REPORTS AND WORK SHEETS
5-694.700

5-694.701 GENERAL

A summation of data on inspection items is required at periodic intervals. The data is collected on report forms. Some forms are submitted to the Mn/DOT Concrete Engineering Unit and all other forms are filed in the Project file for internal use only. The reports submitted to the Mn/DOT Concrete Engineering Unit provide information regarding the progress of the work and become a part of the construction history of the Project. They are also used to track source history to verify changes in sources. All forms used on concrete work other than for miscellaneous materials are shown. Examples of forms not previously illustrated are contained in this section.

Submit the following forms to the Mn/DOT Concrete Engineering Unit:

A. Field Reports

1. Weekly Concrete Report (Form 2448)
2. Weekly Certified Ready-Mix Plant Report (Form 24143)
3. For **Concrete Paving Projects <u>Only</u>**, send copies of all Agency and Contractor tests results including control charts. These include but are not limited to:
   a. Field Core Reports (Form 24327)
   b. Concrete Test Beam Data (Form 2162)
   c. Ride Quality Results
   d. Incentive/Disincentive Information
   e. All change orders and supplemental agreements regarding concrete issues

B. Laboratory Reports

1. Cylinder Reports
2. Aggregate Test Reports
3. Other reports that indicate failing concrete related materials

NOTE: All other forms are for Project internal documentation only. <u>DO NOT</u> send them to the Mn/DOT Concrete Engineering Unit.

A large number of forms were developed for use in the field to aid the Inspector in recording data and tests. Some forms are used as inspection notices. Do not confuse these forms with the report forms. Do not submit them to the Mn/DOT Concrete Engineering Unit, but retain them in the Project File.

5-694.710 PRELIMINARY WORKSHEETS

5-694.711 CONCRETE MIX DESIGN REQUEST (Form 2416)

The Project Engineer submits this form to the Mn/DOT Concrete Engineering Unit to initiate the concrete mix design process. Submit one form for each source or combination of sources of aggregates used. If the source was not previously used, at least **one month's notice** is necessary. For sources previously used, **two week's notice** is required.

Instructions for Completing the Concrete Mix Design Request (Form 2416)

Complete all items on the Mix Design Request. Any items left blank may delay receiving a mix design.

Item numbers listed below correspond to the numbers in Figure A 5-694.711. See Figure B 5-694.711 for a completed example.

Item 1: Project Number
List the low project number.

Item 2: From
Identify the name of the person requesting the mix design and the Project Engineer, if different.

Item 3: Telephone Number
List the telephone number of the person requesting the mix design.

Item 4: Type of Work
List the part of structure for which the concrete is intended. For example, if the concrete is for a bridge pier, don't just write "Bridge", write "Bridge - Pier".

Item 5: Mix Number
Indicate the Mn/DOT mix design requested.

Item 6: Gradation Number
Indicate the gradation specification. Contact the Concrete Supplier to determine what gradation specification is selected (if there is a choice).

Items 7 and 8: % of ¾"+ and % of ¾"-

If more than one size of aggregate is used, indicate the percent of each of the materials used in the composite. Contact the Concrete Supplier to obtain this information.

Item 9: Class of Coarse Aggregate (A, B, C, etc.)
Indicate the class of the coarse aggregate. If unsure, refer to Spec. 3137.2B or ask the Concrete Supplier.

Item 10: Fly Ash? (Y/N)
Indicate whether or not fly ash is included in the mix design.

Item 11: Other Admixtures (Type & Mfr.)
Indicate type and manufacturer of admixture if expected to use.

Item 12: Source of Fine Aggregate Pit Number
List the pit number for the fine aggregate source.

Item 13: Fineness Modulus
List the Fineness Modulus of the fine aggregate. The Supplier provides this number.

Item 14: Source of Coarse Aggregate Pit Number
List the pit number for the coarse aggregate sources.

Item 15: Source of Fly Ash, Power Plant (If Used)
Identify the fly ash power plant, not the distributor of the fly ash.

Item 16: Class
Designate the class of the fly ash, it is either "C" or "F".

Item 17: If Ready-Mix, Name and Location
Indicate the name of the ready-mix plant and specify the location. For example, list Cemstone #28, Minneapolis, not just Cemstone.

Item 18: Date
Indicate the date the mix design is requested.

Item 19: Signed
Handwritten signature of the Project Engineer.

Item 20: Date of First Pour
Indicate the earliest possible date of the first pour.

5-694.712 ESTIMATED COMPOSITION OF CONCRETE MIXES (Form 2406)

After receiving a completed *Concrete Mix Design Request* (Form 2416), the Mn/DOT Concrete Engineering Unit issues the Composition of Concrete Mixes.

Commonly referred to as the Mix Design, the Composition of Concrete Mixes provides the estimated mix proportions. See Figure A 5-694.712 for a completed example.

Mn/DOT TP-02416-03 (10-2002)

PROJECT NO: 1

TO: Concrete Engineering Unit

FROM: 2

TELEPHONE NUMBER: 3

SUBJECT: Concrete Mix Design Request

Please submit the following information as soon as it can be definitely ascertained. This information is necessary before the concrete proportions can be designed for your project. Submit one form for each source or combination of sources of aggregates to be used. If the source has not been previously used, at least **ONE MONTH'S notice** will be necessary. For sources that have been used, **TWO WEEK'S notice** will be required.

Type of Work	Mix No.	Gradation No.	% of 3/4"+	% of 3/4"-	Class of Coarse Aggregate (A, B, C, etc.)	Fly Ash? (Y / N)	Other Admixtures (Type & Mfr.)
4	5	6	7	8	9	10	11

Source of Fine Aggregate Pit No.: 12 FINENESS MODULUS 13

Source of Coarse Aggregate Pit No.: 14

Source of Fly Ash, Power Plant (If Used): 15 Class: 16

If Ready-Mix, Name and Location: 17

DATE 18 SIGNED 19 Date of First Pour 20

CONCRETE PROPORTIONS WILL NOT BE ISSUED UNTIL THIS FORM HAS BEEN RECEIVED AT THE CONCRETE ENGINEERING UNIT. SUBMIT ONE COPY EITHER BY MAIL OR FAX AT 651-779-5580. PLEASE INCLUDE A COVER SHEET.

Mn/DOT TP-02416-03 (10-2002)

PROJECT NO: 1020-30

TO: Concrete Engineering Unit

FROM: Clay Pitts

TELEPHONE NUMBER: 651-654-8739

SUBJECT: Concrete Mix Design Request

Please submit the following information as soon as it can be definitely ascertained. This information is necessary before the concrete proportions can be designed for your project. Submit one form for each source or combination of sources of aggregates to be used. If the source has not been previously used, at least **ONE MONTH'S notice** will be necessary. For sources that have been used, **TWO WEEK'S notice** will be required.

Type of Work	Mix No.	Gradation No.	% of 3/4"+	% of 3/4"-	Class of Coarse Aggregate (A, B, C, etc.)	Fly Ash? (Y / N)	Other Admixtures (Type & Mfr.)
MISC	1A43	50		70/30	C	Y	
PILES	1C62	50		70/30	C	Y	
MISC	3Y43	50		70/30	C	Y	
C & G	3A22	50		70/30	C	Y	
C & G	3A32	50		70/30	C	Y	
SLOPE PAVING	3A34	50		70/30	C	Y	

Source of Fine Aggregate Pit No.: 123456 FINENESS MODULUS 2.70

Source of Coarse Aggregate Pit No.: 70% 123456 (3/4-) 30% 134567 (3/8-)

Source of Fly Ash, Power Plant (If Used): NSP-EAGAN Class: C

If Ready-Mix, Name and Location: QUICKMIX, MILL CITY, MN

DATE 2/3/03 SIGNED CLAY PITTS Date of First Pour 3/4/03

CONCRETE PROPORTIONS WILL NOT BE ISSUED UNTIL THIS FORM HAS BEEN RECEIVED AT THE CONCRETE ENGINEERING UNIT. SUBMIT ONE COPY EITHER BY MAIL OR FAX AT 651-779-5580. PLEASE INCLUDE A COVER SHEET.

