



# **25-Year Performance of SPS-2 Projects in Kansas**

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# Specific Pavement Studies (SPS)

- Deal with structural design
- SPS-2: Strategic study of structural factors for rigid pavements

# SPS -2: Experimental layout

- Primary Factors
  - Subgrade: **fine** and coarse
  - Traffic: **medium** and heavy
  - Temperature: **freeze** and non-freeze
  - Moisture: wet and **dry**
- Secondary Factors
  - PCCP drainage: yes and no
  - PCCP strength and thickness
  - Lane width
  - Base type

# Kansas SPS-2 Experiment Features

- Construction: July 1992
- PCC slab thickness: 8" or 11"
- PCC Modulus of Rupture: 550 or 900 psi
- Base: DGAB, LCB, PATB  
PCTB (KDOT control)
- Subgrade: Fly-ash modified silty clay



# Objectives

- Assess performance of Kansas SPS-2 sections
- Compare performance of SPS-2 sections with KDOT control section

# Kansas SPS-2 Test Section Details

SHRP ID (2002XX)	Base Type	Design Slab Thickness (in)	Design Concrete Strength (psi)	Lane Width (ft.)
01	6" DGAB	8	550	12
02	6" DGAB	8	900	14
03	6" DGAB	11	550	14
04	6" DGAB	11	900	12
05	6" LCB	8	550	12
06	6" LCB	8	900	14
07	6" LCB	11	550	14

# SPS-2 Test Section Details

SHRP ID (2002XX)	Base Type	Design Slab Thickness (in)	Design Concrete Strength (psi)	Lane Width (ft.)
08	6" LCB	11	900	12
09	4" PATB	8	550	12
	4" DGAB			
10	4" PATB	8	900	14
	4" DGAB			
11	4" PATB	11	550	14
	4" DGAB			
12	4" PATB	11	900	12
	4" DGAB			
Control	6" PCTB	12	600	12

# ESAL Comparison

SHRP ID (20-02XX)	Thickness (in)	Modulus of Rupture (psi)	25 Year ESALs* (millions)	ESALs from AASHTO 1993 (millions)
01	7.7	550	19	11
02	7.4	900	19	16
03	11.2	550	19	63
04	11.3	900	19	157
05	7.3	550	19	12
06	7.7	900	19	24
07	10.9	550	19	54
08	10.9	900	19	406
09	8.4	550	19	7
10	8.5	900	19	26
11	11.2	550	19	72
12	11.1	900	19	239
59 (KDOT)	11.9	600	19	83

\* WIM Data





# LTPP Monitoring

- IRI measurements every year since 1992
- Faulting since 1999
- FWD testing since 1992

