Transportation Innovation Program (TRIP)

Three years old and starting to show results

3 Years? What have you done?

- Initiated a contract with Upper Great Plains Transportation Institute (UGPTI)
- Built a program website with NDDOT IT personnel
- Wrote a "Call for Transportation Innovation Ideas"
- Developed an NDDOT TrIP Policy

That doesn't seem like much.

- First call for ideas was issued April 2nd 2015 with a deadline of April 20th 2015
  - 2nd deadline was May 29th 2015
- 12 total deadlines have passed
  - Most recent was September 15th, 2017
- 99 total submissions
  - 93 effectively unique submissions

That doesn't seem like much (cont).

- 85 of those 93 submissions have been presented to Executive Management
- 29 of those 85 concepts were chosen for advancement of some sort
- $2.5 million set aside per year for TrIP funding

So about those 29 items…

TrIP Number	Funding Allocated	Concept
46	$126,000*	Underseal
47	$0	Fiberglass Reinforcement
49	$306,000*	Fiber reinforced HMA
52	$30,000	Thermistors
55/64	$1,000,000	Soil Stabilization
56/58	$484,422*	Fiber Optic Traffic Counting
66	$0	Self Service DL Kiosks
69	$95,000*	Tri-Axial Geogrid
70	$30,000*	MIT Scan
71	$200,000	Hydrated Lime
73	$0	Digital DL Applications (forms)
82	$28,000	SmartCone
83	$47,000*	Jointbond
84	$60,000	WaterShed Geo
107	$0	Technical bid Review
142	$38,000*	UltraGuard
146	$30,000	Laser Scan

TrIP Number	Funding Allocated	Concept
149	$0	Comment Collection
151	$25,000	Sand Jacking
157	$243,000*	MicroMill/ MicroSurface
159	$UNKNOWN	Geocomposite drainage system
163	$36,000*	Snow proof Roadway Markings
171	$74,500	Using SmartCone in IWZ
175	$150,000	Asset Management Software
162/176	$650,000	GSRI Bridge
180	$0	Pipe Joint Repair
277	$0	Centrifugally Cast Concrete Pipe Lining
285	$66,000	MARWIS
67	$55,000	Performance based testing for HMA

* Indicates actual project costs rather than estimated costs

Approximate Total Funding Allocation is $3,800,000

Details…We got Details! TrIP 46

Texas Underseal

- Intent is to reduce reflective cracking from existing roadway surfacing
  - Traditional seal coat placed after milling and before placement of overlay asphalt
- ND Hwy 22 constructed in 2015
- First TrIP related project to get underway
- Total cost of $126,000 dollars
  - $28,145 per mile

Pictures…We got those too! TrIP 46 Underseal

Pictures…We got those too! TrIP 46 Underseal

Pictures…We got those too! TrIP 46 Underseal

Details…We got Details! TrIP 46 Underseal

- Second project completed in 2017
  - ND Hwy 16
  - $404,000 ($15,792 per mile)
- Monitoring will continue
- Items to consider in the future:
  - Speed of the mill

So what else has been done? TrIP 55/64

Soil Stabilization

- Used a proprietary product and process to try and stabilize subgrade on Hwy 57 west of Ft. Totten
- Other options had been tried and didn't prove to be effective
- Injected a material into the subgrade to displace trapped water, which would typically freeze causing an uneven roadway surface

So what else has been done? TrIP 55/64

Soil Stabilization

So what else has been done? TrIP 55/64

Soil Stabilization

So what else has been done? TrIP 55/64 Soil Stabilization

- Completed in 2016
  - Prior to injection, the roadway was signed at 55 mph during the summer and 25 mph in the winter
  - Post construction it was signed at 45 mph and remained at that speed through summer 2017
- The roadway surface wasn't "smooth" post injection
  - To fully complete the process, a mill and some type of overlay will be needed
- Speeds have normalized