MN/DOT TP-02406-02 (12-92)

Minnesota Department of Transportation
Estimated Composition of Concrete Mixes

To: Clay Pitts Title: Project Engineer S.P. No. 1020-30
Address: P.O. Box 325, Mill City, MN 55101

MATERIAL	Pit Number	CEMENT MANUFACTURER, FLYASH GENERATING PLANT, OR AGGREGATE SOURCE			TYPE OR CLASS	GRAD. NO.	SPG.	ABSORP.	F.M.
Cement	------	(Any Certified)			I	----	3.15	----	----
Fly Ash	------	(Any Certified)			C	----	2.58	----	----
Fine Agg.	123456	SALINGER, LAKELAND			---	----	2.64	.008	2.70
Coarse Agg. No.1	123456	SALINGER, LAKELAND	CA - 50	70	C	3/4-	2.70	.014	----
Coarse Agg. No.2	134567	ROCK ISLAND, FALLS CITY		30	C	3/8-	2.65	.016	----
Coarse Agg. No.3									----
Coarse Agg. No.4									----

Admixtures: A.E.A. (Type 3 Concrete) Water Reducers or Retarder (M1 and M2)

COMPUTED ON TAPE NO.	MIX NO.	BATCH VOLUME CU. FT.	C/V RATIO	SLUMP RANGE (INCHES)	% AIR	PORT. CEMENT	FLY ASH	WATER	Estimated Batch Weights- Pounds(dry)				
									Fine Agg.	Coarse Aggregate			
										No.1	No.2	No.3	No.4
	1A43	RM	.56	3-4	1.5	507	89	276	1372	1296	556		
	1C62	"	.44	5-6	"	404	71	290	1302	1393	597		
	3Y43	"	.54	3-4	6.5	549	97	271	1193	1276	547		
	3A22	"	.50	1-2	"	455	80	245	1256	1345	576		
	3A32	"	.50	2-3	"	481	85	262	1229	1316	564		
	3A34	"	.50	2-3	"	485	86	269	1312	1241	532		
		NOTICE: ALL TESTS AND SAMPLE RATES MUST COMPLY WITH THE MATERIALS CONTROL SCHEDULE											

Copy To:

Note: Adjust above dry weights for moisture contained in the aggregates
Ready-mix batches are based on 27.00 cubic feet +1%

Dist M Materials

Extra 4

Date 2/17/03 *Mica Schist*
Concrete Engineering Specialist

5-694.715 CERTIFIED READY-MIX REPORTS AND WORKSHEETS

All of the reports and worksheets in sections 5-694.716 through 5-694.727 are required for documentation on all projects requiring Certified Ready-Mix. These sections include descriptions and examples of each form. **To obtain a blank form, download a copy of the form from the Mn/DOT Concrete Engineering website at www.mrr.dot.state.mn.us/pavement/concrete/forms.asp.**

5-694.716 CONTACT REPORT (Form 2163)

Prior to the beginning of a project, or once per calendar year, an Agency Plant Monitor shall perform a thorough on-site inspection of the concrete plant in order to complete a *Concrete Plant Contact Report*. This Contact Report contains the information necessary to assure that the plant is able to produce concrete meeting specifications, and has a signature block for the Ready-Mix Producer certifying that the Producer will maintain the plant in that condition. See Figure A 5-694.716 (1-4).

5-694.717 TEST OF WEIGHING EQUIPMENT (Form 2124)

This form is for reporting a complete calibration of the weighing equipment at the plant. Reports on spot checks are not required. This form is applicable to either ready-mix or paving. See Figure A 5-694.717.

5-694.718 CONCRETE BATCHING REPORT (Form 2152)

This form is for calculating and documenting moisture results and proportioning aggregates by Producer Technicians. It is intended as a worksheet and must remain at the plant for the entire season. The spaces on the backside do not require completion for ready-mix production. See Figure A 5-694.718.

5-694.719 AGGREGATE MOISTURE CONTENT CHART

This chart is produced and maintained by the Producer's Technician and is used as an aid for Plant and Field Personnel to track the total aggregate moisture content. If the plant has moisture probes, the moisture probe correlations are also plotted on this chart. It must remain at the plant for the entire season. See Figure A 5-694.719.

5-694.720 CONCRETE AGGREGATE WORKSHEET (Form 21763)

This worksheet is for calculating the Producer's quality control (QC) gradations. Each coarse and fine aggregate gradation must be independently numbered consecutively, beginning with number one each year. It must remain at the plant for the entire season. See Figure A 5-694.720.

TP-2163-02 (1/2002) dual

Minnesota Department of Transportation

Contact Report – Ready Mix 2003

Plant Name: Quickmix Date: 3/4/03

Address: 1221 Industrial Street Phone: 651-555-1235

Mill City, Mn 55101 Fax: 651-555-1236

Prior to the production of Agency concrete **each construction season**, an Agency Representative shall perform a thorough on-site inspection of the concrete plant to assure that the plant can produce concrete meeting Mn/DOT Specifications.

In addition, the Concrete Producer must also provide the following copies of documentation:

[X] **Lab Equipment Calibrations** Producer must check and calibrate the sieves prior to starting production. The date of calibration should be clearly marked on the equipment using the procedures described in the Mn/DOT Lab Manual 2001, 2002, 2008, and 2009.

T.S.

[X] **Scale and/or Meter Calibrations** An approved scale company or the Minnesota Department of Public Service must check and calibrate the scales. Thereafter, they are checked and calibrated once each year. Additional calibrations are made at three-month intervals using the procedures described in the Mn/DOT Concrete Manual 5-694.431 and 5-694.433.

[X] **Certificate of Compliance** A batch ticket that includes all Mn/DOT Specifications, and the supporting oven dried mix design and moisture test results.

[X] **Technicians**

MN/Dot Certified Plant 1 Technician John Stone Cert # 10000

MN/Dot Certified Plant 1 Technician David Rock Cert # 10001

MN/Dot Certified Plant 2 Technician Mike Boulder Cert # 10002

MN/Dot Certified Plant 2 Technician Cell Phone # 651-555-6789

Agency Representative: Tom Sands

[ ] Approved for Agency production in 2003

[ ] Approved for limited Agency production in 2003 (500 yd^3 for general concrete; 200 yd^3 for bridge concrete)

[X] Re-inspected and approved on 3/20/03 by Tom Sands

[X] Not approved for the following reason/s:

Scales have not been calibrated

The Concrete Producer agrees to maintain all plant and laboratory equipment within allowable tolerances as set forth in the MN/DOT Specifications, to have all moisture and gradation tests run by a Plant Level I Technician certified by MN/DOT, and to have the Plant Level II Technician certified by MN/DOT on site at all times or available at the plant site in a reasonable time frame when called.

After completing the Concrete Plant Contact Report, any procedural changes that cause non-compliance with this program will result in de-certification of the plant and cessation of further production of Agency concrete.

Certified by: Jim Granite

Plant Representative

Plant

Type of Mixer:

Type of Plant: Ready Mix __X__ Transit Mix _____

Batching Equipment: Make: Selectron

Model: CB500

Condition: good

Tilting Drum (60 sec) __X__ Turbine (45 sec) ____ Rotary (30 sec) ____

Max. mixer batch size 7.5 yd^3

Dry Batch Truck Mixing (5 min or 50 revs.) _____

Plant has Mixer and Truck Mixing capability _____

Certificate of Compliance:

Computerized Batch Printout (y/n): Y English/Metric Conversion: _____

NOTE: All of the following items are required (Specification 2461.4D7a)

X **a**. Name of Plant	X **g**. Truck Number	X **m**. Admix Product Name
X **b**. Contractor	X **h**. Yd^3/load	X **n**. Pit Number
X **c**. Date	X **i**. Yd^3/Cum	X **o**. Admix Qty
X **d**. State Project Number	X **j**. Mix Design	X **p**. Design Wts
X **e**. Bridge Number	X **k**. Cement Brand & Mill	X **q**. Design Water
X **f**. Batch Time	X **l**. Fly Ash Power Plant	

X **r**. Target and Actual Batched Wts of all components; and Trim and Total Water Wts

X **s**. Labeled Spaces for Field Test Results (air content, air temp, concrete temp, slump, cylinder #, and part of structure)

Aggregate Moisture Meters:

Material	Plant Equipped with Meter (y/n)	Make	Model	Sensor Location	Does meter automatically adjust computer weights
Sand	YES	HYDRONICS	HV02	12"-18" ABOVE GATE	YES
3/4"+ (19mm+)	NO				
3/4"- or (19mm-)	NO				
1/2"- or 3/8"- (12.5mm or 9.5mm)	NO				
Class A	NO				

Scale and Meter Information:

