TRip Ideas advanced through August 15, 2016

- Using Micro Milling with Micro-surfacing projects
  - Tighter milling spacing/less depth
  - Smoother surface/ride/better bonding of treatment
  - Can get by with thinner surface treatment
  - Project identified as Hwy 46 from Mile post 0.00 to Mile post 19.00
    - Miles 0.00 to 17.00 will be a test section
    - miles 17.00 to 19.00 will be a control

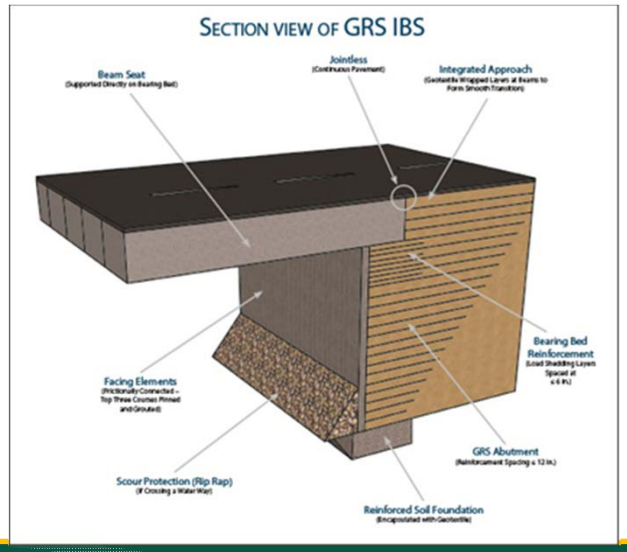
Status - TRip Ideas advanced through August 15, 2016

- Using Roadway Drainage Geocomposite Underdrain System under PCCP unsealed Joints
  - Need to identify pilot location. Intend to daylight drain w/o headwalls
  - **Exec direction is to not seal joints over test site – narrow saw cut only**



Status - TRip Ideas advanced through August 15, 2016

- Geosynthetic Reinforced Soil Integrated Bridge
  - 2 Submittals – one general and one specific to Stark County
    - Stark County proposal was selected for advancement
    - no GRS-IBS systems in North Dakota (200 total in 44 states)
    - Goal is to learn process so county staff can construct in future

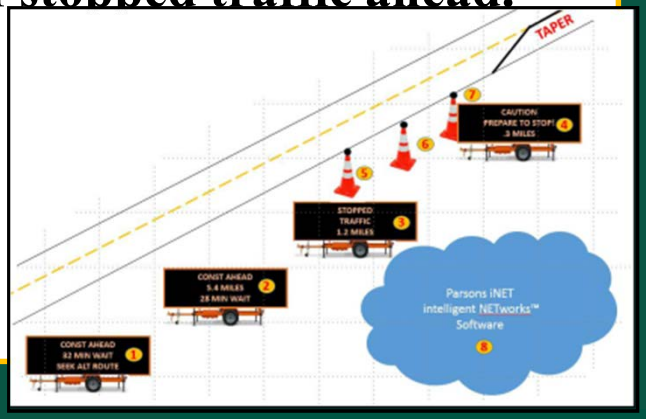


Status - TRip Ideas advanced through August 15, 2016

- Snow-proof Roadway Marking System through the use of Electrically Conductive Fly Ash Geopolymer Concrete Mortar
  - **project will be implemented through patch cutting and the self-heating fly ash geopolymer concrete poured** along the segment and connected with a power source
  - The **mix design, circuit, and efficiency of the self-heating geopolymer concrete mortar have been validated**

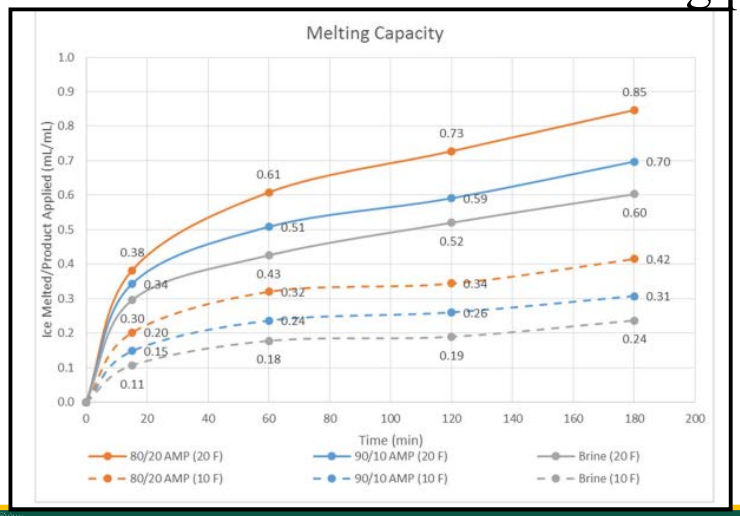
Status - TRip Ideas advanced through August 15, 2016

