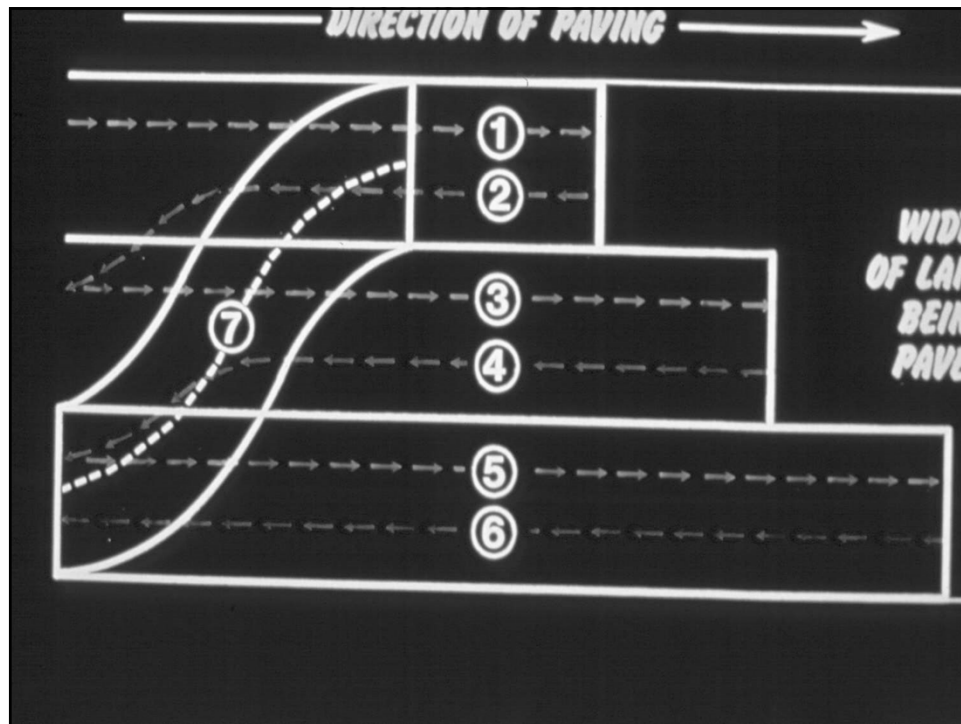


Field Determination of Target Density for Plant Produced Asphalt Mix by Use of the Control Strip Technique

