

CONSTRUCTION CYCLE-7 PLANS



Federal Aviation
Administration



Presented to: FAA Airport Pavement Working Group

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NEW PAVEMENT CONSTRUCTION



NON-DESTRUCTIVE TESTING & PAVEMENT STRUCTURE CHARACTERIZATION



Construction Cycle (CC) at NAPTF



POSTTRAFFIC TESTING



FULL-SCALE TRAFFIC TESTS & PAVEMENT EVALUATION



CONSTRUCTION CYCLE – 7 (CC-7)

PRIMARY OBJECTIVES

- Perpetual Pavements

Develop Perpetual Pavements Design criterion for airport pavements.

- Overload

Determine allowable aircraft overload criteria for flexible pavement.

CONSTRUCTION CYCLE – 7 (CC-7)

SECONDARY OBJECTIVES

- Determine alpha factor for 10-wheel (5D) gear configuration.
- Study the structural performance of drainable bases.
- Investigate changes in subgrade CBR with moisture movement in low strength subgrade.

CC7 – PERPETUAL PAVEMENTS

OBJECTIVES

- Develop Perpetual Pavements Design criterion for airport pavements.
- Determine the vertical strain threshold in the intermediate HMA layer to limit rutting.
- Determine the horizontal strain threshold in the HMA base layer to prevent bottom-up fatigue cracking.
- Determine relationship between laboratory fatigue strain threshold and measured field HMA strains.
- Study strain distribution in the HMA layer.

PERPETUAL PAVEMENT

Perpetual Pavement is “an asphalt pavement designed and built to last longer than 50 years without requiring major structural rehabilitation or reconstruction, and needing only periodic surface renewal in response to distresses confined to the top of the pavement.”

[Perpetual Asphalt Pavements – A Synthesis, Asphalt Pavement Alliance]

