Random Sampling technique

Section 6 of ERLPM
Random sampling rules

• Philosophy for random sampling
• Material selection
• Size of production
• Partial production
• Sampling methods for plant produced material
• Sampling practice for field placed material
• Sampling joints

Considerations for Random sampling

• Same Materials

• Same Process

• Same Opportunity to be Selected
Two processes for selecting as testing materials

• Testing material as produced by the plant: there are two methods:
  
a) Selecting by time  
b) Selecting by weight  

• Testing material compacted in the field

Size/quantity of material to be tested

• Plant produced material:
  
a) One Day’s production ≤ 2000 Tons  
b) Half Day’s production when Day Production is  
   2000 < Day > 4000 Tons

• Field Compacted material: the size generated by the plant produced material
Sampling the lot

- Divide Lot into 4 Equal sublots except for Test Strip where the lot is divided by 3

- Take sample from each subplot

What happen is production has to stop? – Partial lots

- 3-4 samples were taken, sublots constitute a Lot

- 1-2 sublots add to next day

- Next day production would have 3-6 sublots
Sampling plant produced material

• **Sample by Time**

• **Sample by weight (Tonnage)**

Sampling by time - example

• *Production Duration 10 HRS*
• *Sublots: 10/4 = 2 ½ Hrs = 150 minutes*
• *Assuming trucks will leave every 10 Min.*
• *Increment 150 /10 = 15 trucks*
• *Form 15 numbered pieces and put them in a bowl*
• *Draw one per Sublot*
• *Sample the truck at time selected*
Sampling by weight - Example

- Lot size 2000 Tons
- Assuming load on Trucks = 20 Tons
- Sublots size 2000/4 = 500 Tons
- Increment 500/20 = 25 trucks per sublot
- Form 25 numbered pieces and put them in a bowl
- Select one for each sublot
- Sample the selected truck

Sampling field compacted material

- Lot side equal to Plant Produced Material, however the Plant Produced Material may have 3-6 sublots
- Divide the lot into 4 sublots (regardless of the Plant Produced Material sublots)
- Use Random Sampling Table 1 on Pages 40/41 of ERLPM
- Form 28 Numbered Pieces
- Randomly select a number per lot
Using random tables

- **Column A** is the Sublot number

- **Column B** is the longitudinal factor used to identify location along the length of sublot

- **Column C** is the lateral factor used to identify location from referenced side of sublot

- If the same number is drawn, use the following set of 4
Example of determination of cores locations

- From bowl with 28 numbered pieces, number 12 is drawn
- From Column “A” Select Lines 01, 02, 03 and 04
- From column B: .320, .489, .542, .153
- From Column C: .212, .827, .352, .163
Pavement geometry

- Pavement Width - 12-1/2 Feet
- Select Reference Side (left)
- Divide lot length
  - 1600/4 = 400 Feet
- Samples to be taken no Closer Than 1 Foot from a Joint

Location of cores - sublot

Sublot 1
Length 400 x 0.320 = 128'
Width 12.5 x 0.212 = 3'

Sublot 2
Length 400 x 0.489 = 196'
Width 12.5 x 0.827 = 10'

Sublot 3
Length 400 x 0.542 = 217'
Width 12.5 x 0.352 = 4'

Sublot 4
Length 400 x 0.153 = 61'
Width 12.5 x 0.163 = 2'
Location of cores for joint testing

- Could be within same lot or abutting lots
- When within two different lots use the lowest specific gravity
- Divide length into 4 equal sublots
- Directly on the joint (error in P-4C3)
- Minimum diameter 5”
- Penalty on joint density
Joint testing example

Location of cores for joint testing

- From the bowl with 28 numbered pieces we drawn number 16
- B values for column 16
  - 0.331, 0.739, 0.548, 0.516
- Sublot 1; 350 × 0.331 = 115.85 = 116’
- Sublot 2; 350 × 0.739 + 350 = 608.65 = 609
- Sublot 3; 350 × 0.548 = 191.8 = 192’
- Sublot 3; 350 × 0.516 + 350 = 530.6 = 531’
Joint testing

1000 feet

116 feet

300 feet

300 feet

1000 feet

Joint testing

1000 feet

609 feet

300 feet

300 feet

1000 feet
Joint testing

1000 feet

300 feet

300 feet

192 feet

1000 feet

Joint testing

1000 feet

300 feet

300 feet

531 feet

1000 feet
Joint testing – second lane

- Total Joint length
- $600 + 300 = 900$ feet
- $900/4 = 225$ feet
- Number 20 is selected
- Sublot 01 -.415
- Sublot 2 -.958
- Sublot 3 -.150
- Sublot 4 -.154
• Distances along the joint

• Sublot 1 225x .415 = 93.38 = 93
• Sublot 2 225x .958 = 215.55 = 216
• Sublot 3 225x .150 = 33.75 = 34
• Sublot 4 225x 34.65 = 35

Joint testing – second lane

93 feet
300 feet
300 feet
1000 feet
300 feet
Joint testing – second lane

Joint testing – second lane
### Joint testing – second lane

![Diagram of joint testing - second lane](image)

#### IN-PLACE DENSITY ACCEPTANCE CALCULATION

<table>
<thead>
<tr>
<th>LOCATION OF MAT CORES</th>
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<tr>
<td>SUBLOT NO.</td>
<td>PAVEMENT STATION</td>
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</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
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<td>4</td>
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<table>
<thead>
<tr>
<th>LOCATION OF JOINT CORES</th>
<th></th>
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</thead>
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<td>SUBLOT</td>
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CALCULATED BY: 
DATE: 
AFFILIATION: