

Module 4-6

Accelerated Rigid Paving Techniques

Objectives

- Identify conditions for use
- Select appropriate materials
- Discuss special construction procedures
- Describe field testing procedures for monitoring concrete strength
- Determine criteria for opening to traffic

Accelerated Rigid Paving Techniques

Fast track paving

Addresses major limitation of concrete rehabilitation

Not all projects are suitable candidates

Reduces

- Time of lane closure
- Number of lanes closed
- Overall time of delay

Identification of Appropriate Projects

Must result in savings

- Reduced direct agency costs
- Reduced user delay costs

Candidate projects

- Urban intersections
- Commercial areas
- Single access roads
- Urban highways

Rehabilitation Applications

Partial-depth repairs

Full-depth repairs

Slab replacement

Concrete overlays

Reconstruction

Material Selection

Scope of project

Job site conditions

Climatic conditions

Opening time requirements

Available equipment

Cost

Faster setting materials are typically more expensive

Material Types

Portland cement (Type I, II, and III)

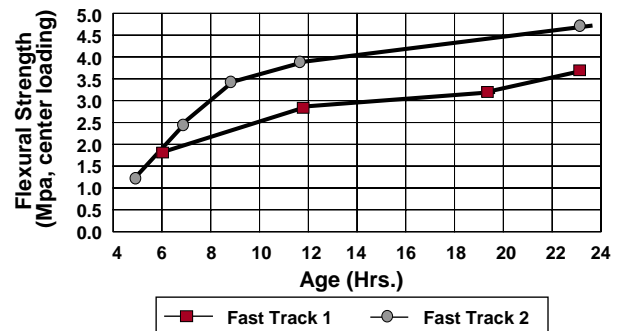
- Higher cement content
- More finely ground cement
- Water reducers / superplasticizers
- Accelerators

Rapid set cement

Regulated set portland cement

Proprietary materials

Strength Development of Fast Track Mixes



Construction Procedures

Concrete removal

Concrete placement

Curing

Joint sawing and sealing

Compressed construction schedule requires careful planning and coordination of activities

NDT Methods

Surface hardness (ASTM C 805)

Penetration (ASTM C 803)

Pull-out (ASTM C 900)

Break-off (ASTM C 1150)

Maturity (ASTM C 1074)

Pulse velocity (ASTM C 597)

Maturity Approach

Accumulated product of time and temperature

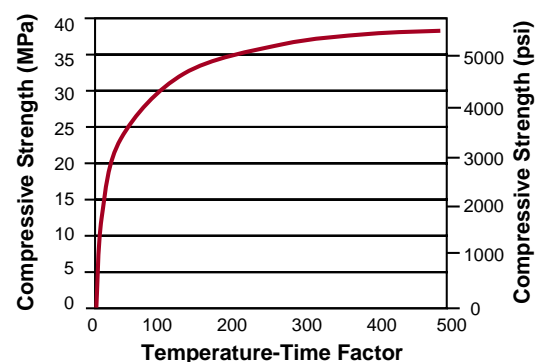
Nurse - Saul method:

$$M(t) = \sum (T_a - T_o) \Delta t$$

Laboratory testing is required to develop a relationship

Temperature is monitored using temperature probes or thermocouples

Maturity Curve



Pulse Velocity Approach

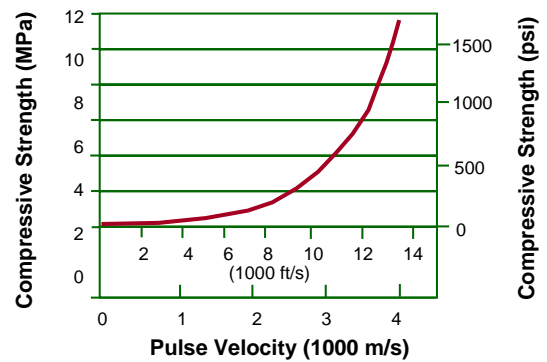
Device sends short pulse sound waves

Transducers receive the signals

Velocity of the wave correlates to concrete strength

Relationships developed through laboratory testing

Pulse Velocity Curve



Summary

Faster setting materials are typically more expensive

Careful planning and coordination are required

High early strength development

- Increase cement content
- Reduce water / cement ratio

Opening based on in-place strength