- Utilizing TheSmartCone Technology for Intelligent Work Zones
  - **SmartCone concept advanced via earlier TRIP submittal**
    - **Proposed to warn work zone workers of vehicle entering the work zone**
  - **This concept would develop an interface for work zones so smart cones monitor queued traffic and convey information back to variable message signs to warn of stopped traffic ahead.**



Status - TRip Ideas advanced through August 15, 2016

- Salt Brine Enhancer
  - **This concept calls for product called** AMP that **improves performance of salt brine at lower temperatures**, and **increases the effectiveness of salt brine to adhere to the road surface** and melt more ice with a lower application rate
  - Includes a sensor/monitoring plan with installation.



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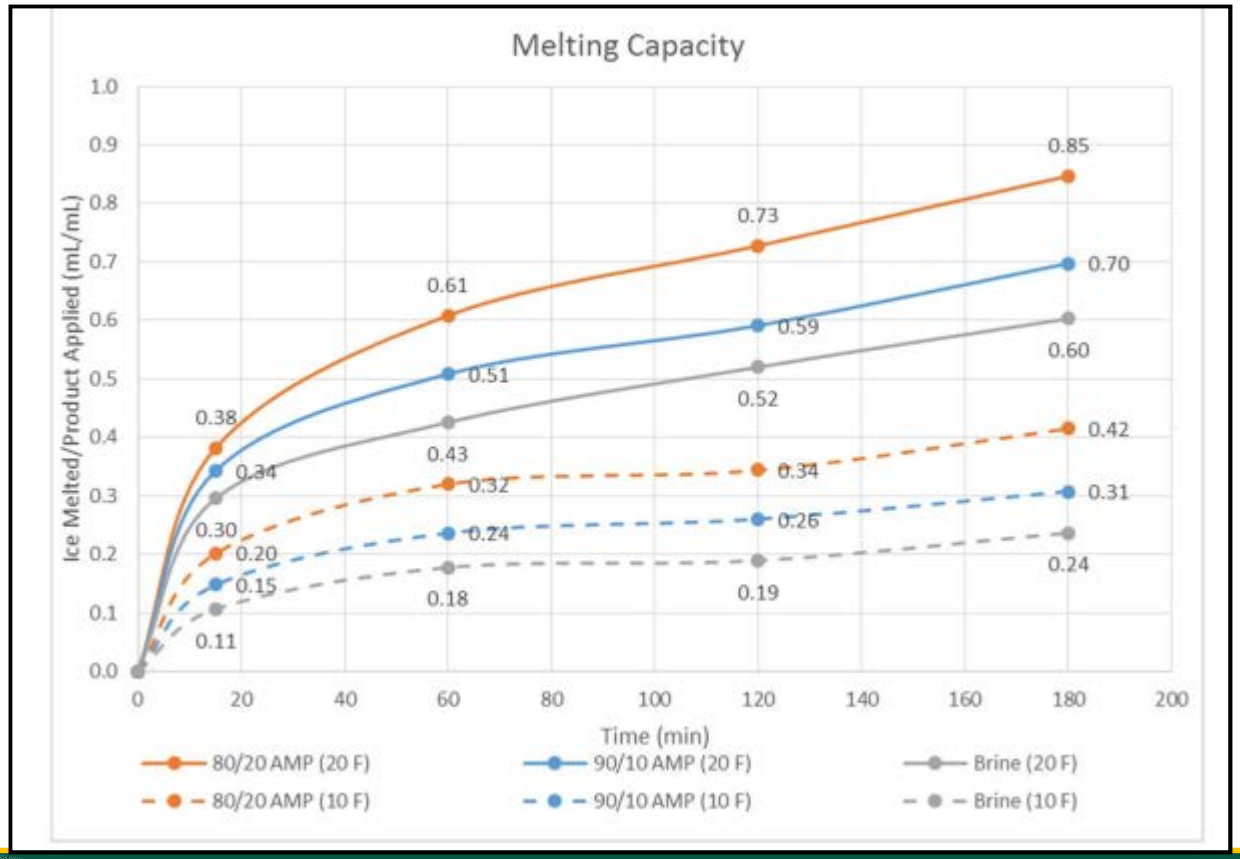
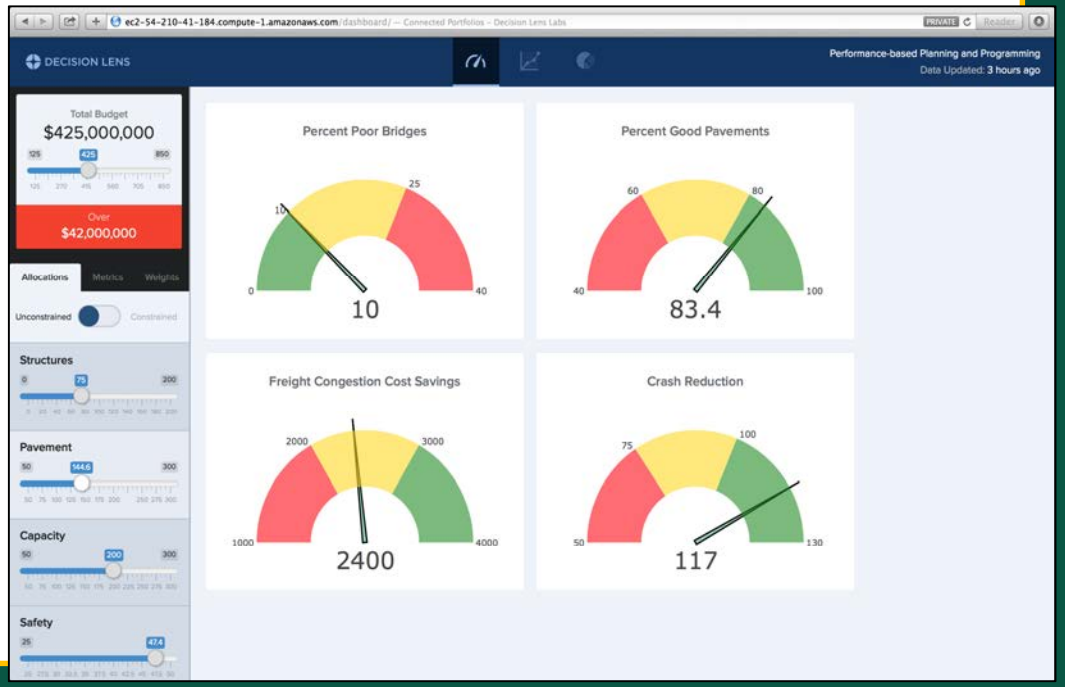
- Salt Brine Enhancer



Status - TRip Ideas advanced through August 15, 2016

- Cross-Asset Performance Based Planning and Programming Dashboard

Visual and analytical aids intended to support improved executive construction program decision making in the NDDOT