Material	Type	Make	Capacity	Graduation
Cement	DIGITAL	SELTEC	5,000 LB	5 LB
Fly Ash	"		5,000 LB	5 LB
Slag				
Aggregate	"		25,000 LB	20 LB
Water Scale				
Water Meter	VALVE	BADGER	2 ½"	1 GA

Materials

Cementitious Materials:

Material	Supplier w/Mill	# of Silos	Capacity (tons)	Delivered By (truck, rail)	Delivered To Silo By (blower, elevator)	Delivered To Hopper By (gravity, auger)	Sampled At (truck, rail, hopper valve)
Cement	HOLCIM - MASON CITY	2	100 &60	TRUCK	BLOWER	AUGER	TRUCK
Cement							
Fly Ash	NSP - EAGAN	1	25	TRUCK	BLOWER	GRAVITY	TRUCK
Slag							
Other							

Admixtures:

Type	Supplier	Name of Product	Sampled At (dispensing tubes recommended)
A.E.A.	EUCLID	AEA92	STORAGE TANK
Water Reducer	EUCLID	WR-91	"
Retarder	EUCLID	RETARDER 100	"
Super Plasticizer	EUCLID	EUCON 37	"
Calcium Chloride	VAN WATERS & ROGERS	CACL2	"

Aggregates:

Material	Supplier	Pit Location	Pit Number	Delivered By	In Plant storage (tons)
Sand	SALINGER	LAKELAND	123456	TRUCK	60
3/4"+ (19mm+)	"	"	"	"	60
3/4"- (19mm-)	"	"	"	"	60
1/2"- or 3/8"- (12.5mm or 9.5mm)	ROCK ISLAND	FALLS CITY	134567	"	60
Class A	MERIDIAN	ST. CLOUD	173006	"	60

Plant is fed by: Drive over hoppers __4__ How many compartments __4__
Field hoppers _____ How many _____
Number of storage bins __4__
Are stockpiles separated (y/n) __Y__
How many belts feed plant working bins __4__
Is turn head used (y/n) __N__
Aggregate sampled at: Batch Hopper _____ Belt __X__ Stockpile _____

Water:

Source:
__X__ City Water
____ Well Water
____ Both

Proportioned by:
__X__ Meter
____ Scale

Can water be heated with a boiler (y/n) __Y__
Temperature gauge location: ON RECIRCULATION LINE

Lab and Equipment

Inspection Quarters:

__X__ Area (120 ft^2)	__X__ Suitable Desk	Posted Information
__X__ Adequate Lighting	__X__ Chair	__X__ Current Site Map
__X__ Heating System	__X__ Stool	__X__ Tech I & II Names & Cert #
__X__ Air Conditioning	__X__ Fire Extinguisher	__X__ Tech II Cell Phone #
__X__ Ventilation	__X__ Running Water	
__X__ Concrete Manual		

Equipment:

Mechanical Shakers, Screens and Sieves

Box Screens: **Must have all screens listed below** **Calibrated on __1/2/03__**

____ 2" (50mm)*	__X__ 3/4" (19.0mm)	__X__ #4 (4.75mm)
____ 1 1/2" (37.5mm)*	__X__ 5/8" (16mm)	__X__ Bottom Pan
____ 1 1/4" (31.5mm)*	__X__ 1/2" (12.5mm)	__X__ Mechanical Shaker
__X__ 1" (25mm)	__X__ 3/8" (9.5mm)	

*Required when using 3/4"+ (19.0mm) aggregate

NOTE: Plants producing CA-50 with two fractions will need to use a 1/4" (6.3mm) sieve as a filler between the 3/8" (9.5mm) and the #4 (4.75mm) sieves.

Brass Sieves: **Must have all sieves listed below** **Calibrated on __1/17/03__**

__X__ 3/8" (9.5mm)	__X__ #30 (600µm)	__X__ Bottom Pan
__X__ #4 (4.75mm)	__X__ #50 (300µm)	__X__ Mechanical Shaker
__X__ #8 (2.36mm)	__X__ #100 (150µm)	
__X__ #16 (1.18mm)	__X__ 2 - #200 (75µm)	

NOTE: Two #200 (75µm) sieves are needed, one is for shaking the gradation and the second is for washing the sample during the final steps of the gradation process.

Scales and Miscellaneous

Scales:

__X__ Dairy Scale Calibrated on __2/2/03__ **MINIMUM 55 lb CAPACITY**

Must have one of the two scales listed below.

____ Triple Beam Balance including the needed Hanging Weights (1 - 500g and 2 - 1000g) Calibrated on_____ **MINIMUM 2600g CAPACITY**

__X__ Electronic Scale Calibrated on __1/30/03__ **MINIMUM 2600g CAPACITY**

Miscellaneous:

YES	2" (50mm) Sample Splitter with 3 Pans
ELECTRIC	3 Burners: Natural Gas or Electric
NYLON	Sample Bags: Nylon or Paper-lined Burlap **MINIMUM 33 lb CAPACITY**

STATE OF MINNESOTA

DEPT. OF TRANSPORTATION
Office of Maintenance

TEST OF WEIGHING EQUIPMENT

Owner: Quickmix - Location: Mill City S.P. VARIOUS

Type of Scale: DIGITAL Make: Seltec Fed. No. -

Date of Test: 4-30-2003 Tested by: Tom Sands Bridge No. -

Scale used for weighing: AGGREGATE CAP 25,000 # GRAD 20#

Standard Weight Applied	Wt. Of Added Material	Wt. of Hanger Rods and Platform	Total Applied Load	Scale Reading at Balance	Diff. in Lbs. (+) or (-)	Sensitivity in Lbs.	REMARKS
0	0	0	0	0	0	0	
100			100	100	0		AVERAGE BATCH
200			200	200	0		
300			300	300	0		SIZE 4 ½ CY
400			400	400	0		
500	0	0	500	500	0	0	
0	0	0	0	0	0	0	
0	14000	0	14000	14000	0	0	
100			14100	14100	0		
200			14200	14200	0		
300			14300	14300	0		
400			14400	14400	0		
500		0	14500	14500	0	20#	
							SPOT CHECK CONSOLE
							AGAINST MASTER SCALE
							@ 0.500, FINAL BALANCE
							CONSOLE MUST FOLLOW
							MASTER SCALE WITHIN
							2 GRADUATION OF LESS

General Conditions of Scales: GOOD

Is the equipment protected from wind and weather? YES

Signed Clay Pitts
Project Engineer

Mn/DOT TP-02124-02 (7/80)

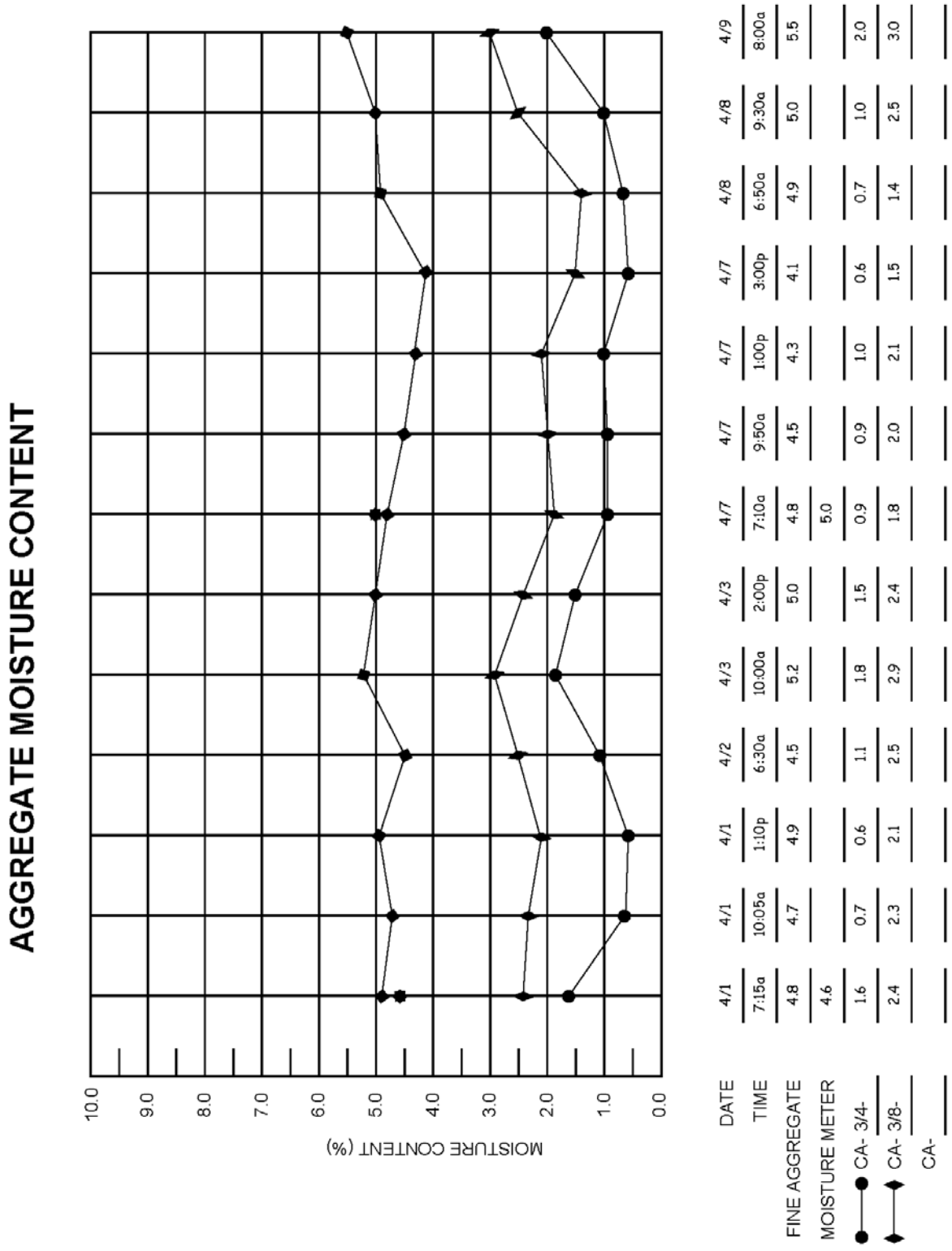
TP 2152-03 (3/2001)

