Mn LTAP Concrete Flatwork Specifications for Local Government Agencies

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AGGREGATE & READY MIX
ASSOCIATION OF MINNESOTA

Mn Concrete Flatwork Specifications for Local Agencies

- Designed as a stand alone specification.
- The intent is to use existing MnDOT forms for field testing and weekly reports
- Minimize surface defects by:
  - Better & timely curing
  - Qualified personnel
  - Mix Design based on strength with limits

Mn Concrete Flatwork Specifications for Local Agencies

Quality Control Plan has 13 items required including the following

- Rain Protection Plan
- Hot Weather Plan
- Cold Weather Plan
- Curing Plan

Mn Concrete Flatwork Specifications for Local Agencies

- Developed for less agency inspection and greater contractor responsibility
- Intent is for more durable concrete
- Requires Contractor Certification and more responsibility on contractor for daily and pre-bid quality tests.

Mn Concrete Flatwork Specifications for Local Agencies

- Concrete Mix Design Performance
- Compressive Strength of 4000 psi at 28 days
- 400 lbs Minimum Cement Content
- 530 lbs Minimum Cementitous Content
- 658 lbs Maximum Cementitious Content
- Maximum W/C = 0.42 for Machine Placed
- Maximum W/C = 0.45 for Hand Placed

Mn Concrete Flatwork Specifications for Local Agencies

- Fewer bid items for designers
- Concrete pavement to include all items
- Different thickness – 7 " concrete pavement
- Current MnDOT system – example
  - Dowels
  - Steel

Steel will be incidental to concrete pavement item

Payment Includes Structures

Curb & Gutter LF includes intake structures

Concrete Pavement Sq. Yd. includes manholes

5 Main Parts

- General
  - Definitions:
    - Engineer or Contracting Authority's representative
    - Contractor
- Products
- Execution
- Concrete Strength by Maturity
- Pre-Pour Meeting

Part 1 General 1.5 Measurement and Payment

- Concrete Pavement
- Curb and Gutter
- Sidewalk and Concrete Median
- Concrete Field Testing
- Concrete Pavement Smoothness
- Maturity Testing for Compressive Strength
- Enhanced Coarse Aggregate Quality

Pay items in red are options for paving and quality testing

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- Enhanced Coarse Aggregate Quality

Part 2 Products

- Cement
- Supplementary Cementitious Materials
- Fine Aggregate for Concrete
- Coarse Aggregate for Concrete
- Concrete Mixes

Materials
use MnDOT approved or ASTM approved

- Cement
- Water
- Fine Aggregate
- Coarse Aggregate
- Admixtures
- Joint Sealers

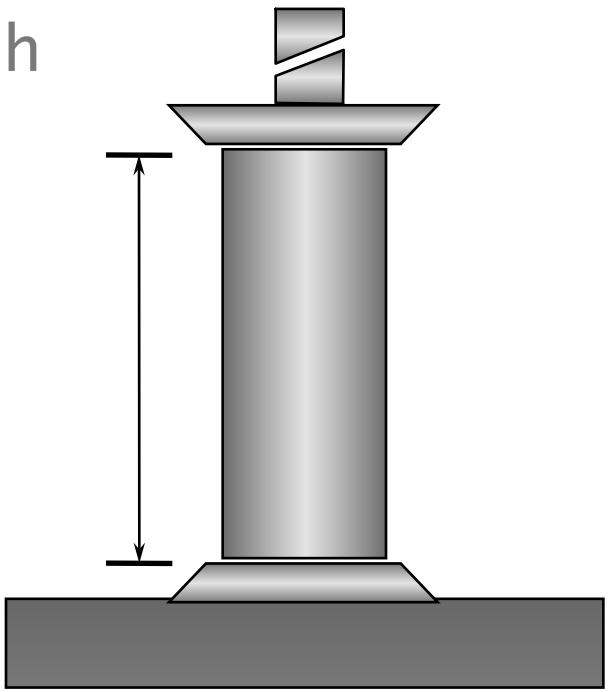
LTAP Guidelines for Local Concrete Infrastructure

- New Spec is all performance
- 4000 psi concrete at 28 days
- Traffic allowed at 3000 psi
- Water/cementitious ratio set at maximums
- Paving 0.42
- Hand work 0.45

Part 2.2 Concrete Mixes

Compressive Strength 4000 psi at 28 days According to ACI 301 by the Field Experience Method or Lab Trail Batch method.

Standard Cylinder 4” X 8” for Aggregates 1 ¼” or less



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Concrete Mix Design

Contractor Mix Design

- Maximum fly ash replacement is 30%
  - w/ max. cementitious 420/180 lb/cy
  - w/ min. cementitious 420/110 lb/cy
- Maximum slag* replacement is 35%
  - w/ max. cementitious 390/210 lb/cy
  - w/ min. cementitious 345/185 lb/cy

* Slag is considered as cement so minimum cement content of 420 lb/cy is not applicable.

Concrete Strength

- Historically strength achieved in 7 days
- Early Strength mixes achieved strength in 3 days
- Lower w/c concrete can achieve strength in ≈ 3 days
- Early Strength mixes can be designed to easily achieve opening times in 24 hours.
- Maturity a good system to monitor strength development.

Slump Maximum 5”

- No slump penalties
- Slump only run on hand placed concrete
- Slump, air and Temperature when strength specimens are made

Certificate of Compliance

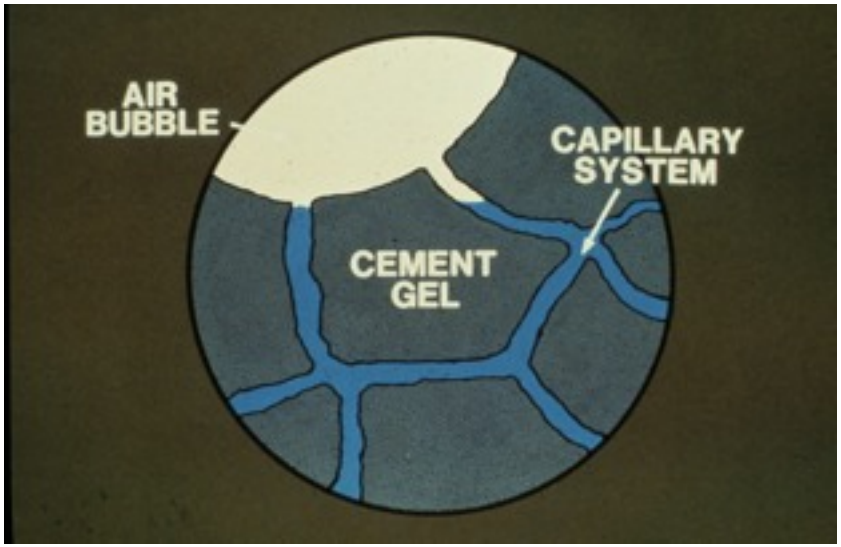
- Use MnDOT System
- All reports done by contractor personnel
- All reports turned over to contracting authority

Chemical Admixtures Part 2.2 A, 6

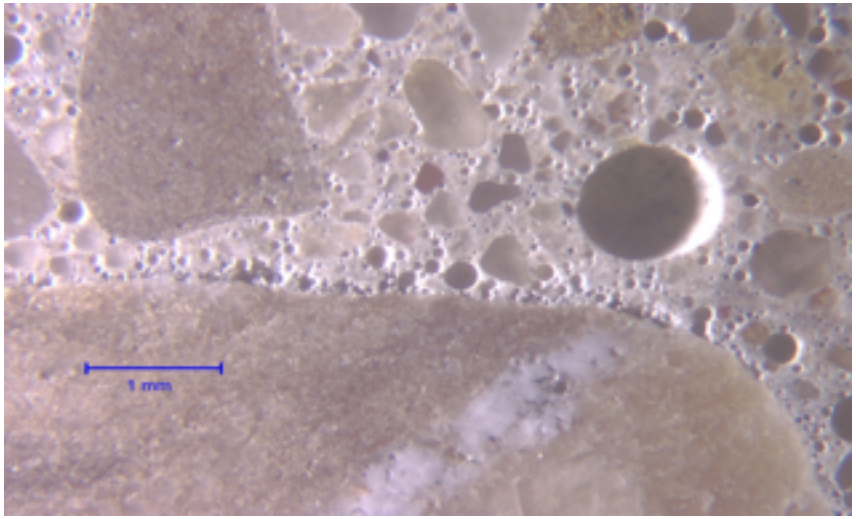
- Type A Water Reducing and mid-range water reducing admixtures
- Type B Retarding/Hydration Stabilizers
- Type C Accelerating Admixtures
- Type D water reducing and retarding Admixtures
- Type S Viscosity Modifying Admixtures

Air Entrainment in Plastic Concrete Delivered in 90 min.

Safety Relief Valves



6.5 % Air Content



Part 3 Execution

Part 3.1 Personnel

- Will require 2 people to hold a current ACI Concrete Flatwork Technician certification

- Will require at least one of the people to be onsite for all concrete pours

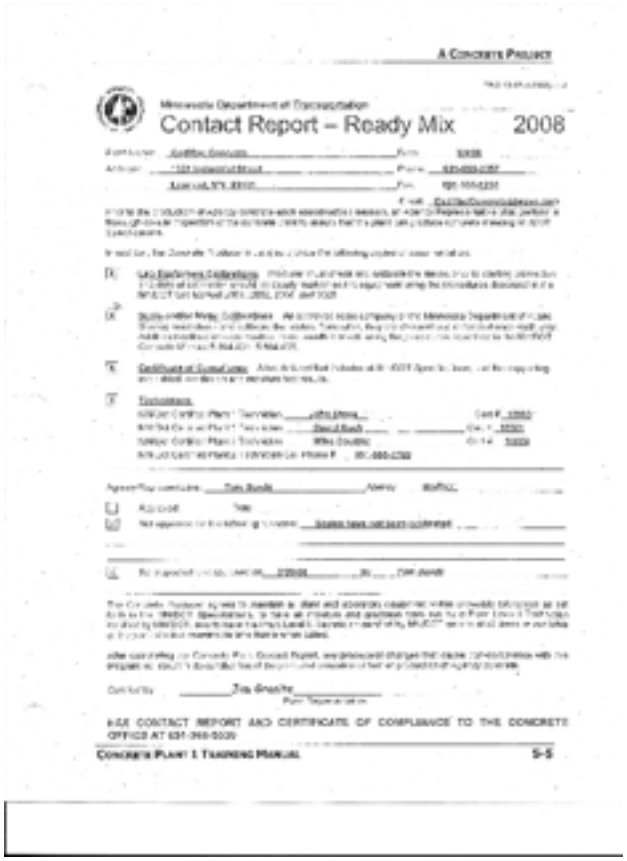
Pre-Pour Meeting
for 500 cubic yard pours

- Projects People
- Grading done
- Concrete Schedule
- Concrete Mixes
- Concrete Testing
- Concrete Placement
- Curing Plan

Ready Mix Plant is Either MnDOT Certified or ACI

MnDOT Forms to be Used

Contact Report 2163



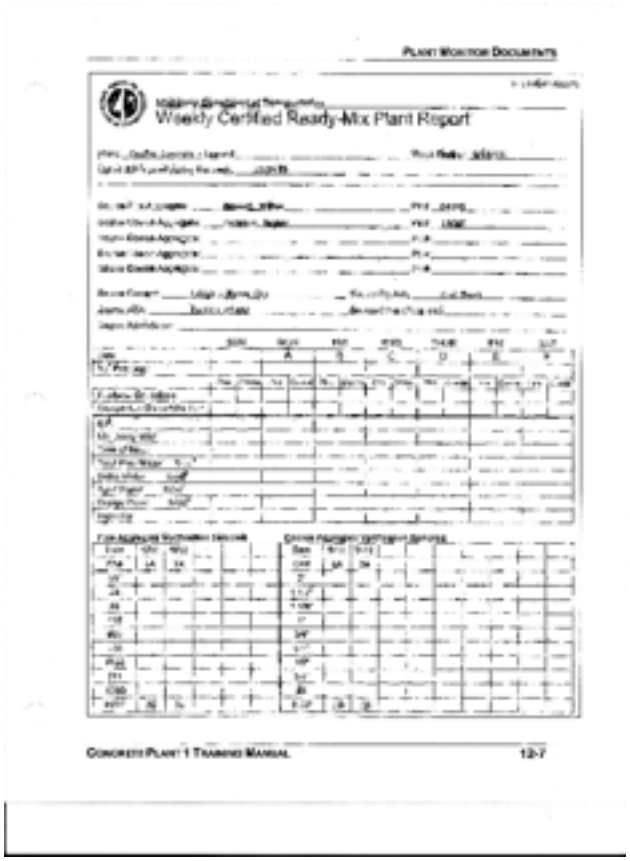
A CONCRETE PROJECT

Minnesota Department of Transportation

Contact Report – Ready Mix 2008

CONCRETE PLANT 1 TRAINING MANUAL 5-5

Weekly Certified R-M Report



PLANT MONITOR DOCUMENTS

Weekly Certified Ready-Mix Plant Report

CONCRETE PLANT 1 TRAINING MANUAL 12-7

Concrete Placement Equipment

- Slipform Construction
- Fixed Form Construction
- Curing Equipment

Slip Form Construction

Texturing for Pavements

- Longitudinal Astro Turf
- Longitudinal Broom Finish
- Require 0.8 mm Depth of Texture
- Test only done when texture is in question

Astro Turf with Aggregate

Broom Finish for Sidewalks and Curb and Gutter

Slipform / Curb & Sidewalk

Fixed Form Construction

Mn Concrete Flatwork Specifications for Local Agencies

- A re-circulating bypass system that provides for continuous agitation of the reservoir material.

Curing of all Concrete Part 3.8

- An airless spraying machine is required for curing of all concrete.
- Place at a rate of 150 sq.ft./ gallon
- Use MnDOT approved 3754 AMS white pigment curing compound
- Cure placed within 30 minutes
- Failure to comply can result in a monetary deduction of $50 per cubic yard of concrete in question.

Poor Curing

Curing

- Use AMS 3754 or Linseed oil 3755 not water based
- Hudson Sprayer not allowed

Jointing Concrete Pavements

Testing of Air / Plastic

Table 5 Minimal Testing

- Contractor tests air and slump every 200 cubic yards
- Agency decides if it wants to tests at their discretion
- Cylinders made by contractor and agency will test the cylinders

Table 6 Agency Minimal Testing Rates for Concrete Pavement

- Contractor tests air and slump every 200 cubic yards
- Agency tests air and slump every 400 cubic yards or once per day
- Cylinders made by both contractor and agency

Surface Smoothness

- All concrete is covered by a straightedge specification of ¼ “ in 10 feet.
- If Concrete Paving is designed with a Ride Specification it will be done as ALR and shown as a separate bid item.
- Areas of Localized Roughness uses the IRI and will require a MnDOT certified Surface Profiler and a certified operator.

Concrete Pavement Smoothness

- All equipment must be Mn/DOT certified
- Contractor is required to provide computerized ERD files