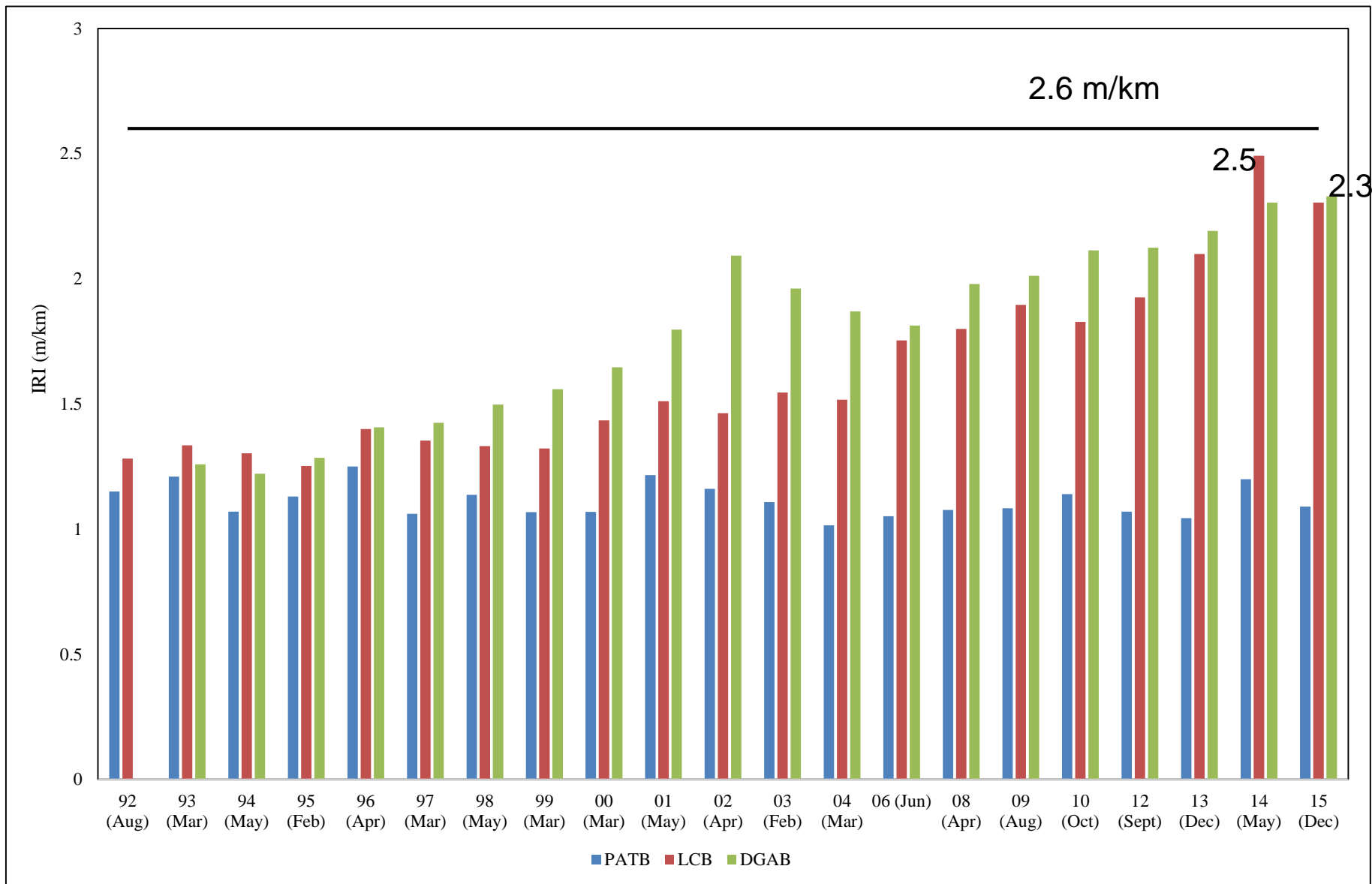


# Drainage

## Drained vs. Undrained Sections