TYPICAL FLEXIBLE PAVEMENT FAILURE



PERPETUAL PAVEMENT

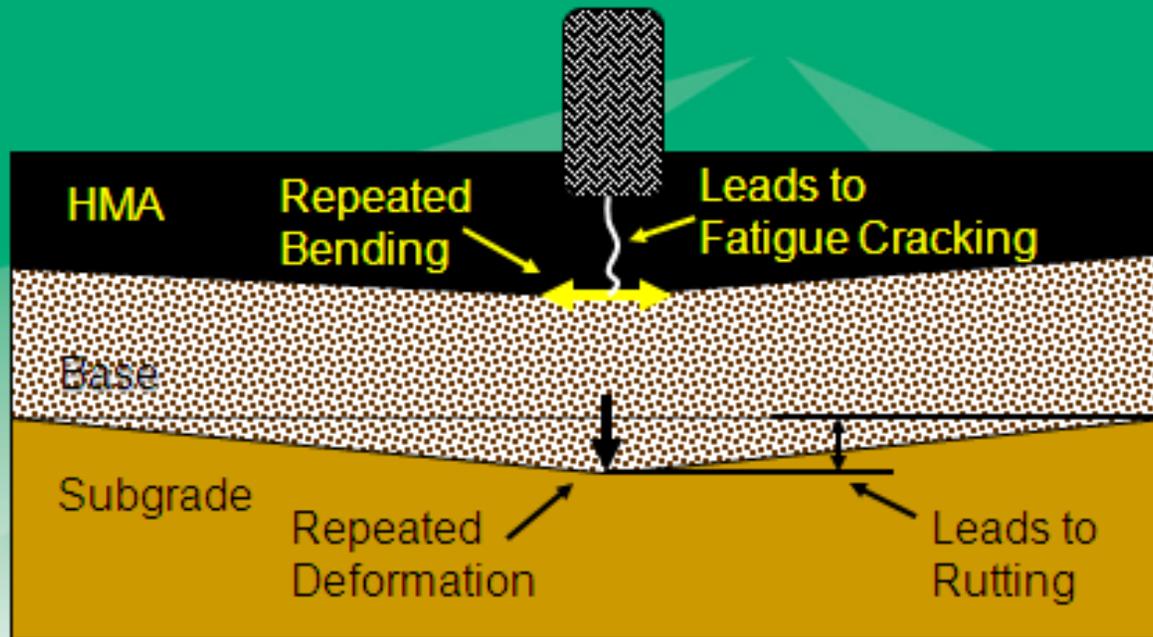


PERPETUAL PAVEMENT

Perpetual Pavements



Performance Goals - Avoid These

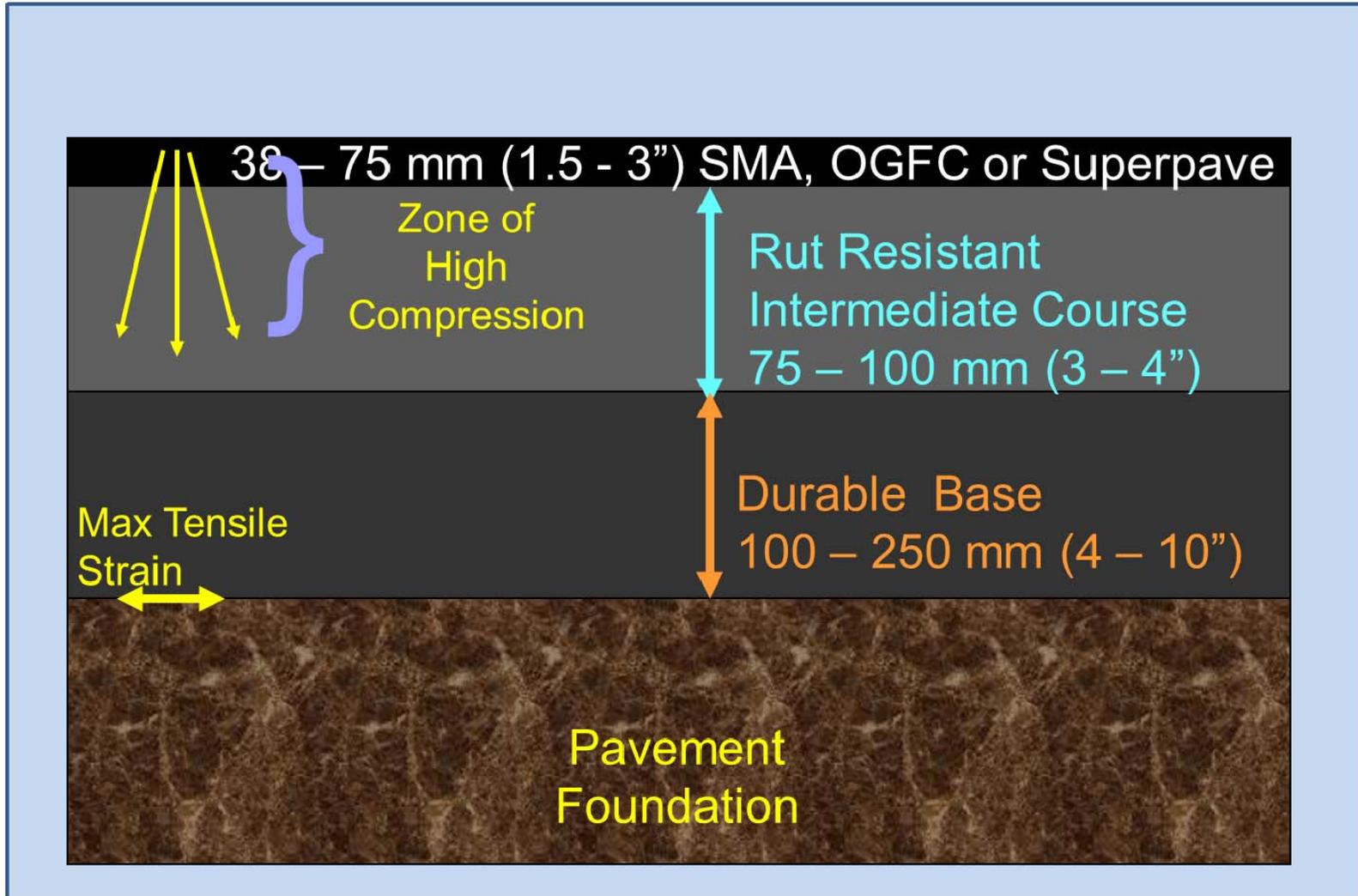


THE NEW ASPHALT, ABSOLUTELY!