SCDOT Standard Method SC-T-65 (5/10)
SCDOT Form No. 400.02



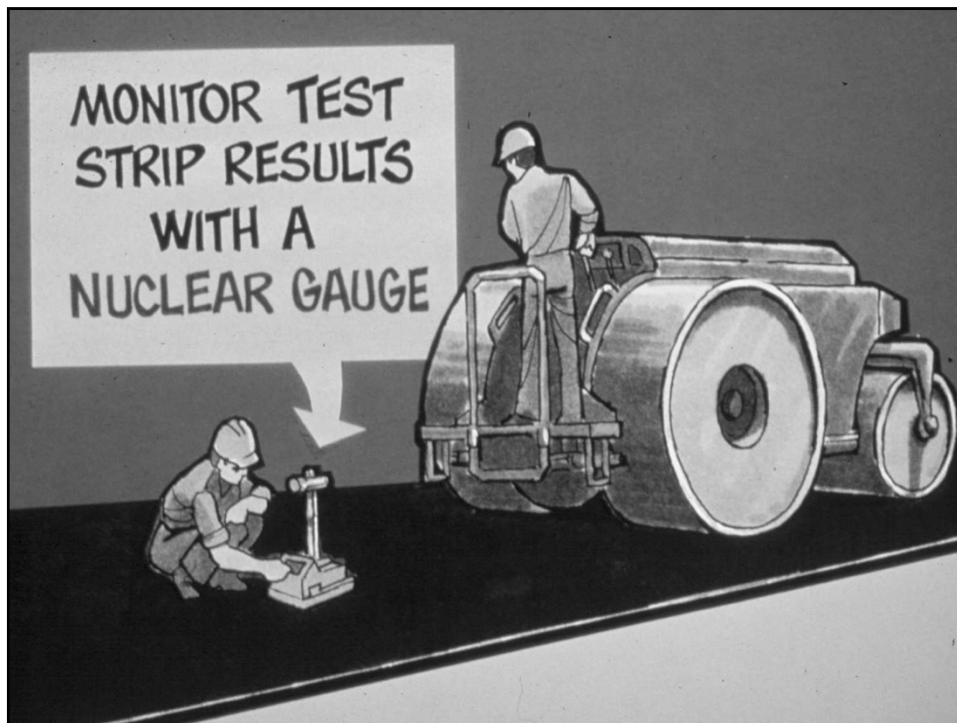


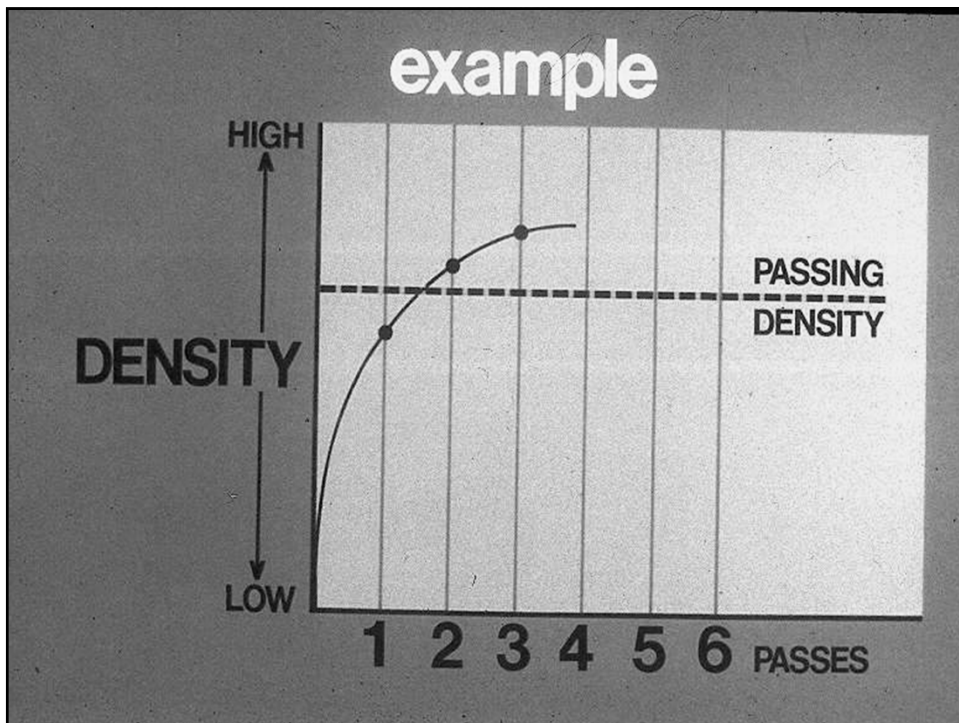
Control Strip and Target Density

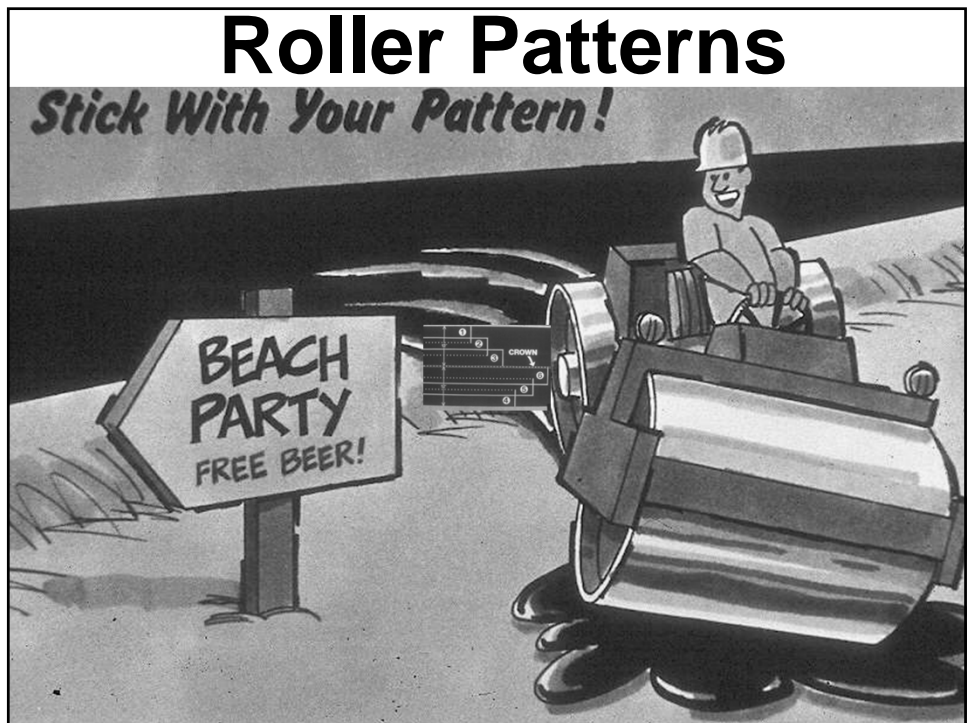
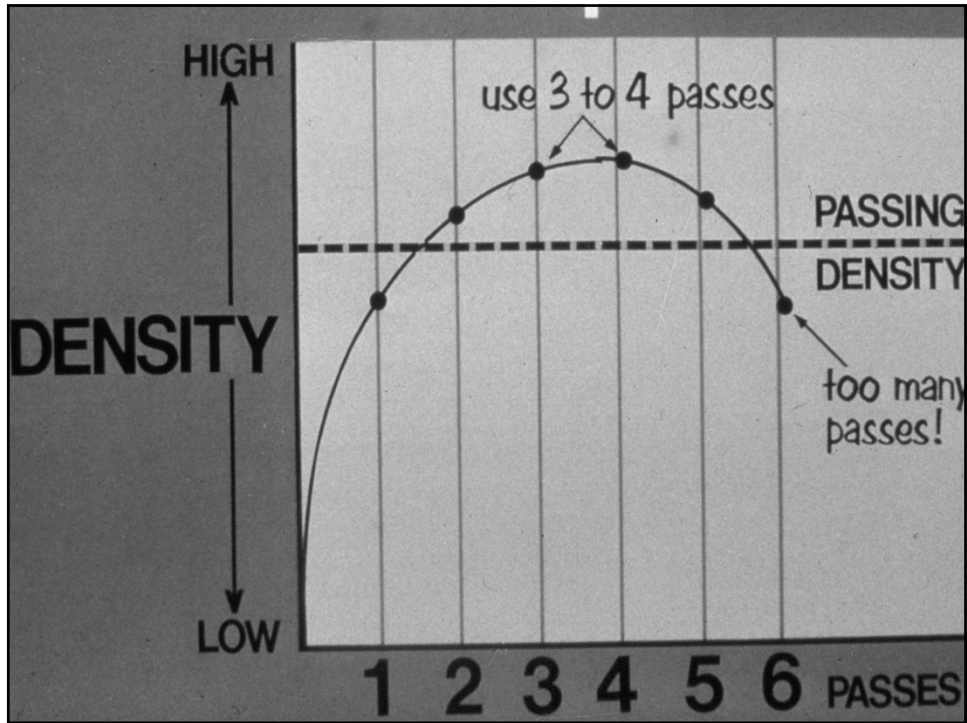
- What is a control strip?
 - Also, known as “roller pattern”
 - Performed at beginning of HMA project
 - Minimum of 900 feet long; one paving width wide
 - Experiment to determine optimum roller pattern for all phases of compaction
 - Also, determine “target density”