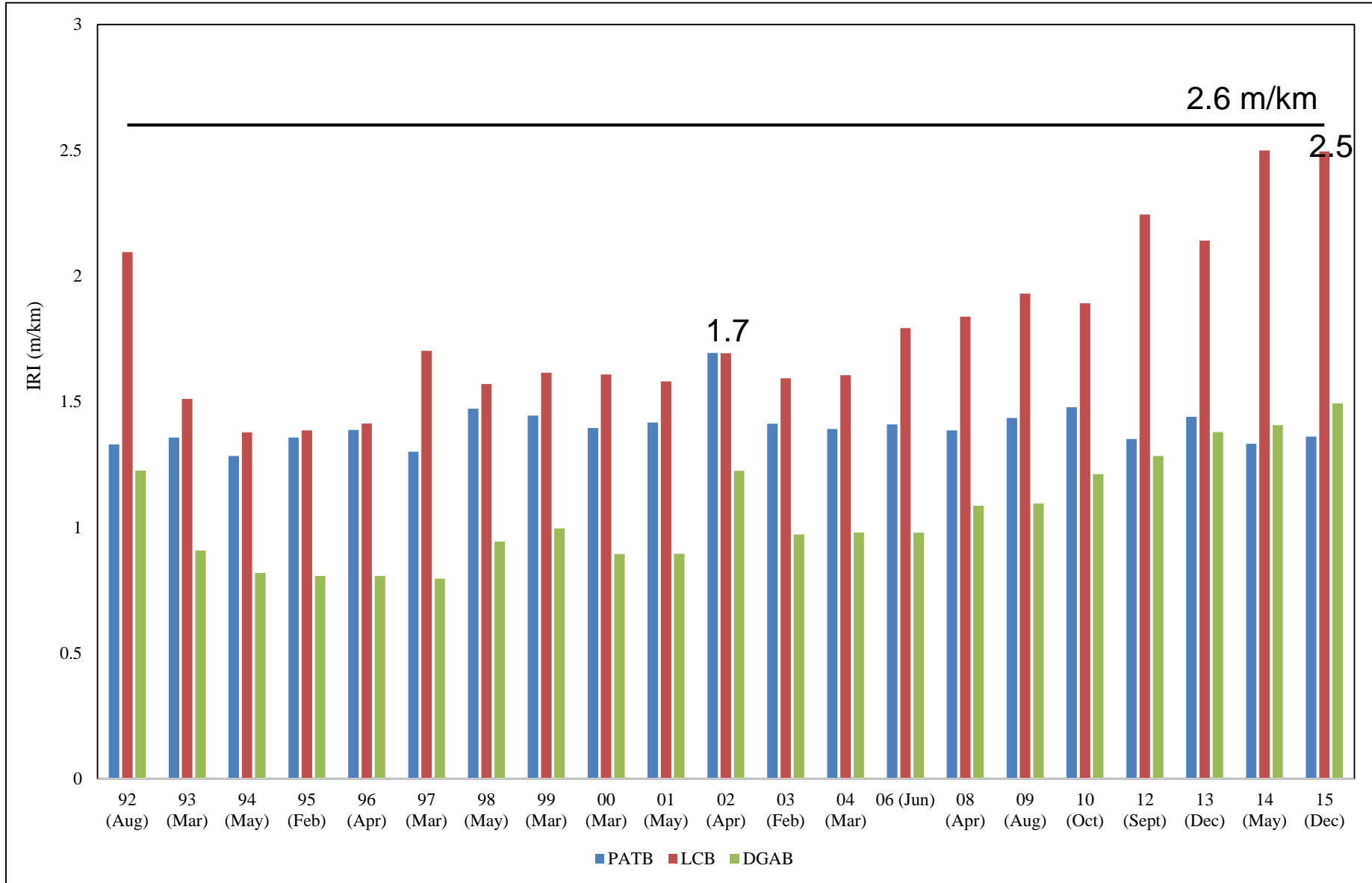
# Drained vs. Undrained Sections: IRI

8" +550 psi+12'



