

**SAMPLE CALCULATIONS FOR DETERMINING PAVEMENT THICKNESS INDEX  
 CORING LAYOUT ILLUSTRATION FIGURE**

The following is an example of the steps used to determine the thickness index for a section of pavement.

**PART 1**

This example is based on ten cores and a project let in English. Cores, from a metric project, measured in millimeters, would be evaluated by the same steps and in accordance with the metric pay schedule.

**Given:** T = Design thickness of pavement = 7.0 in.  
 N = Number of Cores = 10  
 Core lengths = 7.40, 7.10, 8.10, 7.60, 7.95, 8.25, 9.70, 7.90, 8.10, 8.00

**STEP 1:**  $\bar{x}$  = mean thickness =  $\frac{\sum X}{N}$

$\sum X = 7.40 + 7.10 + 8.10 + 7.60 + 7.95 + 8.25 + 9.70 + 7.90 + 8.10 + 8.00 = 80.1$

$\bar{x} = 80.1 \div 10 = 8.01$

$\bar{x} = 8.01$

**STEP 2:**  $S = \frac{\sum (x - \bar{x})^2}{\sqrt{N-1}}$

S = standard deviation of the sample

Core #	$x - \bar{x}$	$(x - \bar{x})^2$
1	7.40 - 8.01 = -0.610	-0.610 x -0.610 = 0.372
2	7.10 - 8.01 = -0.910	-0.910 x -0.910 = 0.828
3	8.10 - 8.01 = 0.090	0.090 x 0.090 = 0.008
4	7.60 - 8.01 = -0.410	-0.410 x -0.410 = 0.168
5	7.95 - 8.01 = -0.060	-0.060 x -0.060 = 0.004
6	8.25 - 8.01 = 0.240	0.240 x 0.240 = 0.058
7	9.70 - 8.01 = 1.690	1.690 x 1.690 = 2.856
8	7.90 - 8.01 = -0.110	0.110 x -0.110 = 0.012
9	8.10 - 8.01 = 0.090	0.090 x 0.090 = 0.008
10	8.00 - 8.01 = -0.010	-0.010 x -0.010 = <u>0.000</u>
		<b>= Sum = 4.314</b>

$S = \sqrt{4.314 \div 9} = \sqrt{0.479} = 0.69$

**S = 0.69**

**STEP 3: TI = thickness index =  $(\bar{x} - S) - T$**

$$TI = (8.01 - 0.69) - 7.00$$

$$TI = 7.32 - 7.00 = 0.32$$

$$TI = 0.32$$

## **PART II**

The following illustrates the procedures to follow when a thick core would qualify, at the contractor's option, to be removed from the analysis for thickness determination. (Based on the above example.)

**Given:** T = 7.0  
N = 10 - 1 removed = 9

Contractor's Option:

$$S = 0.69 \text{ (from Part I)}$$

$$\text{Three standard deviations} = 3 \times S = 2.07$$

Core length at which contractor can choose to remove the core from the TI (up to 10% of the total number of cores)

$$T + 3S = 7.0 + 2.07 = 9.07$$

The core that is 9.70 thick would qualify for removal.

**STEP 1:**  $\bar{x} = \frac{\sum X}{N}$

$$\begin{aligned} \sum X &= 7.40 + 7.10 + 8.10 + 7.60 + 7.95 + 8.25 + 7.90 + 8.10 + 8.00 = 70.4 \\ &= 70.4 \div 9 = 7.82 \end{aligned} \qquad = 7.82$$

**STEP 2:**  $S = \frac{\sum (x - \bar{x})^2}{\sqrt{N-1}}$

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Core #	$x - \bar{x}$	$(x - \bar{x})^2$
1	$7.40 - 7.82 = -0.420$	$-0.420 \times -0.420 = 0.176$
2	$7.10 - 7.82 = -0.720$	$-0.720 \times -0.720 = 0.518$
3	$8.10 - 7.82 = 0.280$	$0.280 \times 0.280 = 0.078$
4	$7.60 - 7.82 = -0.220$	$-0.220 \times -0.220 = 0.048$
5	$7.95 - 7.82 = 0.130$	$0.130 \times 0.130 = 0.017$
6	$8.25 - 7.82 = 0.430$	$0.430 \times 0.430 = 0.185$
7	$9.70 - 8.01 = 1.690$	$1.690 \times 1.690 = 2.856$
8	$7.90 - 7.82 = 0.080$	$0.080 \times 0.080 = 0.006$
9	$8.10 - 7.82 = 0.280$	$0.280 \times 0.280 = 0.078$
10	$8.00 - 7.82 = 0.180$	$0.180 \times 0.180 = \underline{0.032}$
		<b>= Sum = 1.138</b>

$$S = \sqrt{1.138 \div 8} = \sqrt{0.142} = 0.38$$

$$\mathbf{S = 0.38}$$

$$\mathbf{STEP 3: TI = (\bar{x} - S) - T}$$

$$TI - (7.82 - 0.38) - 7.00$$

$$\mathbf{TI = 0.44}$$

$$TI - 7.44 - 7.00 = 0.44$$

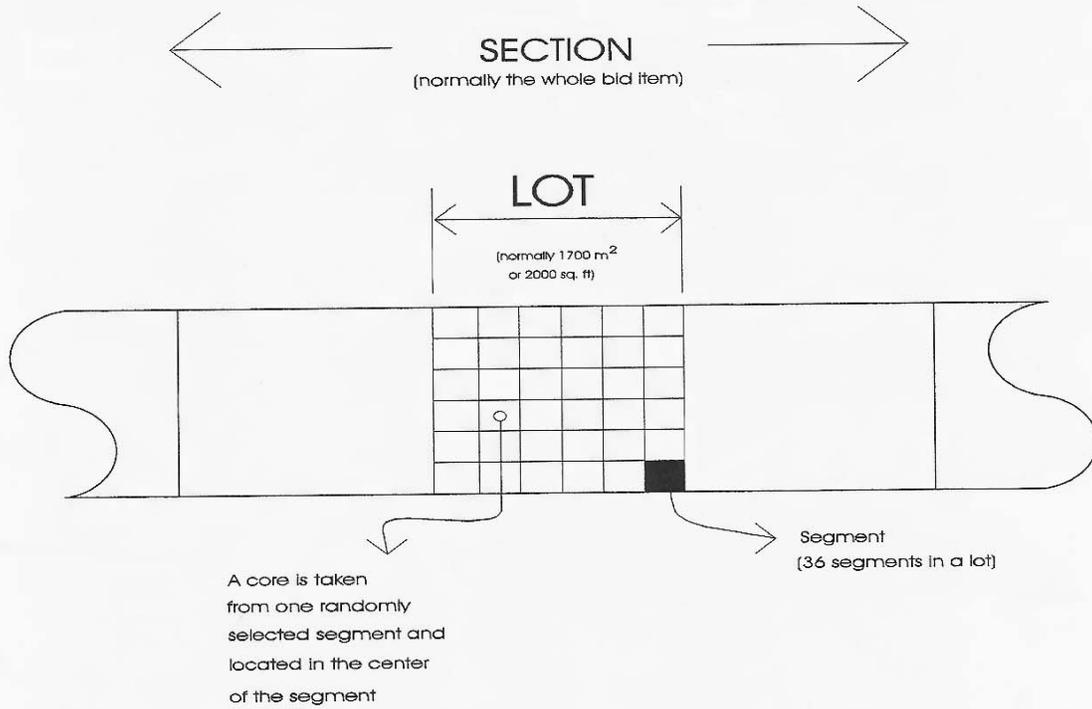


Figure 1