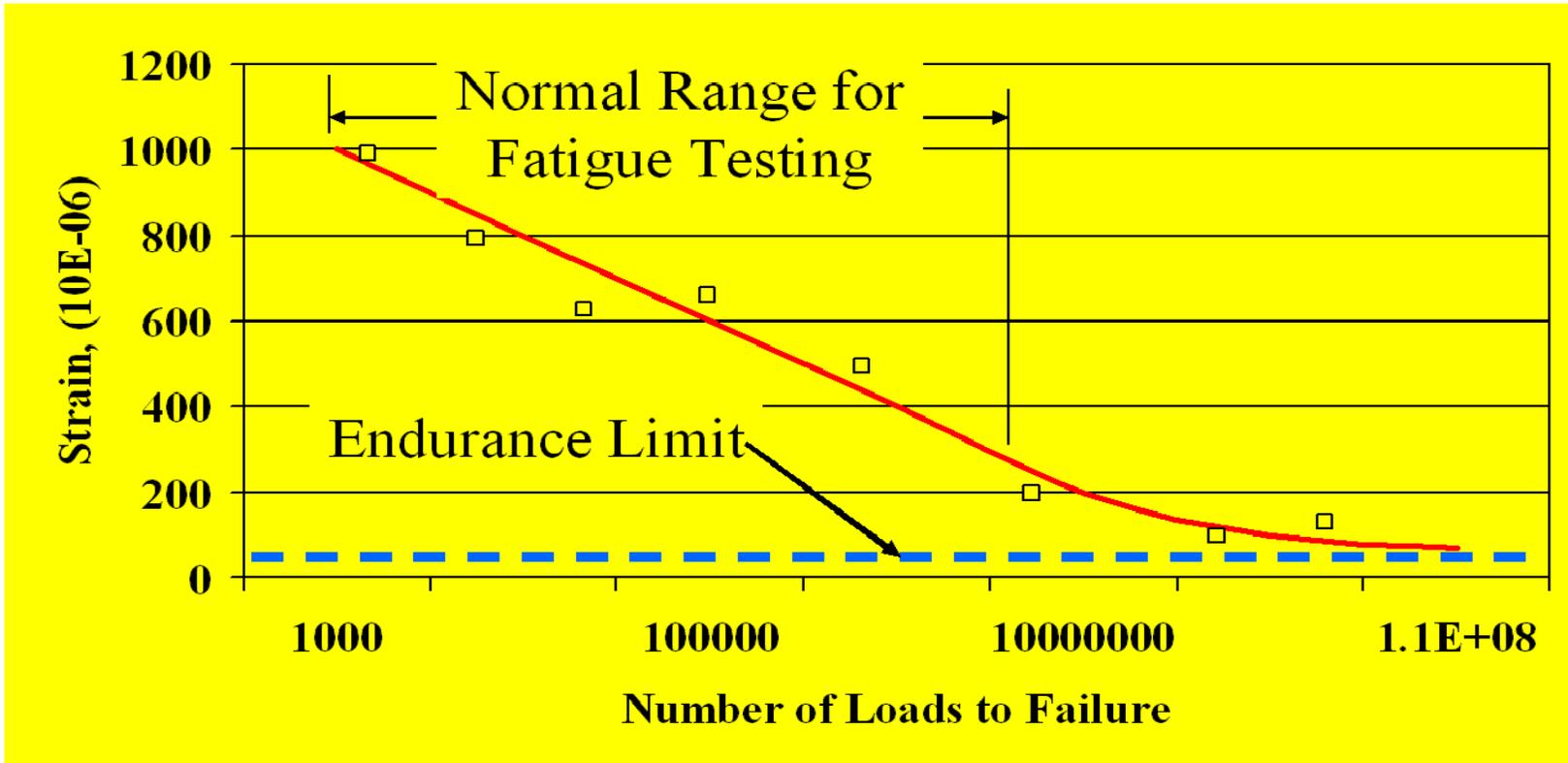
SMOOTH | DURABLE | SAFE | QUIET



PERPETUAL PAVEMENT



PERPETUAL PAVEMENT



Normal Fatigue Testing Results Versus
Endurance Limit Testing



2002

Maryland Aviation Administration Friendship Airport/Baltimore Washington International Airport, Main Runways, Taxiways, Supporting Taxiways and Ramps

In 1951, when these Perpetual Pavement runways were built, Friendship Airport had approximately 70,000 takeoffs and landings. In 2000, the airport, now renamed Baltimore Washington International Airport, recorded 317,000 takeoffs and landings. Despite the increasing demands and the much heavier planes they are required to handle, BWI's HMA runways have continued to function well.