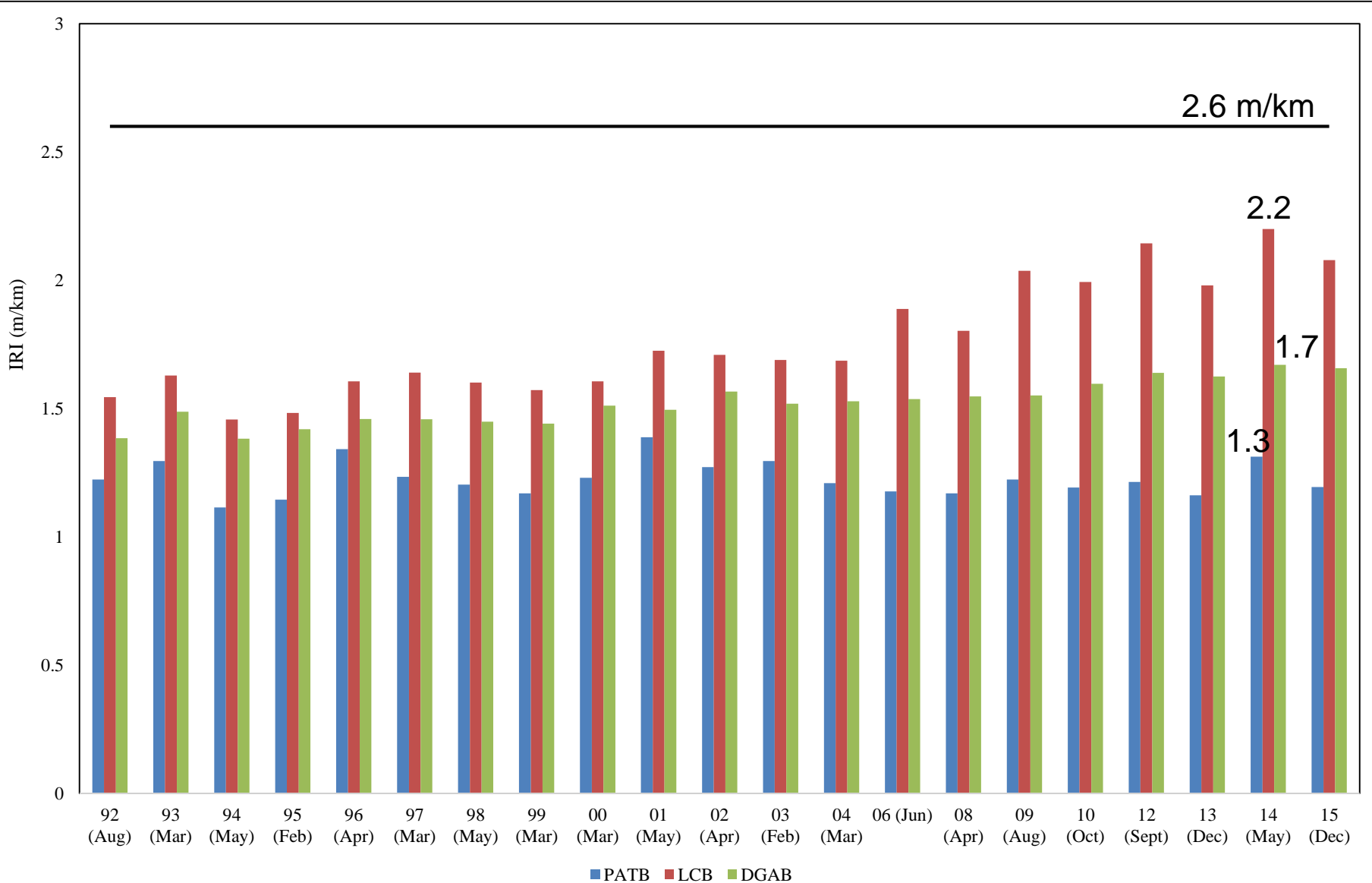
# Drained vs. Undrained Sections: IRI

8" +900 psi+14'