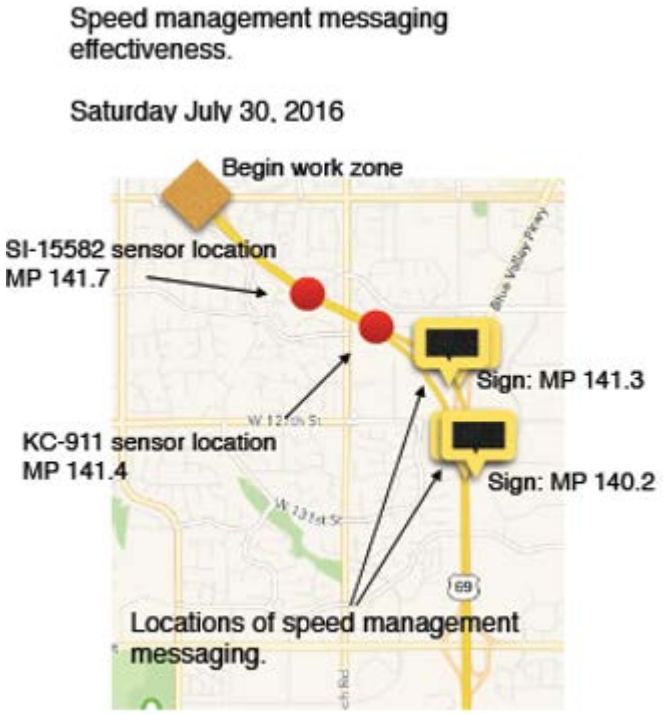


Status - TRip Ideas advanced through August 15, 2016

- Improve Work Zone Safety and Mobility using ITS to create an Intelligent Work Zone (IWZ)

When a condition is detected, the corresponding message is applied to the appropriate sign

SpeedInfo Sensor

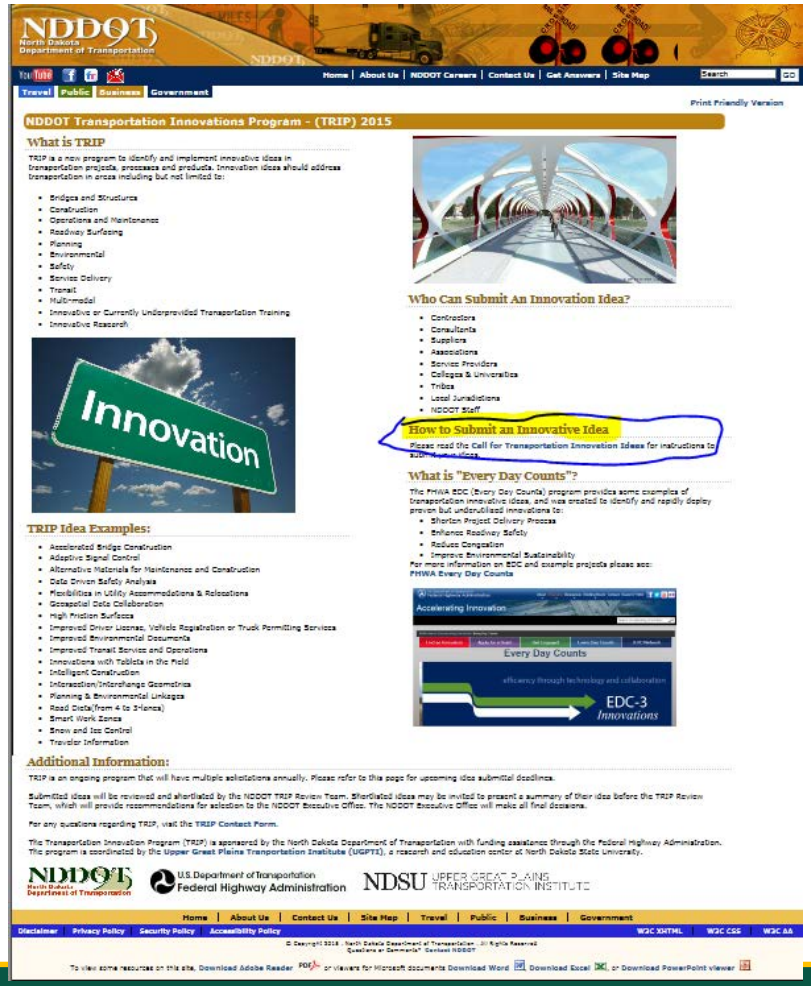


Status - TRip Ideas advanced through August 15, 2016

- Alternative Pipe Joint Repair Method
  - **Using a high performance chemical resistant coating (Zebron PL400H) as part of the process to complete pipe joint repairs**
- **The proposed solution would include the following**:
  - **Fill the joint** with Polyurethane Foam
  - **Patch the joint** with a concrete Cementous mortar to create a flat surface
  - **Score a termination line** 6" on either side of the concrete joint
  - **Apply 125 mils of Zebron** to cover the 12-inch width between termination grooves
- **No project or budget assigned – just direction to add it to pipe repair toolbox**

TRIP

- Next Round of Ideas Due March 6, 2017



Questions?

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