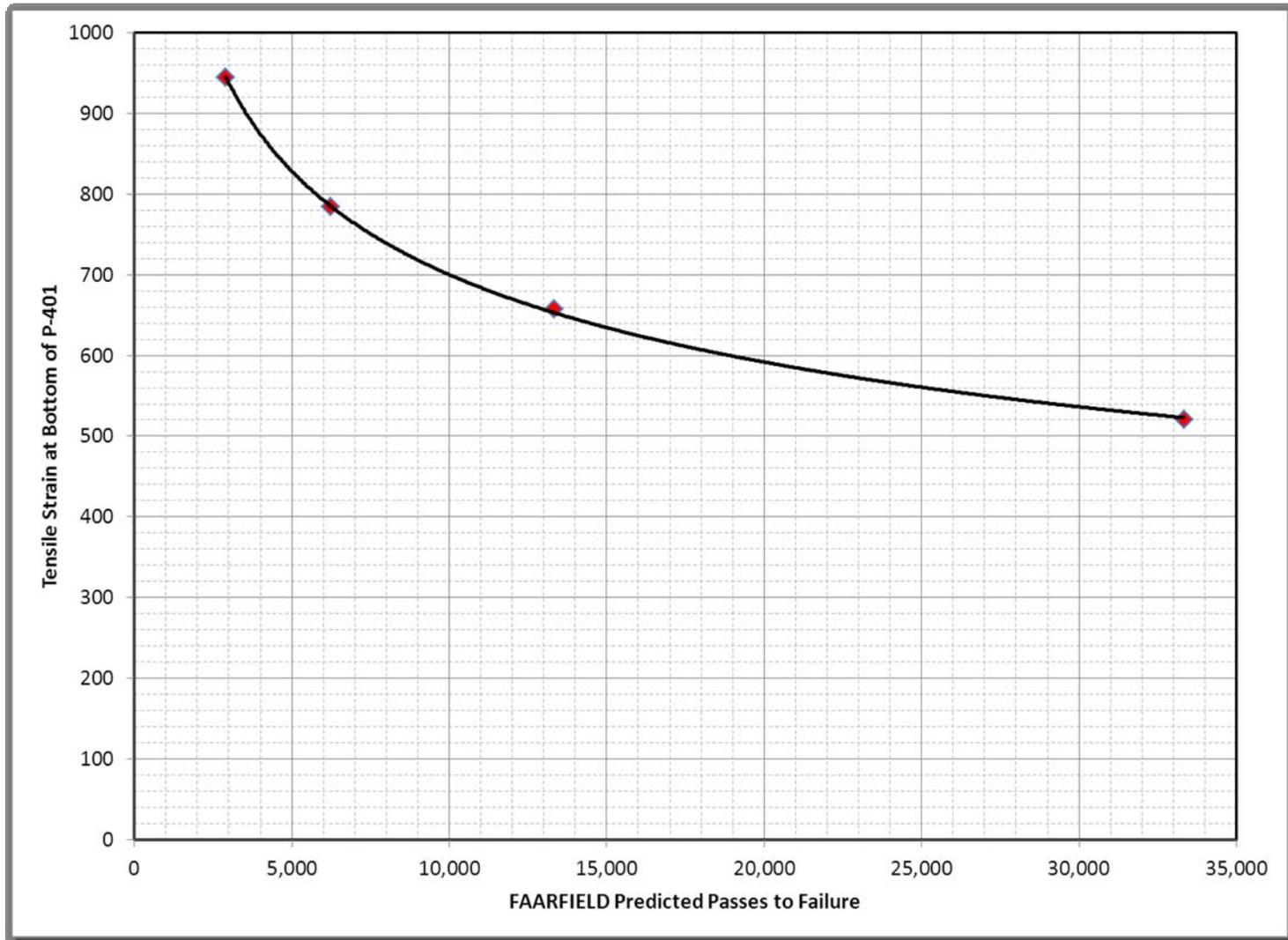
2002

United States Air Force Eareckson Air Station, Alaska, Runway 10-28

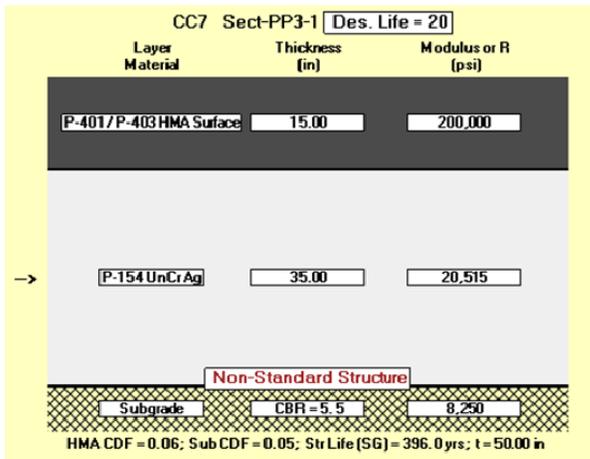
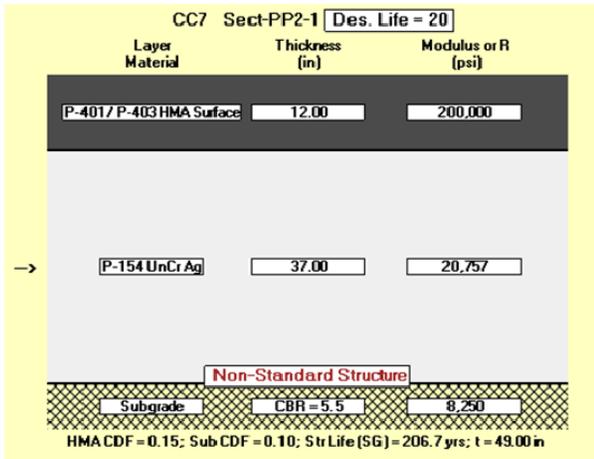
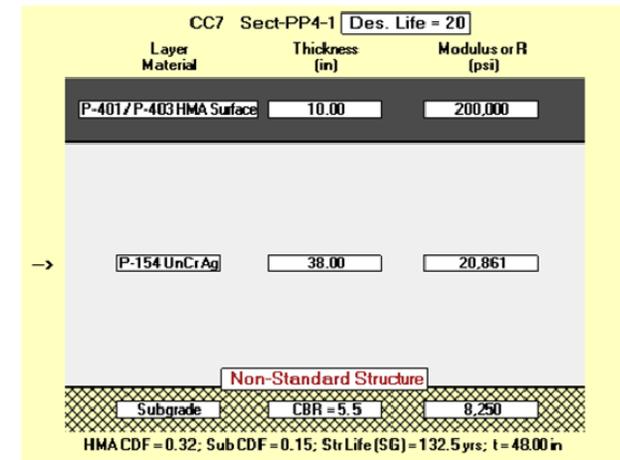
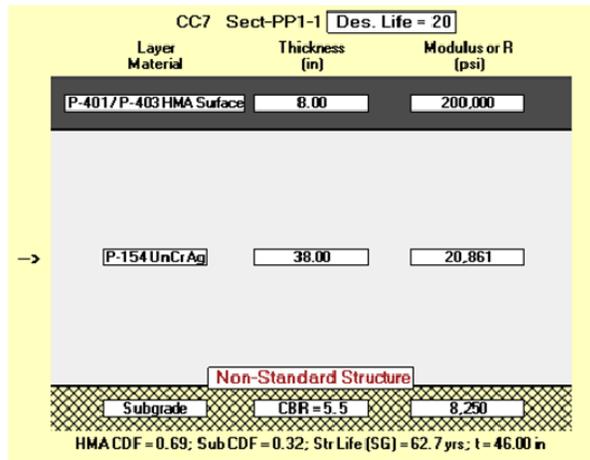
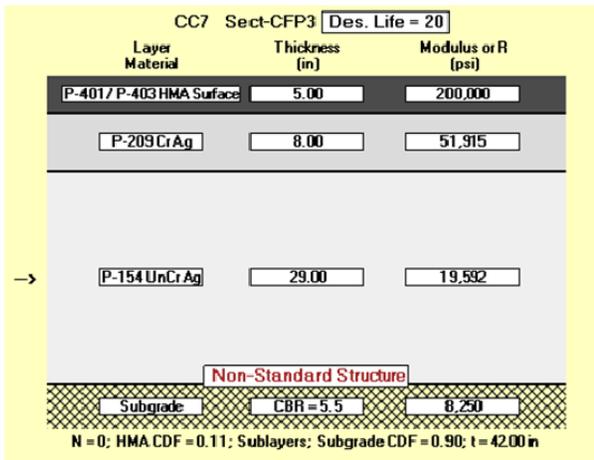
Most runway pavements constructed in Alaska have an approximate life span of 15-20 years. But Runway 10-28 at Eareckson Air Station (formerly Shemya Air Force Base) has performed exceptionally well under severe weather conditions and heavy aircraft loadings for more than 35 years with only minor repairs.

The 10,000-foot runway was constructed during World War II, and received a major rehabilitation in 1967. The Army Corps of Engineers re-established the surface grades of the pavement by removing high spots with a heater-planer and filling in low areas with one to four lifts of 2.5-inch HMA leveling courses. It then overlaid the entire runway with a 1.5-inch HMA surface course. This rehabilitation allowed the runway to support unlimited twin tandem aircraft operations (C-135 and C-141 aircraft up to 290,000 lbs.) for more than 10 years.

