ASSESSING APPROPRIATE LOADING CONFIGURATION IN APT

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APT?

- Controlled application of realistic wheel loading
- Allows monitoring the performance of pavement systems within short time
- Eliminates/reduces the need for in-service experimental sections
APT ADVANTAGES

- Time
- Control of Variables
- Economy and Flexibility
FLORIDA’S APT PROGRAM

- Housed within State Materials Research Park
- Test site consists of 8 linear tracks 150x12 ft.
- 2 additional tracks with water table control capability
- Loading using a Heavy Vehicle Simulator (HVS)
HVS

Weight: 50+ tons
Length: 75 feet
Height: 13 feet
Width: 12 feet
LOADING CAPABILITIES

- Loading: 7 to 45 kips
- Wheel speed: 8 mph
- Sinusoidal loading
- Maximum passes/day
  - 29,000 bi-directional
  - 14,000 uni-directional
TESTING CAPABILITIES

- Test Track Length: 20’
- Wander From 0 – 30”
- Super-Single vs. Dual
- Maximum Rut Depth: 4”
LASER PROFILING
ENVIRONMENTAL CHAMBER

- 2” thick Styrofoam w/ aluminum sheeting
- Windows & doors provided
- Easily removable
HEATING SYSTEM

- 6 elements, 9 ft long, attached to HVS test beam & moving transversely with beam.
- Independently controlled to provide 6 heating zones.
SYSTEM PERFORMANCE

Temperature (°C)

Ambient Air
Surface
INITIAL EXPERIMENT

SBS modifier

Binders:
  PG 67-22
  PG 76-22

SP 12.5 fine graded mixes
LOADING CONFIGURATION ASSESSMENT
UNI-DIRECTIONAL LOADING
BI-DIRECTIONAL LOADING
UNI-DIRECTIONAL w/ WANDER
BI-DIRECTIONAL w/ WANDER
LOADING CONFIGURATION ASSESSMENT

- Good Year G165 super-single tire
- Tire load of 9000 lbs
- Test speed of 8 mph
- Tire pressure of 112 psi
RUT ILLUSTRATIONS

- Bi-Directional, No Wander (above)
- Uni-Directional, No Wander (Left)
RUBBER BUILD-UP
TIRE TREAD PATTERN
TIRE TREAD STRIPS

6" = Half Tire Width
Divided into 30 strips

Tire Centerline

First pattern repetition
Second pattern repetition

14.32"
CONCLUSIONS

- Wo wander, uni-directional - rut developed at rate of 65% greater per-pass basis.
- Wo wander, uni-directional mode placed considerable wearing forces. As much as 25% of tread depth worn away at very localized locations.
- Uni-directional loading, pattern matched very closely the general tire tread pattern.
CONCLUSIONS (Con’t)

- W/ wheel wander, wander increments differently affected the tire-pavement contact.
- Importance of using both wheel wander & appropriate wander incremental step.
- It is recommended that, in order to determine an appropriate loading configuration, a thorough pavement-tire tread investigation be conducted any time the tire brand and/or type is changed.
WEBSITE LINKS

http://www11.myflorida.com/statematerialsoffice/PavementEvaluation/APT/aptresearch.htm
Questions???