2012 Smoothness Device Certification will be held at MnRoad

Typically – First 2 weeks of May

2012 Certificates will be GOLD!

2012 Inertial Profiler Certificate

Date: _____

Serial #: _____

VIN: _____

Manufacturer: _____

Software: _____

Signature: _____

Minnesota Dept. of Transportation

Concrete Thickness Verification

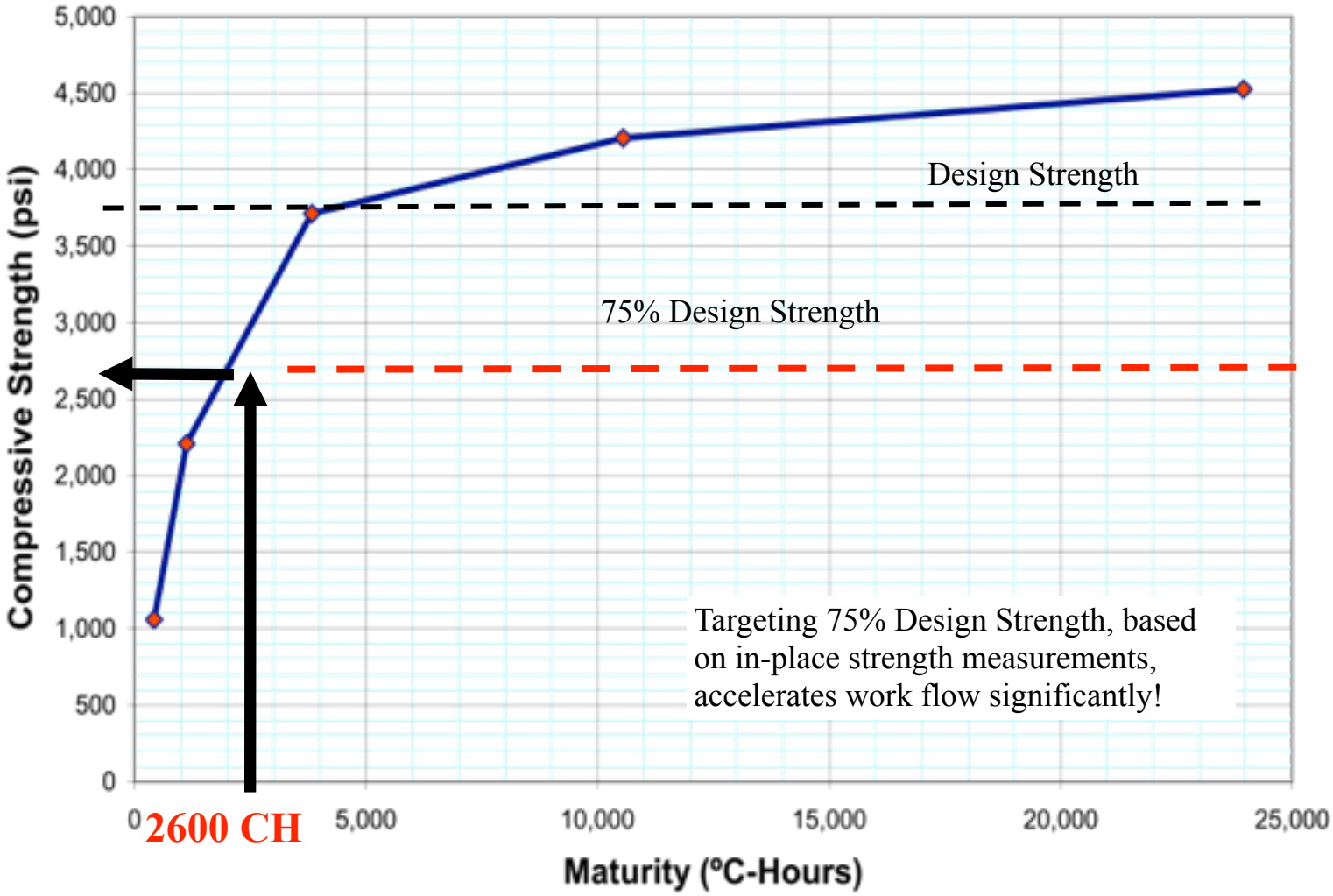
- Coring not required
- Contractor quality control probing
- Coring/probing spreadsheet available on web
- Results to over to contracting authority on a weekly basis
- Penalties assessed according to Table 9 in flatwork specifications.

Part 4 Maturity Testing

- Will be bid as a separate item
- Can be used with any concrete mix.
- Must be re-calibrated with a change in a Cementitious product.
- Can provide the greatest benefit with early strength mixes.

Calibration of Your Mix Design

Application – Convert Maturity to Strength (use the calibration curve)



Follow Wash Out Guidance February of 2009

Wash Out Pit

Pump on Ready Mix Truck

Part 5
Pre-Pour Meeting for 500 cubic yard pours

- Projects People
- Grading done
- Concrete Schedule
- Concrete Mixes
- Concrete Testing
- Concrete Placement
- Curing Plan

Ramsey County (White Bear Lake)

Summary

- Flatwork Specifications are available at the State Aid Website as a Technical Memorandum
- They can be used as a separate specification from the MnDOT specifications.
- We are encouraging engineers to use this entire specification on all projects, sidewalk and C &G to promote uniformity.
- You must add any other specifications you will need for a project as a supplemental to these specifications.

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