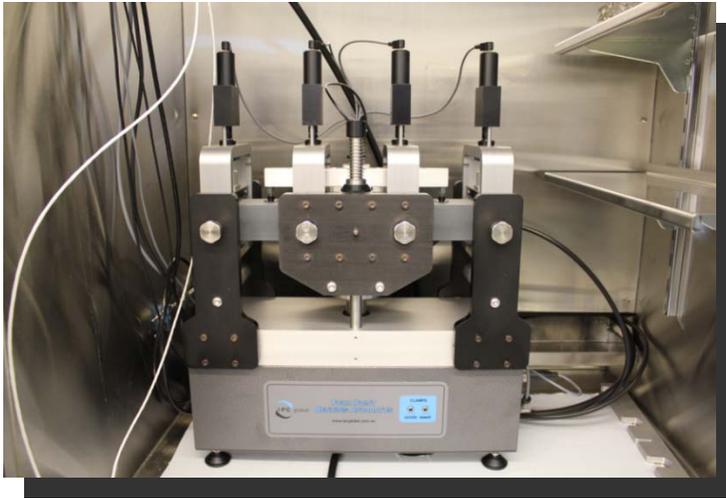
CC7 – PERPETUAL PAVEMENTS



CC7 – PERPETUAL PAVEMENTS



Material Characterization - HMA



Fatigue Test

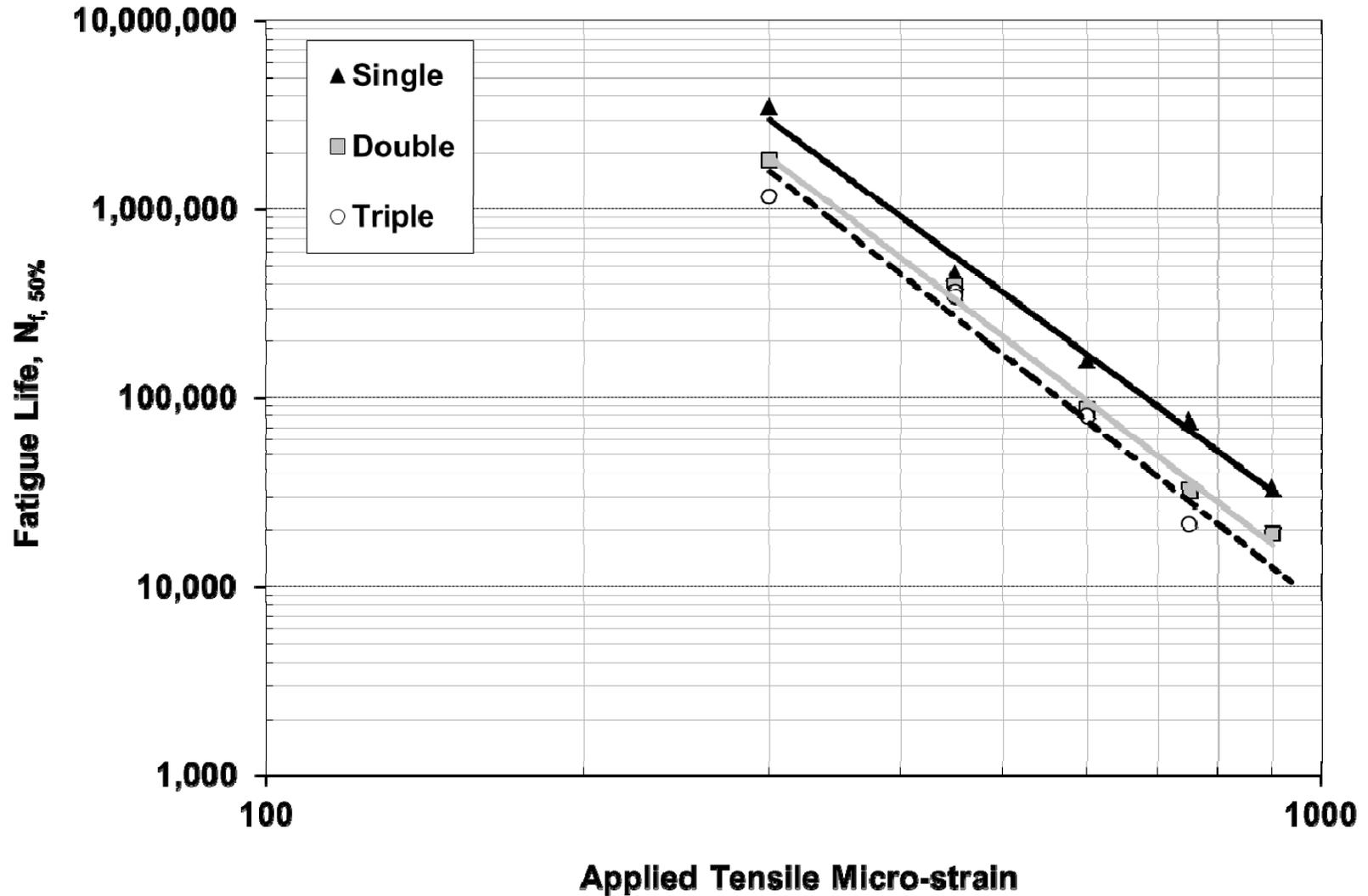


Dynamic Modulus



APA

Material Characterization - HMA



CC-7 : OVERLOAD CRITERIA FOR FLEXIBLE PAVEMENTS

- **Current ICAO standards published in Annex 14 limit overload aircraft to:**
 - ACN 10% above published PCN.
 - 5% of total operations.