Minnesota Department of Transportation

Concrete Batching Report

Batch Plant Quickmix – Mill City Date 4/1/03

Material		Sand	3/4-	3/8-		Sand	3/4-	3/8-		Sand	3/4-	3/8-		Average Free Water (Not Weighted)
A. Wt. Sample + Pan	Wet	718	2338	2345		705	2330	2356		700	2321	2313		
B. Wt. Sample + Pan	Dry	692	2306	2298		680	2316	2310		674	2308	2271		
C. Moisture Loss	A–B	26	32	47		25	14	46		26	13	42		
D. Tare Wt, Pan	-	145	300	300		145	300	300		145	300	300		
E. Dry Wt. Sample	B–D	547	2006	1998		535	2016	2010		529	2008	1971		
F. Total Moisture Factor	C/E	.048	.016	.024		.047	.007	.023		.049	.006	.021		
G. Absorb. Factor	-	.008	.014	.016		.008	.014	.016		.008	.014	.016		
H. Free Moisture Factor	F–G	.040	.002	.008		.039	-.007	.007		.041	-.008	.005		
I. Time Scales Set				7:15a				10:05a				1:10p		
		Mix No. 3Y43 **Cement Wt.** 549 **Fly Ash Wt.** 97 **Design Water** 271												
J. Design Wt.	-	1193	1276	547		1193	1276	547		1193	1276	547		
K. Total Moisture	FxJ	57	20	13		56	9	13		58	8	11		
L. Scale Setting	J+K	1250	1296	560		1249	1285	560		1251	1284	558		
M. Free Moisture	HxJ	48	3	4		47	-9	4		49	-10	3		
Total Free Moisture				55				42				42		
		Mix No. **Cement Wt.** **Fly Ash Wt.** **Design Water**												
J. Design Wt.	-													
K. Total Moisture	FxJ													
L. Scale Setting	J+K													
M. Free Moisture	HxJ													
Total Free Moisture														
		Mix No. **Cement Wt.** **Fly Ash Wt.** **Design Water**												
J. Design Wt.	-													
K. Total Moisture	FxJ													
L. Scale Setting	J+K													
M. Free Moisture	HxJ													
Total Free Moisture														
		Mix No. **Cement Wt.** **Fly Ash Wt.** **Design Water**												
J. Design Wt.	-													
K. Total Moisture	FxJ													
L. Scale Setting	J+K													
M. Free Moisture	HxJ													
Total Free Moisture														


AGGREGATE MOISTURE CONTENT
MOISTURE CONTENT (%)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
DATE
TIME
FINE AGGREGATE
MOISTURE METER
CA- 3/4-
CA- 3/8-
CA-
4/1 4/1 4/1 4/2 4/3 4/3 4/7 4/7 4/7 4/7 4/7 4/8 4/8 4/9
7:15a 10:05a 1:10p 6:30a 10:00a 2:00p 7:10a 9:50a 1:00p 3:00p 6:50a 9:30a 8:00a
4.8 4.7 4.9 4.5 5.2 5.0 4.8 4.5 4.3 4.1 4.9 5.0 5.5
4.6 5.0
1.6 0.7 0.6 1.1 1.8 1.5 0.9 0.9 1.0 0.6 0.7 1.0 2.0
2.4 2.3 2.1 2.5 2.9 2.4 1.8 2.0 2.1 1.5 1.4 2.5 3.0

TP-21763-04 (5/2002)

Minnesota Department of Transportation

Concrete Aggregate Worksheet

S.P. 1020-30	Plant: Quickmix-Mill City	Date: 4/1/03	Agg. Source(s) #: FA – 123456 CA –50 3/4- 123456
Engineer: Clay Pitts	Tester: John Stone	Time: 6:30a	CA –50 3/8- 134567 CA -

Sieve Analysis of Coarse Aggregate

Agg. Fract.	CA - 3/4- Mix Prop. 70 %				CA - 3/8- Mix Prop. 30 %				CA - _____ Mix Prop. _____ %			
	Test No. CA20 Sample Wt. 13.4		Quality Sample Submitted. By JS Date 4/1		Test No. CA20 Sample Wt. 14.4		Quality Sample Submitted. By JS Date 4/1		Test No. Sample Wt.		Quality Sample Submitted. By ____ Date	
Sieve Sizes Pass – Ret.	Weights Ind.	Cum.	% Pass	Grad. Req.	Weights Ind.	Cum.	% Pass	Grad. Req.	Weights Ind.	Cum.	% Pass	Grad. Req.
2" – 1 1/2"												
1 1/2" – 1 1/4"												
1 1/4" – 1"	0											
1" – 3/4"	.9	13.4	100									
3/4" – 5/8"	2.7	12.5	93									
5/8" – 1/2"	5.0	9.8	73		0	14.4	100					
1/2" – 3/8"	3.3	4.8	36		1.1	14.4	100					
3/8" - #4	1.3	1.5	11		9.2	13.3	92					
#4 – Btm	.2	.2	1		4.1	4.1	28					
Check Total	13.4	± 0.3% or 0.2 lb of Sample Wt.			14.4	± 0.3% or 0.2 lb of Sample Wt.				± 0.3% or 0.2 lb of Sample Wt.		

Coarse Aggregate Percent Passing #200 Sieve Test

	(CA -)		(CA -)		(CA -)
(A) Dry weight of original sample					
(B) Dry weight of washed sample					
(C) Loss by washing (A – B)					
(D) % Passing #200 (C ÷ A) × 100					

Composite Gradation for (CA - 50)

Agg. Fract.	CA – 3/4-	CA – 3/8-	CA -	Composite	Grad.
Proportions	70 %	30 %	____ %	100%	Req.
2"					
1 1/2"					
1 1/4"					
1"	70	30		100	100
3/4"	65	30		95	85-100
3/8"	8	28		36	30-60
#4	1	8		9	0-12

Washing Data for Sieve Analysis of Fine Aggregate

(A) Dry sample and record weight	510.3
(B) Wash and dry sample, record weight	506.6
(C) Loss by washing (A – B)	3.7
Enter (C) to the right, for fine sieve analysis	

Sieve Analysis of Fine Aggregate

Quality Sample Submitted. By: J.S. Date : 4/1

Test No. FA12 Sample Wt. 510.3

Sieve Size Pass Ret.	Weights Ind.	Cum.	% Pass	Grad. Req.
3/8" - #4	0		100	100
#4 - #6	0	509.9	100	95 – 100
*#6 - #8	47.4	509.9		**
#8 - #16	105.7	462.5	91	80 – 100
#16 - #30	149.6	356.8	70	55 – 85
#30 - #50	146.3	207.2	41	30 – 60
#50 - #100	49.7	60.9	12	5 – 30
#100 - #200	7.0	11.2	2	0 – 10
*#200 - Btm	.5	4.2	.8	0 – 2.5
Loss by washing	3.7			
Check Total	509.9	± 0.3% of Sample Wt.		
Fineness Modulus	Within ± 0.20		2.84	2.70

* #6 and #200 not included in Fineness Modulus

** #6 is recommended as filler sieve

5-694.721 WEEKLY CONCRETE AGGREGATE REPORT (Form 2449)

The Certified Concrete Ready-Mix Producer records the fine aggregate (sand) and coarse aggregate gradation results on this report. A column between the Producer's quality control tests is left blank for the Agency to record comparison test results. This report is submitted to the Agency weekly. See Figure A 5-694.721 (1-2) for an example that has been completed by the Producer and is ready for submission to the Agency.

5-694.722 QUALITY CONTROL CHARTS

Quality Control charts are a visual and statistical method of tracking gradations in order to achieve better quality control of concrete aggregates. This method is helpful in visualizing the consistency of the material and aiding the Producer in making sound aggregate decisions and adjustments. These charts are produced and maintained by the Producer's Technician. They must remain at the plant for the entire season.

Quality Control Charts are made-up of an Upper Limit (UL), Lower Limit (LL), the midpoint of the range or Target Value (TV), and the Quality Control Band (QCB). The QCB is defined as a band on either side of the TV where the material is considered uniform. The width of the QCB is dependent on the gradation range.

Gradation Range	Width of the QCB
<9	+/- 1
9 - 21	+/- 3
>21	+/- 5

Each test result is labeled with the gradation sample number, date and time, and is plotted on the Quality Control Chart in the appropriate place. Using a different color or symbol, the average of the last four tests is plotted on the same vertical line.

The objective of the aggregate supplier is to have the running average values inside the QCB and to not have an individual test below the LL or above the UL. Mn/DOT uses the LL and the UL values for individual tests as acceptance for projects; however, the running average may provide input for deciding any penalties.

The results of the Agency's verification gradation and the Producer's companion gradations are charted on the same chart to compare results. The Agency results are not included in the running average calculations.

See Figures A and B 5-694.722 for examples of Sand and CA-50 Quality Control Charts.

TP 2449-04 (1/2002)

Minnesota Department of Transportation

Weekly Concrete Aggregate Report

Ready-Mix Plant Quickmix - Mill City Week Ending 4/5/03

S. P. Nos. 1020-30

Sand Source/Location Salinger-Lakeland Pit # 123456

Date	4/1		4/2		4/3				Sand Specs. Sampled @ Belt
Time	6:30a		6:00a		9:00a				
Gradation #	FA12		FA13		FA14				
3/8"	100		100		100				100
#4	100		100		99				95 - 100
#6									-
#8	91		91		90				80 - 100
#16	70		71		73				55 - 85
#30	41		43		43				30 - 60
#50	12		14		12				5 - 30
#100	2		2		2				0 - 10
F.M.	2.84		2.83		2.81				2.70 ± 0.2
#200	.8		1.1		1.3				0 - 2.5
Lab I.D. #	2								
Inspector	J.S.		D.R.		D.R.				

CA-Size 50 Source/Location Composite Pit # 123456 / 134567

Date	4/1		4/1		4/2		4/3		Specs. CA - 50 Sampled @ Belt
Time	6:30a		12:00p		6:00a		9:00a		
Gradation #	CA20		CA21		CA22		CA23		
2"									
1 1/2"									
1 1/4"									
1"	100		100		100		100		100
3/4"	95		90		97		85		85 - 100
1/2"									-
3/8"	36		39		45		36		30 - 60
#4	9		11		12		11		0 - 12
Lab I.D. #	2								
Inspector	J.S.		D.R.		D.R.		D.R.		

CA-Size 3/4- Mix Prop. 70 % Source/Location Salinger-Lakeland Pit # 123456

Date	4/1		4/1		4/2		4/3		Specs. CA - Sampled @ Belt
Time	6:30a		12:00p		6:00a		9:00a		
Gradation #	CA20		CA21		CA22		CA23		
2"									
1 1/2"									
1 1/4"									
1"	100		100		100		100		
3/4"	93		85		96		79		
1/2"	36		35		54		26		
3/8"	11		13		21		9		
#4	1		1		1		3		
Lab I.D. #	2								
Inspector	J.S.		D.R.		D.R.		D.R.		

CA-Size 3/8- Mix Prop. 30 % Source/Location Rock Island-Falls City Pit # 134567

Date	4/1		4/1		4/2		4/3		Specs. CA - Sampled @ Belt
Time	6:30a		12:00p		6:00a		9:00a		
Gradation #	CA20		CA21		CA22		CA23		
2"									
1 1/2"									
1 1/4"									
1"									
3/4"									
1/2"	100		100		100		100		
3/8"	92		100		100		100		
#4	28		35		38		29		
Lab I.D. #	2								
Inspector	J.S.		D.R.		D.R.		D.R.		

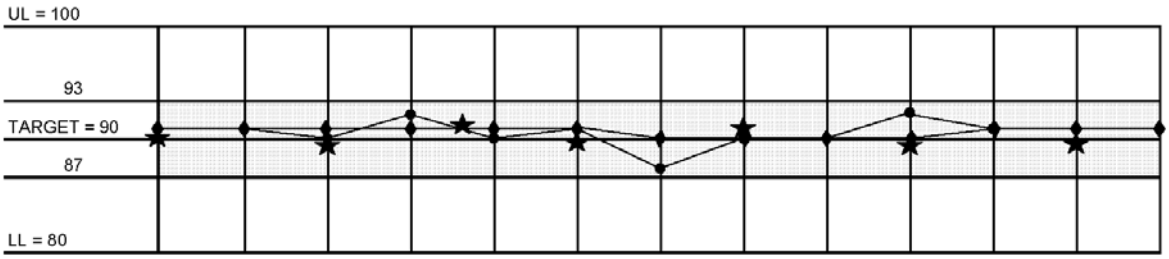
Remarks:

SAND QUALITY CONTROL CHART

Plant Quickmix - Mill City

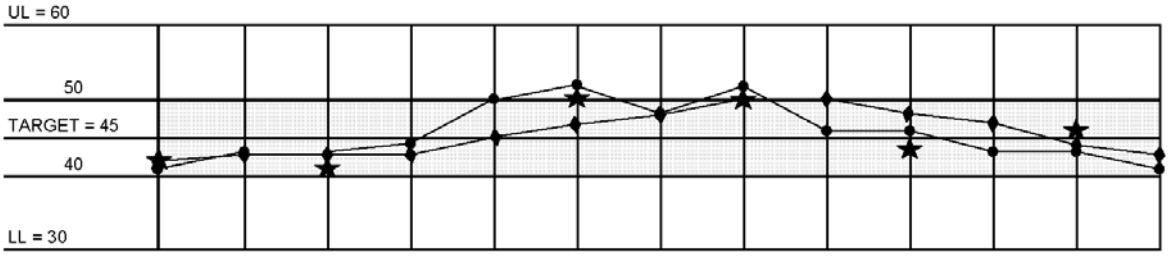
SAMPLE #	12	13	14	15	16	17	18	19	20	21	22	23	24
DATE	4/1	4/2	4/3	4/3	4/7	4/7	4/8	4/9	4/24	4/25	4/25	4/28	4/29
TIME	6:30a	6:00a	9:00a	1:00p	6:30a	2:30p	6:00a	7:00a	6:00a	6:00a	12:00p	6:00a	6:00a

SIEVE: *#8* **RANGE:** *80-100*



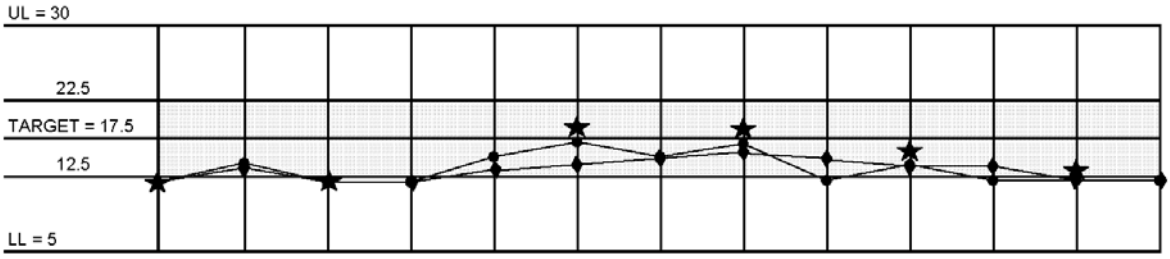
RESULTS	91	91	90	92	90	91	88	90	90	92	91	91	91
RUNNING AVG	91	91	91	91	91	91	90	90	90	90	91	91	91

