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 happens if 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 - subplot

<table>
<thead>
<tr>
<th>Sublot 1</th>
<th>Length $400 \times 0.320 = 128'$</th>
<th>Width $12.5 \times 0.212 = 3'$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sublot 2</td>
<td>Length $400 \times 0.489 = 196'$</td>
<td>Width $12.5 \times 0.827 = 10'$</td>
</tr>
<tr>
<td>Sublot 3</td>
<td>Length $400 \times 0.542 = 217'$</td>
<td>Width $12.5 \times 0.352 = 4'$</td>
</tr>
<tr>
<td>Sublot 4</td>
<td>Length $400 \times 0.153 = 61'$</td>
<td>Width $12.5 \times 0.163 = 2'$</td>
</tr>
</tbody>
</table>
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 drew number 16
- B values for column 16
  - .331, .739, 548, .516
  - Sublot 1; $350 \times 0.331 = 115.85 = 116'$
  - Sublot 2; $350 \times 0.739 + 350 = 608.65 = 609$
  - Sublot 3; $350 \times 0.548 = 191.8 = 192'$
  - Sublot 3; $350 \times 0.516 + 350 = 530.6 = 531'$
Joint testing

1000 feet

116 feet

300 feet

300 feet

Joint testing

1000 feet

609 feet

300 feet

300 feet

1000 feet
Joint testing

1000 feet

300 feet 192 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 1 225 x 0.415 = 93.38 = 93
• Sublot 2 225 x 0.958 = 215.55 = 216
• Sublot 3 225 x 0.150 = 33.75 = 34
• Sublot 4 225 x 34.65 = 35

Joint testing – second lane
Joint testing – second lane

Overview of Regional Airport System & pavement issues
October 27, 2009

Federal Aviation Administration

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Joint testing – second lane

Overview of Regional Airport System & pavement issues
October 27, 2009

Federal Aviation Administration

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Joint testing – second lane

IN-PLACE DENSITY ACCEPTANCE CALCULATION

LOCATION OF MAT CORES

<table>
<thead>
<tr>
<th>SLOT NO.</th>
<th>PAVEMENT STATION</th>
<th>OFFSET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOCATION OF JOINT CORES

<table>
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<th>PAVEMENT STATION</th>
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<tbody>
<tr>
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CALCULATED BY
AFFILIATION

DATE