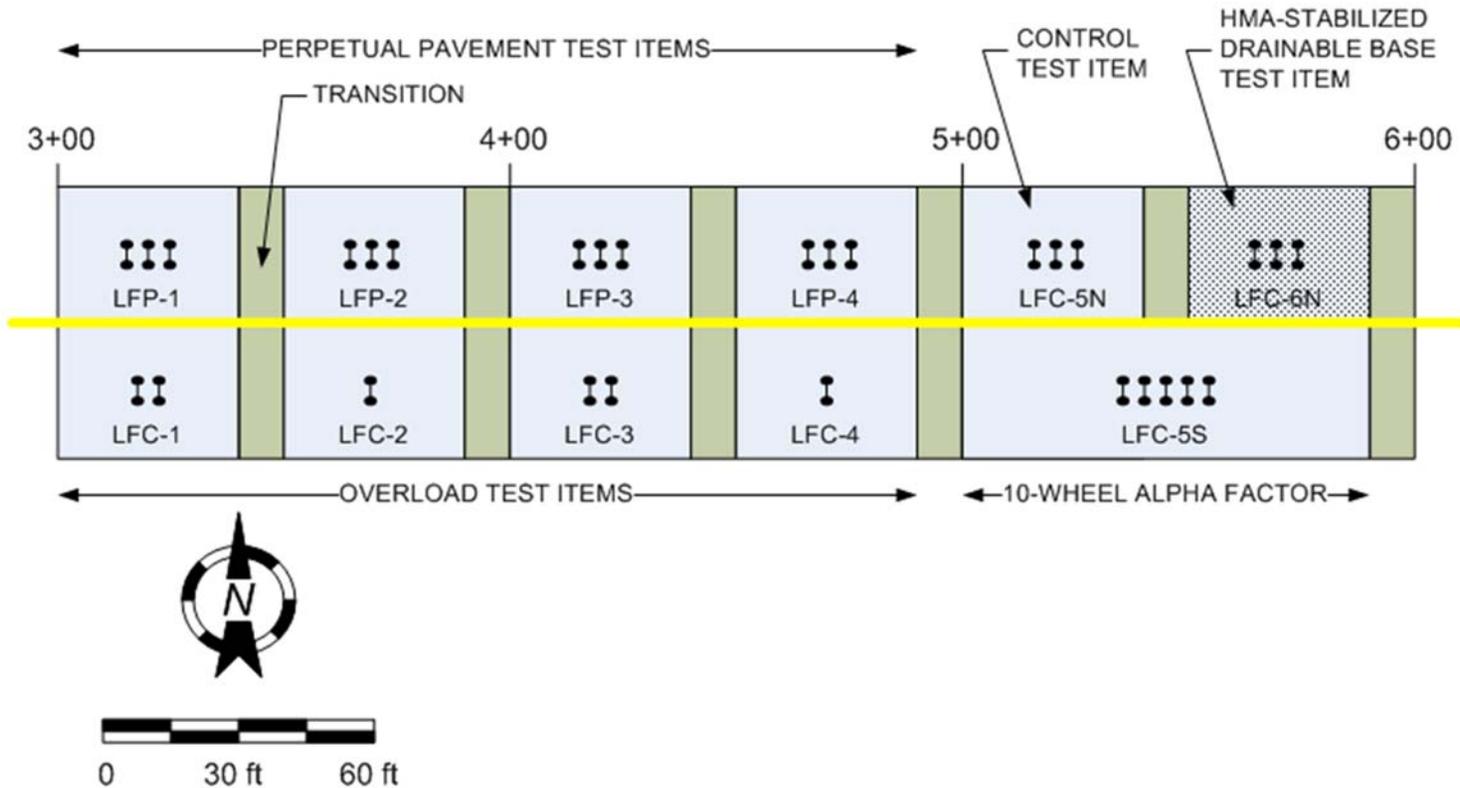


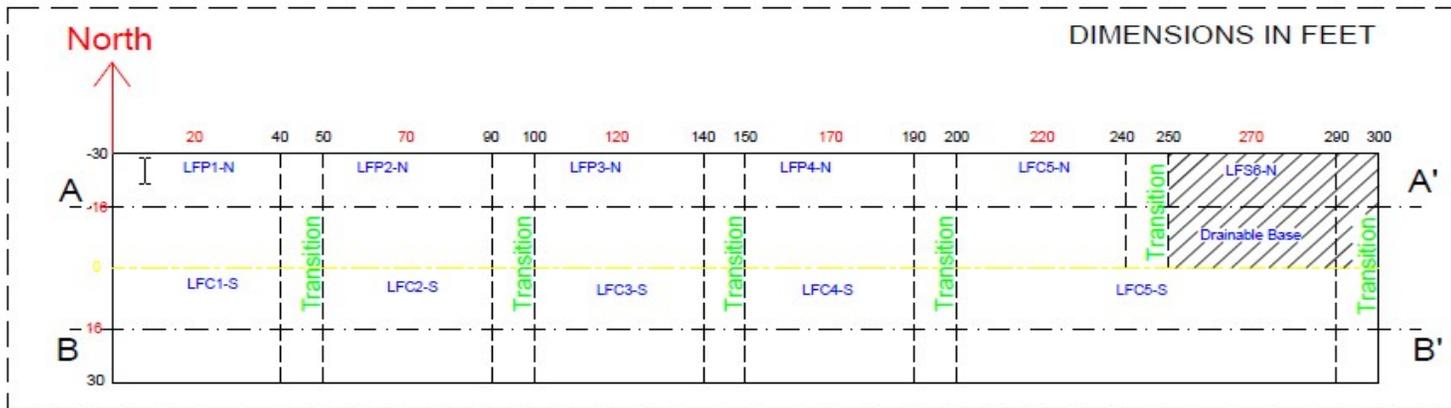
CC-7 : OVERLOAD CRITERIA FOR FLEXIBLE PAVEMENTS