# Drained vs. Undrained Sections: IRI

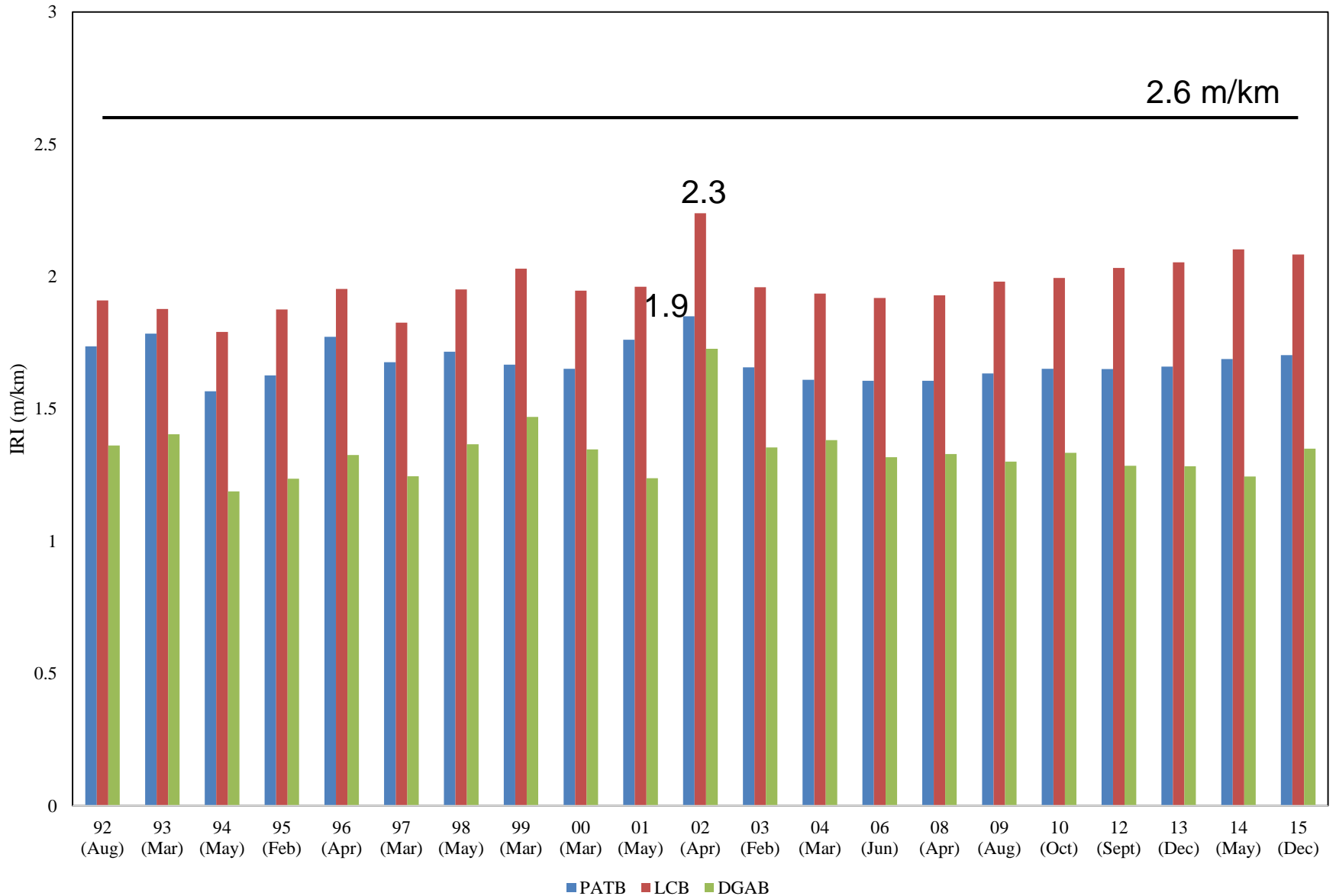
11" +550 psi+14'