Any Non-Roadway stuff? TrIP 66 & 73 Electronic Upgrades for Drivers License

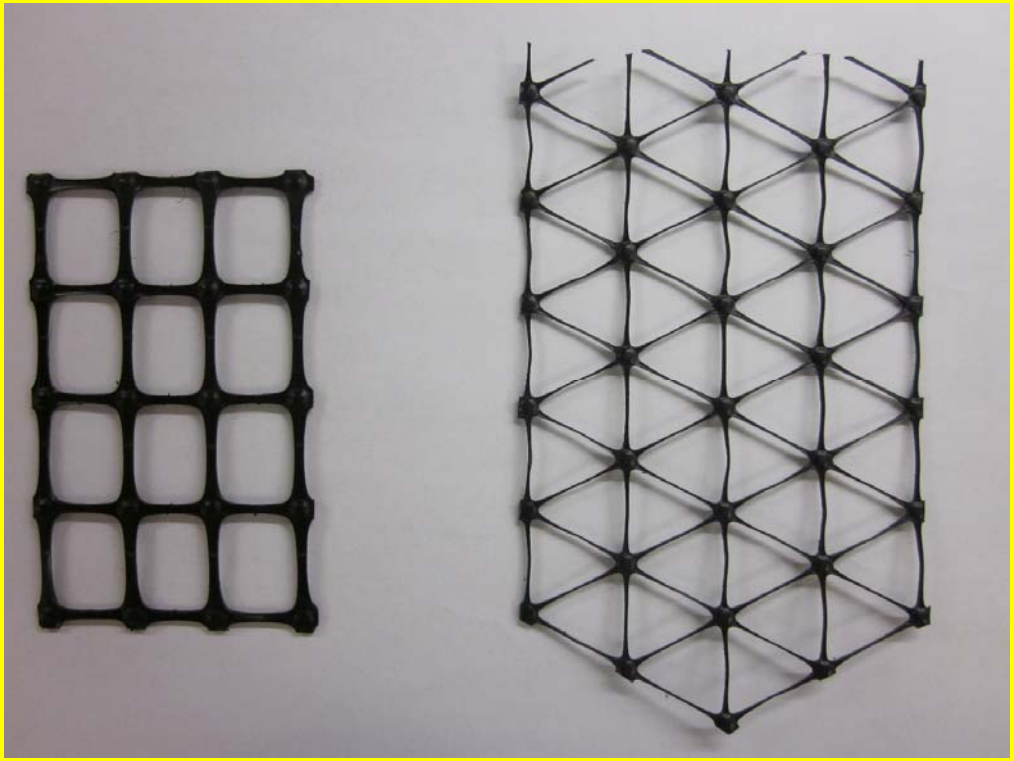
- TrIP 66: Self Service DL Kiosks

- TrIP 73 Digital DL Applications
  - Forms not phones

Any Non-Roadway stuff? TrIP 175 Asset Management Software

- Software package that can interactively show how various investment strategies affect overall system performance
- Allows for generation of scenarios where available funds are focused on one area versus another

Details…We got Details! TrIP 69 Tri-Axial Geogrid



Details…We got Details! TrIP 69 Tri-Axial Geogrid

- Different geometry of the grid that can allow for additional changes to aggregate gradation
- Installed on the Hwy 83 Bypass in Minot
- 3 sections were installed:
  - 12 inches of Class 5 base with tri-axial geogrid;
  - 12 inches of Class 5 base with bi-axial geogrid;
  - 18 inches of Class 5 base with no geosynthetic
- No price difference between the types of geogrid

Another Picture! TrIP 69

Tri-Axial Geogrid

What else ya got? TrIP 157

MicroMilling

- Concept suggests performing a MicroMill before placement of a MicroSurfacing to improve ride
- ND Hwy 49 at the SD border
- 3 sections
  - Micro/Micro (or Micro^2, if you prefer) – 17 miles
  - MicroMill with a double lift of MicroSurface (Micro^3) – 2 miles
  - MicroSurface only – 10 miles

We like the pictures TrIP 157

MicroMilling

We like the pictures TrIP 157

MicroMilling

We like the pictures TrIP 157

MicroMilling

Is it effective? TrIP 157 MicroMilling

- Northbound
  - Un-milled sections had 26% reduction in IRI
  - Milled sections had a 35% reduction in IRI
- Southbound
  - Un-milled sections had 31% reduction in IRI
  - Milled sections had 43% reduction in IRI
- MnDOT published a paper showing similar initial results
  - Also showed that those results are maintainable
  - Last numbers are from 3 years after work completed
- Cost effective too!
  - Project came in at $1.00 per SY, similar to standard milling rates

University InvolvementTrIP 163 & 67 NDSU & UND

- TrIP 163 is a study on potential conductivity of concrete pavements with the intent to remove snow/ice from roadway markings
  - Conducted by NDSU
  - Contract just started and work is beginning
  - Expected completion of lab work in Summer 2018