- **Need to establish rational criteria governing allowable overload operations on flexible pavements.**
- **Full-scale tests will consider:**
 - Percent overload based on PCN.
 - Used pavement life expressed as cumulative damage factor (CDF).

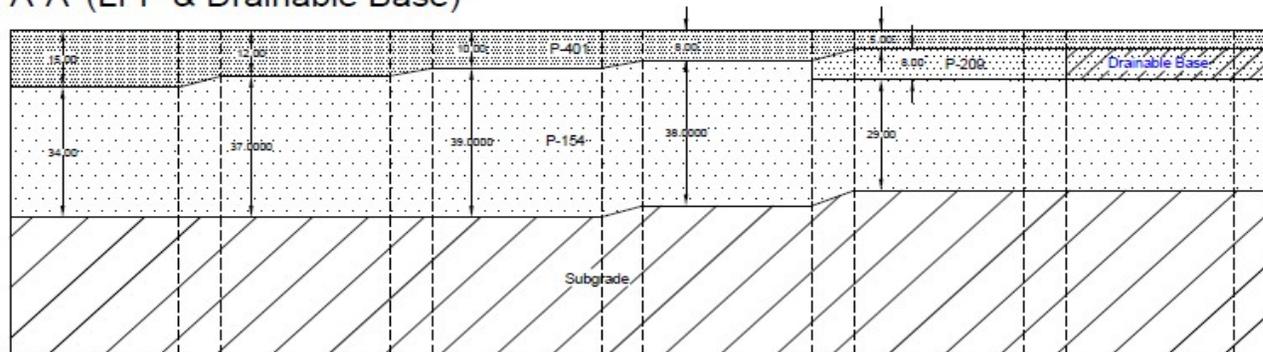


CC-7

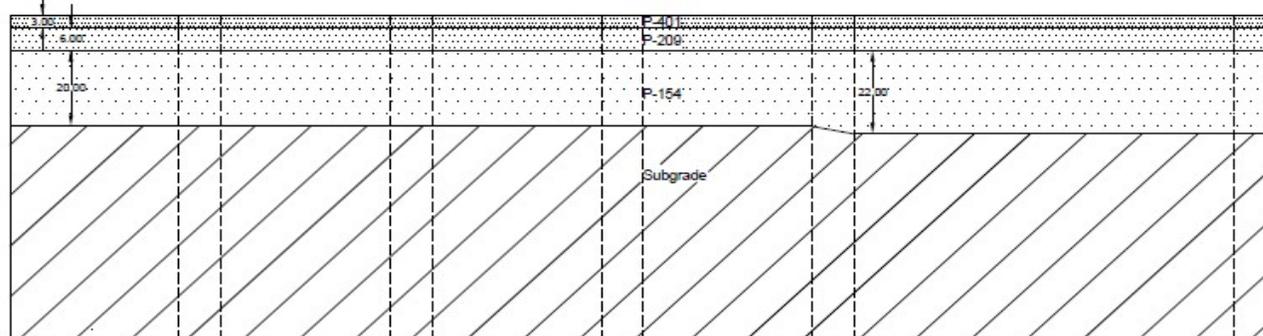




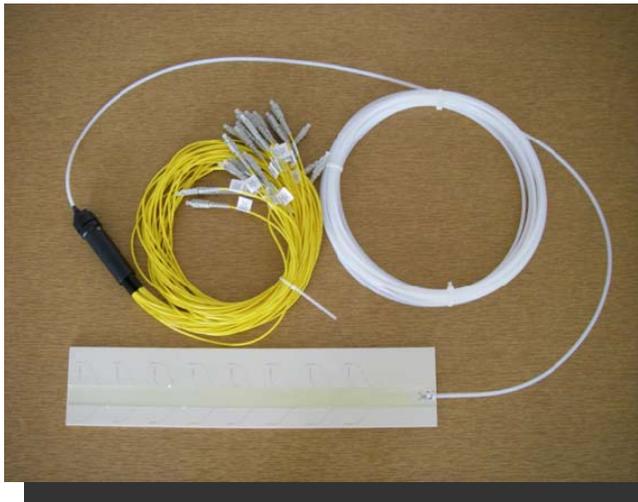
A-A' (LFP & Drainable Base)



B-B' (LFC)



Instrumentation



QUESTIONS??