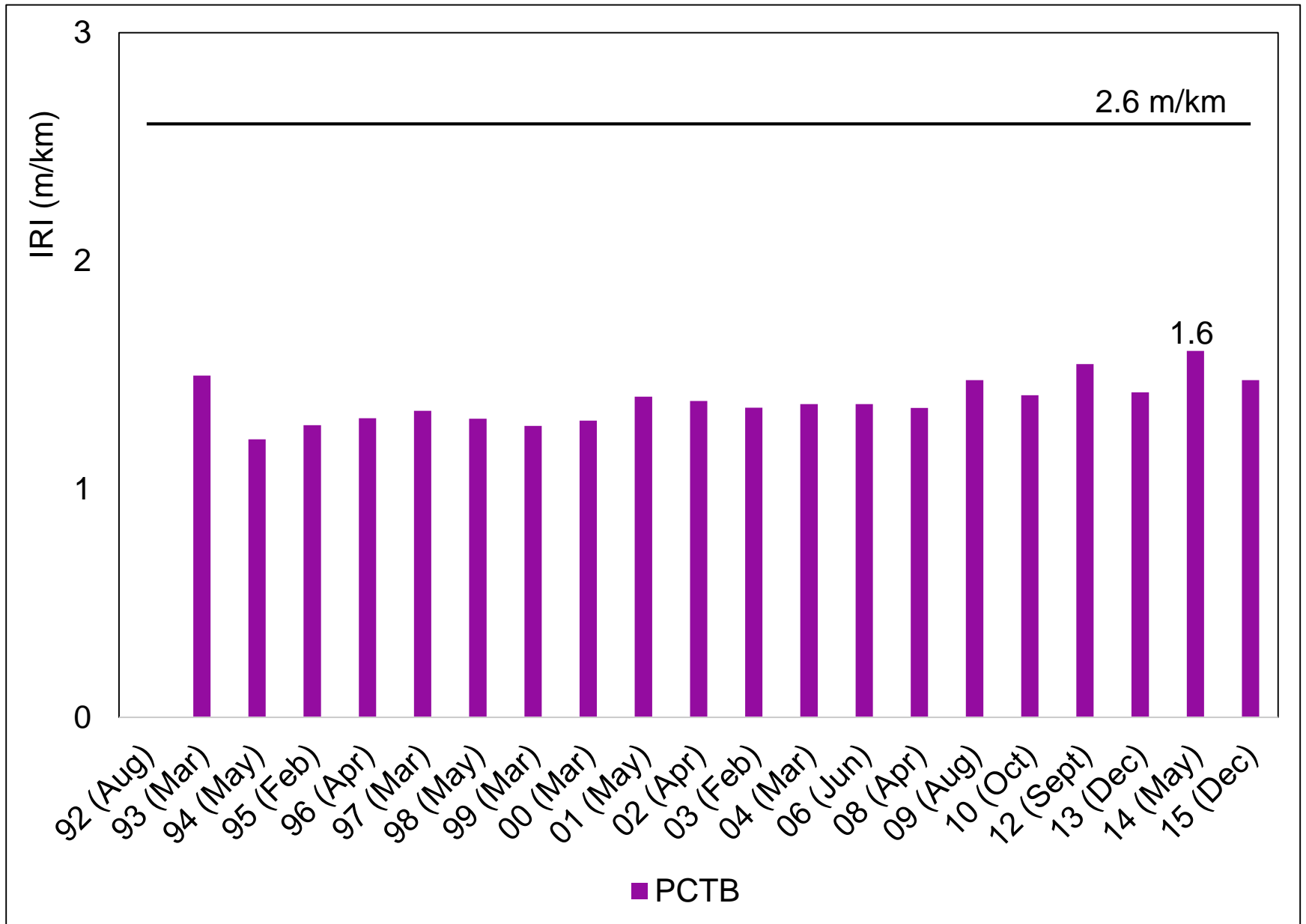
# Drained vs. Undrained Sections: IRI

11" +900 psi+12'