SIEVE: *#30* **RANGE:** *30-60*



RESULTS	41	43	43	44	50	52	48	52	46	46	43	43	41
RUNNING AVG	42	43	43	43	45	47	48	50	50	48	47	44	43

SIEVE: *#50* **RANGE:** *5-30*



RESULTS	12	14	12	12	15	17	15	17	12	14	12	12	12
RUNNING AVG	12	13	12	12	13	14	15	16	15	14	14	12	12

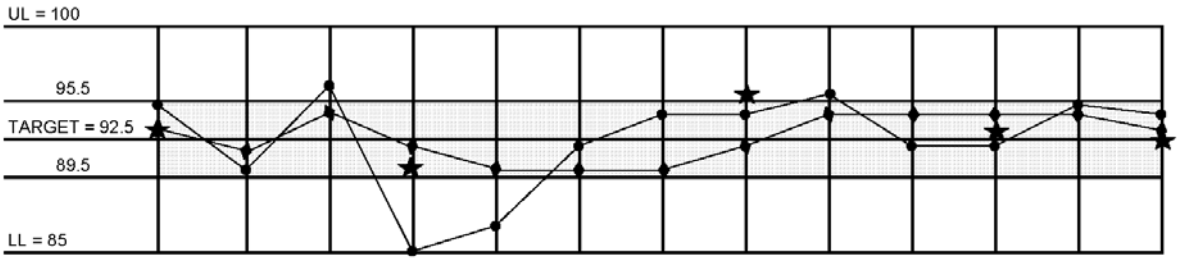
★ STATE RESULTS

CA-50 QUALITY CONTROL CHART

Plant Quickmix - Mill City

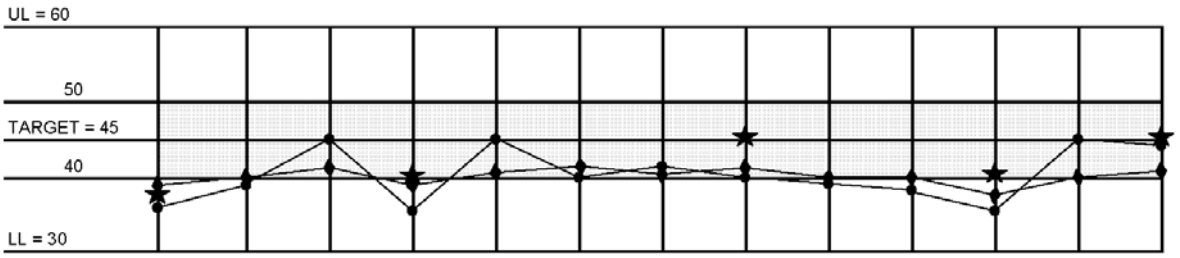
SAMPLE #	20	21	22	23	24	25	26	27	28	29	30	31	32
DATE	4/1	4/1	4/2	4/3	4/3	4/7	4/7	4/7	4/8	4/8	4/9	4/24	4/25
TIME	6:30a	12:00p	6:00a	9:00a	1:00p	6:30a	9:15a	2:30p	6:00a	9:00a	7:00a	6:00a	6:00a

SIEVE: *3/4"* **RANGE:** *85-100*



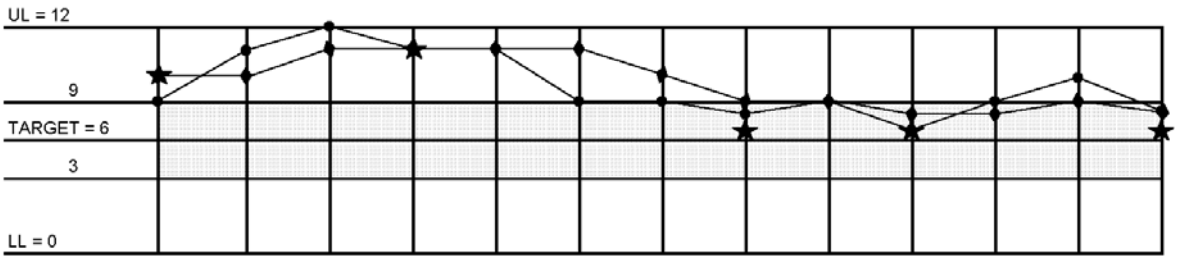
RESULTS	95	90	97	85	87	92	94	94	96	92	92	95	94
RUNNING AVG	93	91	94	92	90	90	90	92	94	94	94	94	93

SIEVE: *3/8"* **RANGE:** *30-60*



RESULTS	36	39	45	36	45	40	42	40	39	38	36	45	44
RUNNING AVG	39	40	42	39	41	42	41	42	40	40	38	40	41

SIEVE: *#4* **RANGE:** *0-12*



RESULTS	9	11	12	11	11	9	9	8	9	7	9	10	8
RUNNING AVG	10	10	11	11	11	11	10	9	9	8	8	9	8

★ STATE RESULTS

5-694.723 CERTIFICATE OF COMPLIANCE (Form 0042)

This form is filled out by the Ready-Mix Plant Producer for all loads of concrete produced for the Agency. The Certificate of Compliance (batch ticket) shall include all the data specified in the latest version of the requirements for "Certified Ready-Mix Concrete Plants". The ticket must accompany the load to the jobsite where it is handed to the Agency Representative.

The Inspector at the job site must obtain the Certificate of Compliance prior to accepting the load of concrete. Reject any load that arrives on the job without a Certificate of Compliance. Report any job site modification in the batch contents on this ticket. Examples of such changes are – "added 5 gallons of water," "12 oz. of air entraining admixture (A.E.A.) (show brand) added with 4 gallons of water," or "10 lb. of calcium chloride in solution totaling 4 gallons added." Place all field test results for slump, air, air temperature, concrete temperature, cylinder numbers and location on the ticket and sign it.

The Certificate of Compliance shall consist of a single sheet maximum. If the computer that generates the Certificate of Compliance malfunctions, the Producer may finish any pours that are in progress provided the plant issues handwritten Certificates of Compliance on the most current version of Mn/DOT Form 0042. New pours are not permitted to begin without a working computerized Certificate of Compliance. See Figure B 5-694.723 for a completed example.

See Figure A 5-694.723 for an example that corresponds to the numbers below. The Certificate of Compliance shall include:

1. Name of the ready-mix concrete plant and location
2. Name of the Contractor
3. Date
4. State Project Number (S.P.)
5. Bridge Number (when applicable)
6. Time concrete was batched/discharged
7. Truck number
8. Quantity of concrete in this load
9. Running total quantity of this concrete mix batched on this day for this project
10. Type of concrete (Mn/DOT Mix Designation Number)
11. Cement brand and production mill
12. Fly ash brand and production power plant
13. Admixture brand and product name
14. Pit number for each aggregate source
15. Admixture quantity per 100 wt. cementitious and/or ml/m^3 (oz/yd^3) for:
    - air entraining admixtures
    - water reducing admixtures
    - other admixtures
16. Design weights (Oven Dry) per m^3 (yd^3) for:
    - cement
    - fly ash
    - each coarse aggregate

- fine aggregate (sand)

17. Design water weight
18. Target and Actual batched weights for:
    - cement
    - fly ash
    - each coarse aggregate fraction
    - fine aggregate (sand)
    - actual water added
    - any trim water added
19. Total water (Batch Water + Free Moisture) (kg. or lb.)
20. The ticket shall also include the following information printed with enough room beside each item to allow the Field Inspector to record the appropriate test results: air content, air temperature, concrete temperature, slump, cylinder number, and location/part of structure.

Items 11, 12, 13, 14, and 16 are needed only on the first Certificate per day per mix designation or when one of these items changes.

21. Producer's signature
    a. Metro District

    All concrete batched in the Metro District requires a computerized Certificate of Compliance.