Control Strip and Target Density Problem Session

- What is “target density”
 - Highest density achievable on the project
 - Changes from one project to the next
 - Effected by:
 - Subgrade / base support
 - HMA thickness
 - Rollers and paving equipment
 - Example: 141.2 lbs./cu. ft.
 - Used for acceptance on some projects (base and thin-lift surface mixes)
 - Used for monitoring purposes on other projects (most surface and all intermediate mixes)







Control Strip and Target Density

- Control strips are necessary to:
 - Determine an optimum roller pattern
 - How many passes with each roller?
 - Varies based on many factors
 - Ensure proper target density
 - Vital to achieving contract density requirements

Control Strip Equipment

- Rollers - Contractor may select equipment for rolling the HMA, so long as:
 - Proper density is achieved
 - Smooth riding pavement is obtained
- Nuclear gauge
 - Capable of measuring the density of HMA
 - Operated by a trained and certified operator
 - Use zero offset on gauge
 - If an electronic impedance type gauge is used, ensure that it is approved by the Asphalt Materials Engineer (AME).

Control Strip Construction and Procedures

- Divide minimum 900 ft. control strip into three sections; approximately 300 ft. in length
- First 300 ft. section is to allow the asphalt plant to “level out” at the beginning of production (use 3-3-3 in this area)
- Second 300 ft. section is divided up into three sections of minimum 100 ft. each for each phase of rolling (more on this next page)
- Final 300 ft. section is for obtaining 12 random samples for calculation of target density

Control Strip Construction and Procedures

- First 100 ft. section (300-400'), number of breakdown roller passes will be determined
 - A-3-3
- Second 100 ft. section (400-500'), number of intermediate roller passes will be determined
 - A-B-3
- Third 100 ft. section (500-600'), number of finish roller passes will be determined
 - A-B-C

Control Strip Construction and Procedures

- Use SCDOT Form 400.02 to record test information
- Record gauge and temp. readings in three locations in middle of each of the 100 ft. sections after each pass of roller at least 3 ft. from edge of pavement
- Gauge readings at least 10 ft. apart
- Average three gauge readings and record

Control Strip Construction and Procedures

- Continue rolling until max. attainable density is achieved determined by successive readings showing an average decrease in density or a maximum of four passes in each phase
 - Max passes does not apply to pneumatic rubber tire rollers
- If more than four passes needed (other than for rubber tire rollers), contact AME immediately for investigation

Control Strip Construction and Procedures

- If more than three rollers are used, use 100 ft. additional in the 300 ft. section
- If less than three rollers are used, use 100 ft. less in the 300 ft. section
- Contractor has the authority to vary the roller pattern as the paving operation progresses in order to achieve density requirements.
 - If roller pattern varies more than two passes per phase from the original roller pattern, the contractor must establish a new roller pattern.

Control Strip Construction and Procedures

- Perform for all phases of rolling
 - Breakdown
 - Intermediate
 - Finish
- Minimum of two passes in each phase
- Intermediate rolling completed by 175° F
- Finish rolling – remove roller marks and limit passes to avoid breaking the mixture

Control Strip Construction and Procedures

- Indicate number of passes for each phase on the form
- If the Quality control Manager feels that additional rollers are needed to achieve optimum density, repeat the procedure using the additional rollers or passes

Target Density

- In final 300 ft. section, after rolling pattern has been set:
 - Take 12 random nuclear gauge tests
 - Discard highest and lowest readings
 - Average the 10 remaining tests
 - Use this number as the target density for the paving operations

Control Strip and Target Density

Let's Work a Problem!