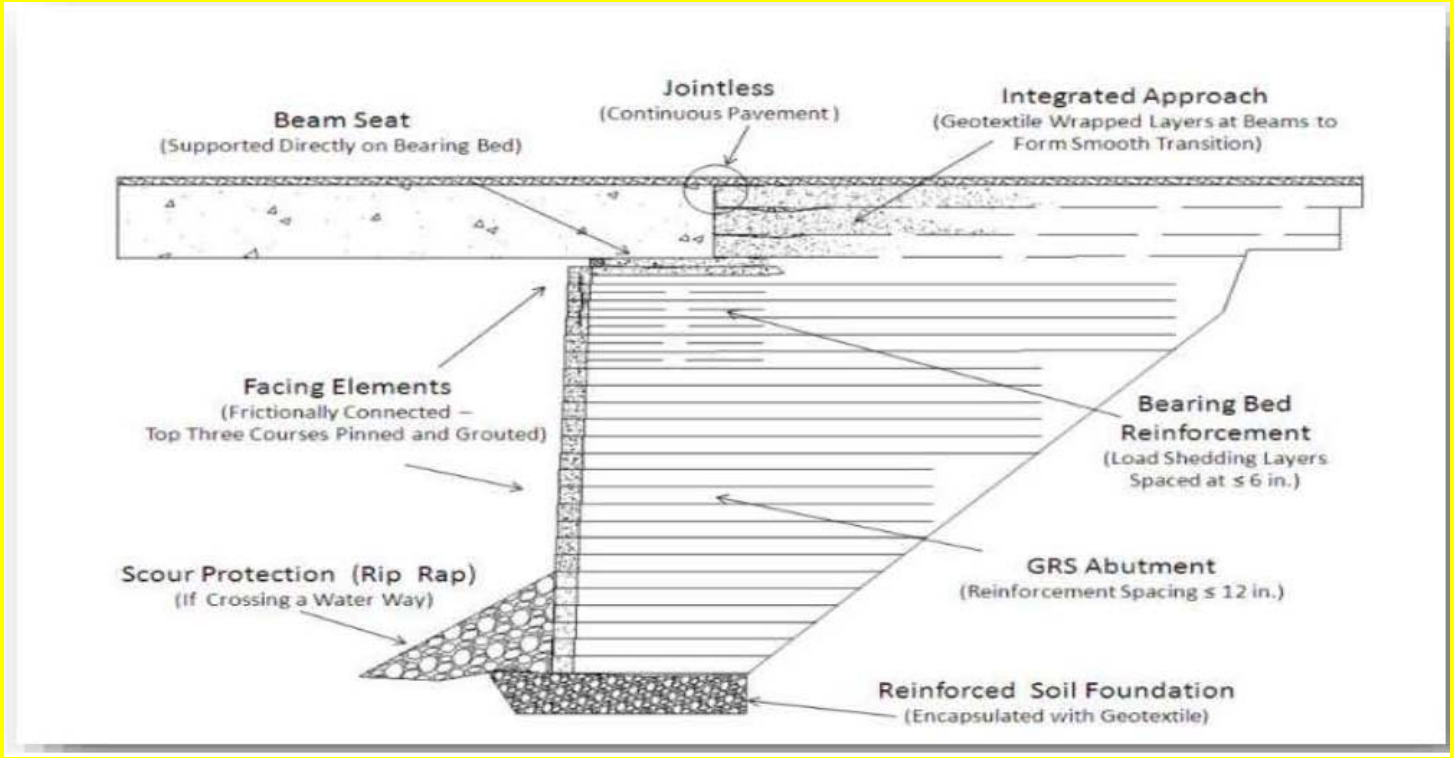
University InvolvementTrIP 163 & 67 NDSU & UND

- TrIP 67 is a study on HMA to determine new and improved acceptance methods for bituminous pavements
  - Conducted by UND
  - Developing a work plan for the study
  - Expected to take 12 months from the time a contract is in place

What about structures? TrIP 162 & 176 GSRI Bridge

- GeoSynthetic Reinforced Soil Integrated Bridge System
- Stark County submitted a structure for replacement using this system
- Stark County was notified and began working on the plans
- Project WAS scheduled for Spring 2018 bid opening
  - During plan development it was found that the location wasn't ideal for the concept
    - Hydraulic issues led to the structure needing to be larger than originally anticipated;
    - Forced costs beyond what was reasonable
    - Stark County decided a box culvert would fit the needs hydraulically, with less cost and withdrew the project

What about structures? TrIP 162 & 176 GSRI Bridge



What's Next?
Unidentified Implementation Items

- WaterShed Geo – Surface installed soil stabilization; resembles field turf
- Laser Scan – LIDAR type system that can be used to survey difficult to access areas such as slide repair areas
- Sand Jacking – Alternative to foam jacking approach slabs; uses sand blown in from the sides vs drilling through surfacing
- Geocomposite Drainage system – a geosynthetic material that can drain water from beneath a pavement; intended for a concrete pavement, beneath joints
- Pipe repair concepts – 2 different concepts that can become part of the pipe repair selection process when the correct circumstances exist

Odds & Ends

Random Thoughts

- Next cut off point for submissions is March 26th, 2018
- Submissions always welcome!
- TrIP is *NOT* the only way to move new ideas through the Department and into reality