    The signature of a Certified Technician is required on the first Certificate of Compliance of each Agency pour. The Technician must verify the following when signing the first Certificate of Compliance:

    1. The mix designation and all required specification information are correct.
    2. The 1 cubic meter (1 cubic yard) oven dry batch weights are correct.
    3. The current moisture data on aggregates have been entered in the batching system.
    4. The batching system is weighing accurately.

    b. Out-state Districts

    Computerized Certificates of Compliance are required when Contract quantities exceed 385 cubic meters (500 cubic yards) for general concrete work and 155 cubic meters (200 cubic yards) for bridge concrete.

    For Contracts that do not exceed the limits addressed above, the Ready-Mix Producer may use handwritten *Certificates of Compliance* (Form TP00042). See Figure A 5-694.723.

    The Producer must sign the Certificate of Compliance for each individual truckload of ready-mixed concrete at the time of delivery. The Producer must verify the following when signing the first Certificate of Compliance:

    1. The mix designation and all required specification information are correct.
    2. The 1 cubic meter (1 cubic yard) oven dry batch weights are correct.
    3. The current moisture data on aggregates have been entered in the batching system.
    4. The batching system is weighing accurately.

TP 0042-02 (3/2000)

Minnesota Department of Transportation

Certificate of Compliance

Ready-Mix Plant		Contractor		S. P.	Date
1		2		4	3
Bridge	**Mix #**	**Truck #**	**Time Batched**	**Quantity this load**	**Cumulative quantity**
5	10	7	6	8 yd^3	9 yd^3

	Design Wt. (C.Y.)	Total Moisture	Free Water	Target Batch (C.Y.)	Target Batch Weight	Actual Batch Weight	Manufacturer & Mill or Power Plant/Aggregate Source & Pit #
Cement	16				18	18	11
Fly Ash	16				18	18	12
Sand	16				18	18	14
CA 3/4+	16				18	18	14
CA 3/4-	16				18	18	14
CA	16				18	18	14
Water	17				18	18	
Total Water (Free Plus Batched)						19	

Total Water Available to Add at Jobsite		Total Water Added at Jobsite		Total Water	
	Gal.		Gal.		Lbs.
	(Target – Actual)/8.33				Water Added at Jobsite*8.33 + Total Water (Actual)

Admixture	Dose	Manufacturer/Type
Air Entraining Agent	15 oz/c.y.	13
Admixture # 1	15 oz./cwt.	13
Admixture # 2	15 oz./cwt.	13

Plant Representative Comments and Signature

21

Field Tests			**Field Comments**
Location (Station, etc.) 20			
Air Temp. 20	Conc. Temp. 20	Cyl. # 20	
Air Content (%) 20	Slump 20		

TP 0042-02 (3/2000)

Minnesota Department of Transportation

Certificate of Compliance

Ready-Mix Plant		Contractor		S. P.	Date
Quickmix - Mill City		Pebble Brothers		1020-30	4/1/2003
Bridge #	**Mix #**	**Truck #**	**Time Batched**	**Quantity this load**	**Cumulative quantity**
89006	3Y43F	10	8:55a	10 yd^3	10 yd^3

	Design Wt. (C.Y.)	Total Moisture	Free Water	Target Batch (C.Y.)	Target Batch Weight	Actual Batch Weight	Manufacturer & Mill or Power Plant/Aggregate Source & Pit #
Cement	549			549	5490	5480	Holcim - Mason City, IA
Fly Ash	97			97	970	980	NSP - Eagan, MN
Sand	1193	57	48	1250	12500	12520	123456 Salinger - Lakeland
CA 3/4+							
CA 3/4-	1276	20	3	1296	12960	12920	123456 Salinger - Lakeland
CA- 3/8-	547	13	4	560	5600	5640	134567 Rock Island - Falls City
Water	271		(55)	215	2150	2000	
Total Water (Free Plus Batched)					2710	2550	

Total Water Available to Add at Jobsite	19 Gal.	Total Water Added at Jobsite	5 Gal.	Total Water	2592 Lbs.
	(Target – Actual)/8.33				Water Added at Jobsite*8.33 + Total Water (Actual)

Admixture	Dose	Manufacturer/Type
Air Entraining Agent	14 oz/c.y.	Euclid - AEA 92
Admixture # 1	oz./cwt.	
Admixture # 2	oz./cwt.	

Plant Representative Comments and Signature

Mike Boulder

Field Tests **Field Comments**

Location (Station, etc.)			
End Diaphragm, South			
Air Temp. 54°F	Conc. Temp. 70°F	Cyl. # 3	
Air Content (%) 6.2%	Slump 3.5		

5-694.724 CERTIFIED READY-MIX PLANT DAILY DIARY

Producer's Technicians are required to maintain a daily plant diary that includes the following information: State Project number, yards produced each day, tests performed, material problems, breakdowns, weather, etc., all to the approval of the Engineer.

CERTIFIED READY MIX PLANT DIARY

Plant: Quickmix - Mill City
Date: 4/1/2003
Technician: John Stone
Weather Conditions: Cloudy 60°

SP	MIX	QTY (m^3,y^3)
1020-30	3Y43	185

	Gradation Test ID Numbers					
Fine	12					
Coarse	20	21				

	Time Scales Set					
Moisture	7:15A	10:05A	1:10P			

Remarks: 3/4- ran on the fine side for two consecutive tests. I informed Plant 2 Technician Mike Boulder and called Bill Dozer of Salinger Aggregates.

CERTIFIED READY MIX PLANT DIARY

Plant: Quickmix - Mill City
Date: 4/2/03
Technician: John Stone
Weather Conditions: Sunny 70°

SP	MIX	QTY (m^3,y^3)
1020-30	3Y43	72

	Gradation Test ID Numbers					
Fine	13					
Coarse	22					

	Time Scales Set					
Moisture	6:30A					

Remarks: Met with Bill Dozer. He feels Salinger has identified the aggregate problem and it is corrected.

5-694.725 WEEKLY CERTIFIED READY-MIX PLANT REPORT (Form 24143)

This form is required for Certified Ready-Mix. The Agency Plant Monitor fills out this form. It contains a summary of each week's verification (audit) samples and documents the water content of the observed loads. The original stays with the job file and a copy is sent to the Mn/DOT Concrete Engineering Unit. See Figure A 5-694.725.

5-694.726 AGENCY PLANT MONITOR DAILY DIARY

Agency Plant Monitors are required to maintain a daily plant diary that includes the following information: Time arrived at plant; State Project number; quantity (estimate if necessary) of each mix produced; materials and sources; ID number and type of samples taken; time of departure; additional observations and comments; and the Monitor's signature.

QUICKMIX – MILL CITY 4/1/03

INSP: TOM SANDS
ARR: 8:30 a.m.
DEP: 10:35 a.m.
LAB SAMPLES: #2 CEMENT, #2 FLYASH,
#6A SAND, 3/8- & 3/4-
#12C SAND & #20C 3/8- AND 3/4-
MATERIALS:
SAND & 3/4- = SALINGER - LAKELAND PIT #123456
3/8- = ROCK ISLAND - FALLS CITY PIT 134567
CEMENT = HOLCIM – MASON CITY, IA
FLY ASH = NSP - EAGAN, MN
COMMENTS: JOHN STONE, QUICKMIX'S LEVEL I TECHNICIAN COMPLETED QC TESTING @ 7:15 a.m. FOR TODAY'S SCHEDULED POUR @ 8:00 a.m. THE 3/4- GRADATION (#20C) WAS ON THE FINE SIDE TODAY. JOHN CONTACTED THE PIT TO SEE IF ADJUSTMENTS COULD BE MADE. NO OTHER PROBLEMS.

PROJECTED PRODUCTION:
S.P. 1020-30 3Y43F 160 CY

Tom Sands

TP-24143-04 (2/2003)

Minnesota Department of Transportation

Weekly Certified Ready-Mix Plant Report

Plant: Quickmix - Mill City Week Ending: 4/5/03

List all S.P.'s used during the week: 1020-30

Source Fine Aggregate: Salinger - Lakeland Pit # 123456

Source Coarse Aggregate: Salinger - Lakeland Pit # 123456

Source Coarse Aggregate: Rock Island - Falls City Pit # 134567

Source Coarse Aggregate: Pit #

Source Coarse Aggregate: Pit #

Source Cement: Holcim Mason City Source Fly Ash: NSP - Eagan

Source AEA: Euclid - AEA92 Source Other (Slag, etc)

Source Admixtures:

	SUN		MON		TUE		WED		THUR		FRI		SAT	
Date					4/1		4/2		4/3					
Yd^3 Produced					185		72		196					
	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse	Fine	Coarse
Producer Gradations					1	2	1	1	1	2				
Companion Gradations Run														
S.P.					1020-30		1020-30		1020-30					
Mix Designation					3Y43F		3Y43F		3A22F					
Time of Batch					8:55a		10:00a		10:45a					
Total Free Water lb/yd^3					56		43		39					
Batch Water lb/yd^3					200		202		183					
Total Water lb/yd^3					256		245		222					
Design Water lb/yd^3					271		271		245					
Inspector					T.S.		T.S.		T.S.					

