

Section 977

GUIDELINES FOR EVALUATION OF CONCRETE MIX DESIGN BASED ON
STRENGTH TEST RESULTS

References:

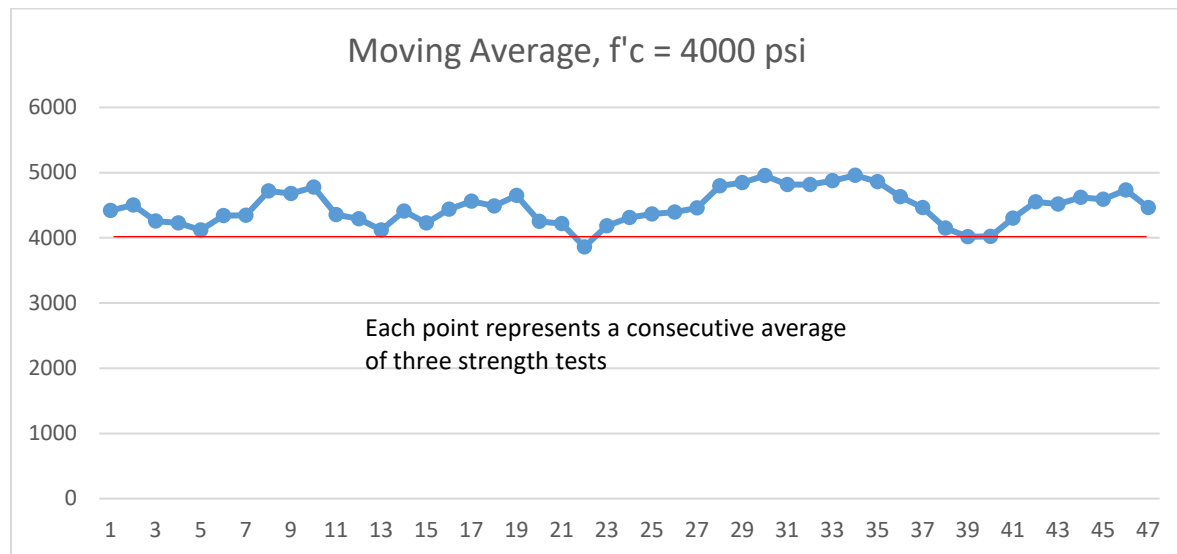
UDOT Standard Specifications
 UDOT Project Special Provision 03055s
 UDOT Minimum Sampling and Testing Requirements
 ACI 214R

977.01 Objectives

This guide provides a procedure for evaluating the control of project concrete strength test results and suggests a methodology for review and correction or suspension of an irregular mix design.

977.02 Quality Tests and Procedures

Portland Cement Concrete is sampled and tested for compressive strength according to The UDOT Minimum Sampling and Testing Requirements section 03055. Record test results by date to allow for evaluation of each mix design. A simple moving average strength chart shown below can be used to track the consistency of strength tests. (ACI 214R)

**977.03 Criteria for Evaluating Mix Design Control**

There are two criteria that will prompt an evaluation of a mix design in production.

1. If the average of any three consecutive strength tests falls below f'_c an evaluation of the related mix design should begin. In the chart above, any point below the red line represents this condition.
2. If more than 6.0 percent of individual, random strength test results are below f'_c an evaluation of the mix design should begin.

977.04 Mix Design Evaluation

If either of the two stated conditions occur an immediate evaluation of the mix design to determine the root cause of poor strength results is necessary. Batch to batch variations on concrete strength may be influenced by multiple factors, most of which can be evaluated by a review of batch tickets and inspection reports. A suggested checklist for review follows:

- Consistency of water/cementitious ratio
 - Target water, actual water
- Variations of air content
- Fresh concrete temperature
- Cementitious content
- Admixture consistency
- Moisture condition of aggregates
- Cylinder handling
- Testing practices

977.05 Mix Design Remedies

If the root causes of the strength test variability can be determined and verified, the conditions should be resolved and use of the mix design may continue. If no clear cause of the strength issues can be determined, suspension of the mix design may be required and a new mix design or trial batch should be submitted.