2.6 m/km



# KDOT Control Section: IRI

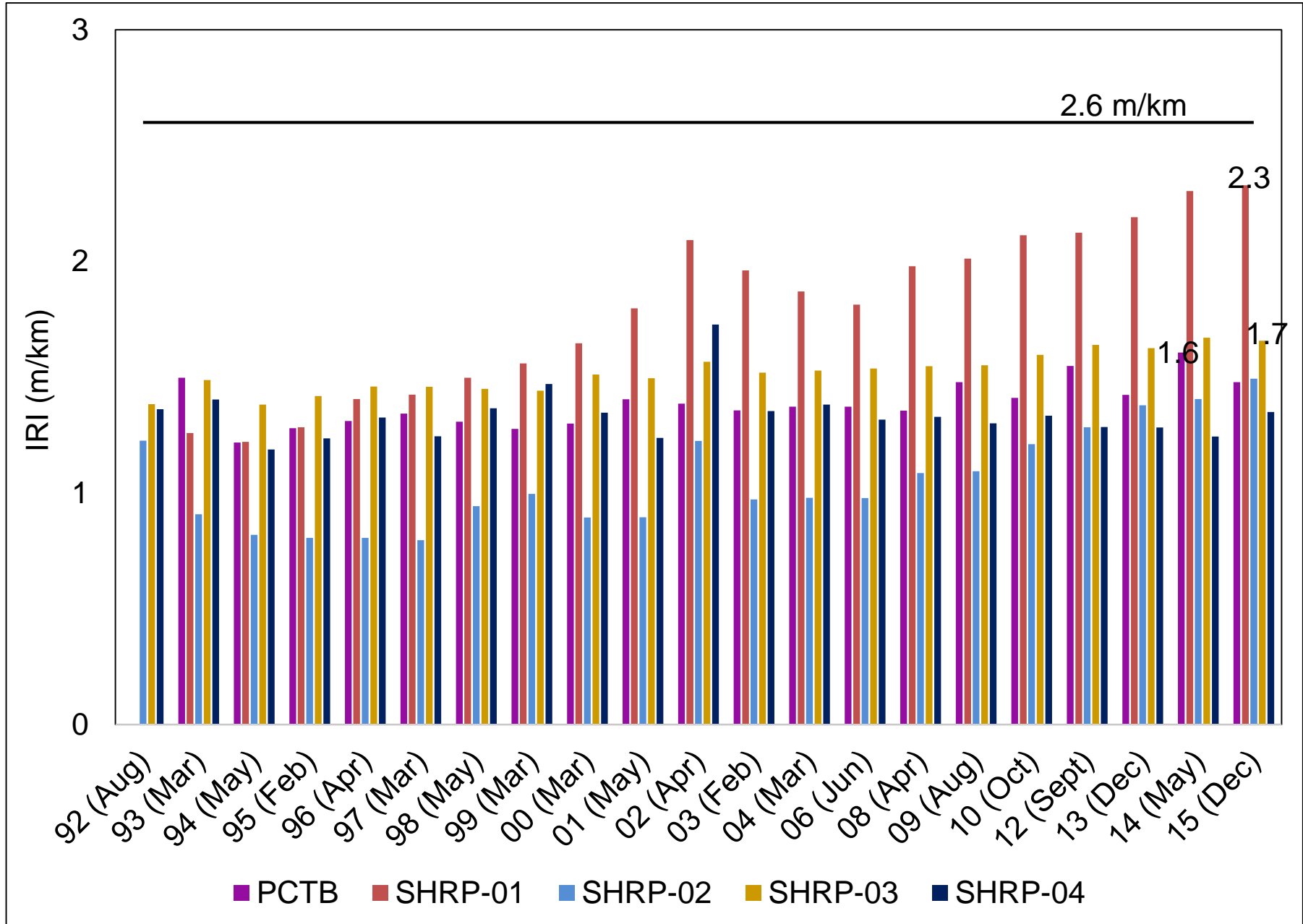


# Base Type

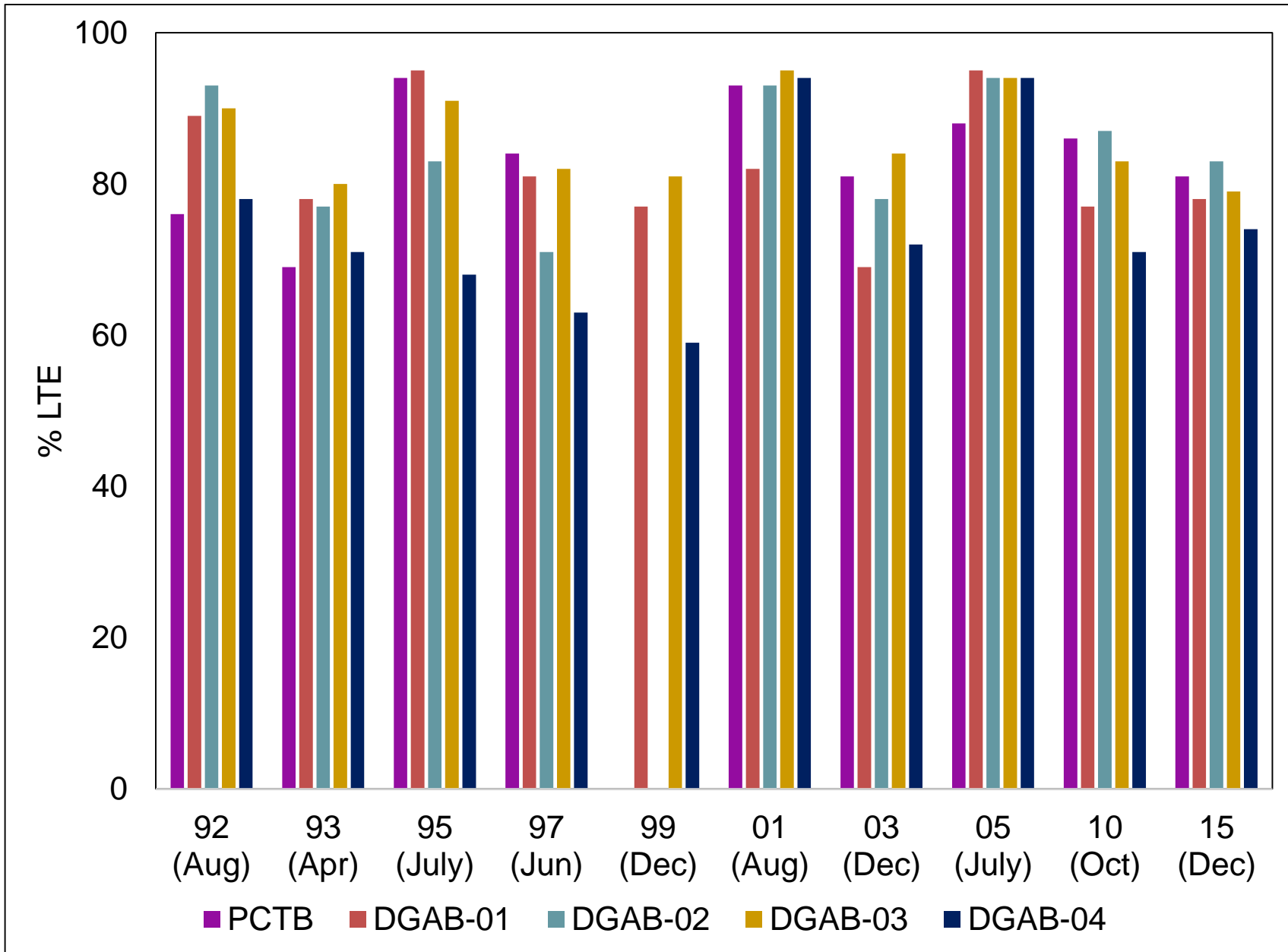
PCTB (KDOT) vs. DGAB (LTPP)



# PCTB vs. DGAB: IRI



# PCTB vs. DGAB: % LTE



# Conclusions

- Most Kansas SPS-2 sections are smooth with almost no faulting
- PATB drainable sections have performed the best
- LCB sections did not stay smooth
- DGAB sections with thin PCC slab and low PCC strength have performed the worst
- KDOT PCTB section performed very well