Fine Aggregate Verification Samples

Date	4/1	4/3			
FA#	6	7			
3/8"	100	100			
#4	100	99			
#8	90	89			
#16	73	73			
#30	42	41			
#50	12	12			
#100	2	1			
FM	2.81	2.85			
#200	1.0	.8			
INSP	T.S.	T.S.			

Coarse Aggregate Verification Samples

Date	4/1	4/3							
CA#	6	7							
2"									
1 1/2"									
1 1/4"									
1"	100	100							
3/4"	93	90							
5/8"	83	79							
1/2"	58	53							
3/8"	38	40							
#4	10	11							
INSP	T.S.	T.S.							

5-694.727 WEEKLY CONCRETE REPORT (Form 2448)

This form is a summary of data relating to concrete production including mix design, test results, quantities, etc. and is submitted weekly to the Mn/DOT Concrete Engineering Unit. An interactive computerized version is available on the website which has point and click capabilities, drop down boxes, and automatic calculations.

Item numbers listed below correspond to the numbers on Figure A 5-694.727. See Figure B 5-694.727 for a completed example of a *Weekly Concrete Report* (Form 2448).

Instructions for Completing the Weekly Concrete Report

Item 1: Low S.P.
Use the lowest S.P. or S.A.P. Number for project. Do not create separate reports for each S.P. on a project.

Item 2: Bridge #
If concrete was placed on any part of a bridge structure, list the Bridge Number.

Item 3: Engineer
List the name of the Project Engineer or Project Supervisor.

Item 4: Inspector
List the name of the Chief Inspector responsible for the concrete listed in the weekly report.

Item 5: Contractor
For Ready-Mix list the Concrete Contractor. For paving jobs list the Paving Contractor.

Item 6: Batch Plant
For Ready-Mix Concrete, list the name and the city of the plant. If there is more than one plant with the same name, list the plant number (i.e. Togo Ready-Mix No. 3). If the concrete comes from 2 different plants - 2 Weekly Concrete Reports are required.

Item 7: Report #
Number the reports for each project sequentially starting with Number 1.

Item 8: Week Ending
Enter last date (M/D/YY) (Saturday) of current construction week.

Item 9: Size/Type
List the type of cement (I, II, or III).
List the fly ash class (C or F).
List the grade of slag (100 or 120).
Other is for microsilica, etc.
List the size fractions of aggregate (Sand, 3/4-, 3/4+, CA-50, etc.).
For Admixtures list the type (A, B, A(MR), etc.)

Item 10: Pit # or Manufacturer
The cement, fly ash, pit numbers, and other admixture information are found on the Certificate of Compliance. The pit number is also found on the Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 11: Specific Gravity
This number is found on the Mix Design issued by the Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design. Use specific gravity of 2.58 for fly ash used at Ready-Mix Plants. Use the individual fly ash specific gravity for paving projects.

Item 12: Absorption Factor
This number is found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 13: Mix Designation and Design Weights
List the mix designation and oven dry design weights for each mix. These weights are found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design. List the admixture dosage. This number can be found on the Certificate of Compliance or the Paving Batch Ticket.

Item 14: Design Water
This weight is found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 15: Mix
List the mix designation for the load tested.

Item 16: Date
List the date (M/D/YY) the concrete was placed.

Item 17: Location
List stations for paving jobs. List component name for other work, i.e. W. Abutment, Pier Col #1, SE Wingwall, etc.

Item 18: Time
Indicate the time that the concrete was batched. To display time correctly, type in the actual time, then space, then A or P (8:42 P).

General Notes on Items 19-24

Record ALL concrete tests on this page. Record extra tests taken in addition to those required by the "Schedule of Materials Control." DO NOT list any test averages, instead, list each test INDIVIDUALLY. Attach additional sheets if necessary.

Item 19: % Air
Record the air content to the nearest 0.1%. Compare results with specification 2461.4A4b. Air contents should range between 5% and 8% with a target of 6.5%.

Item 20: Slump
Record the slump to the nearest 5 mm (1/4 in.). Compare the results with Specification 2461.4A4a.

Item 21: Total Actual Water
Indicate the total water in kilograms per cubic meter (pounds per cubic yard) of concrete. This is the sum of the total water printed on the batch ticket and any additional water added at the plant and/or job site divided by the batch size.

Item 22: Cylinder/Beam No.
Indicate the field number of the test specimen. For cylinders, list the field ID number submitted on the *Cylinder ID Card* (Form 2409).

Item 23: Air Temperature
Indicate the ambient air temperature at the time the concrete tests were taken.

Item 24: Concrete Temperature
Indicate the concrete temperature at the time the concrete tests were taken.

Item 25: Water Ratio
This number is determined by dividing the total actual water (Item 21) by the design water (Item 14). This number should not be more than 1.04.

$$\text{Water Ratio} = \frac{\text{Total Actual Water}}{\text{Design Water}}$$

Item 26: Water/Cementitious Ratio
This number is determined by dividing the total actual water (Item 21) by the total design cementitious. Total cementitious includes cement, fly ash, slag, etc.

$$\text{Water/Cement Ratio} = \frac{\text{Total Actual Water}}{\text{Total Design Cementitious}}$$

Item 27: Remarks
List additional information or comments, i.e. change in air added at plant or jobsite, why some test results are out of spec, or where an air test was taken, etc.

Item 28: Additional Remarks
This space is for additional remarks that may have come up during the week that may affect the quality of the concrete.

Item 29: Mix Number
Enter the mix designations used on the project during this week.

Item 30: Date
List the date for each day of the week.

Item 31: Daily Totals
Enter daily totals in cubic meters (cubic yards) for each mix design used.

Item 32: Daily Totals (m^3 or yd^3)
List the daily totals in cubic meters (cubic yards) for all mixes.

Item 33: Weekly Totals (m^3 or yd^3)
List the total quantities for each mix.

Item 34: Grand Total
List the sum total of cubic meters (cubic yards) of concrete placed during the week.

Item 35: Inspector
Handwritten signature of person who filled out Weekly Concrete Report.

Item 36: Phone Number
Phone number of person who filled out Weekly Concrete Report.

Item 37: Engineer/Supervisor
The Project Engineer or Project Supervisor signs the completed report after they have reviewed the document for accuracy.

Mn/DOT WEEKLY CONCRETE REPORT (ENGLISH) - Form 2448-04 (6/20/2002)

Low S.P. 1	Material	Size/ Type	Pit # or Manufacturer	Specific Gravity	Absorp. Factor	Mix #1	Mix #2	Mix #3	Mix #4	Mix #5	Mix #6
						13					
Bridge # 2	Cement	9	10	3.15		13					
	Fly Ash	9	10	11		13					
Engineer 3	Slag	9	10	11		13					
	Other	9	10	11		13					
Inspector 4	F Agg 1	9	10	11	12	13					
	F Agg 2	9	10	11	12	13					
Contractor 5	C Agg 1	9	10	11	12	13					
	C Agg 2	9	10	11	12	13					
Batch Plant 6	C Agg 3	9	10	11	12	13					
	C Agg 4	9	10	11	12	13					
Report # 7	Admix 1	AEA	10			13					
	Admix 2	9	10			13					
Week Ending 8	Admix 3	9	10			13					
					Design Water	14					

Mix	Date	Location	Time	% Air	Slump (in)	Total Act. Water (lb/c.y.)	Cylinder/ Beam #	Air Temp °F	Concrete Temp °F	Water Ratio	W/C Ratio	Remarks
15	16	17	18	19	20	21	22	23	24	25	26	27

Additional Remarks:	Mix Number	30	30	30	30	30	30	30	Week Totals yd³
28	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	Daily Totals yd³	32	32	32	32	32	32	32	34

Inspector: 35 Phone Number: 36 Engineer/Supervisor: 37

Mn/DOT WEEKLY CONCRETE REPORT (ENGLISH) - Form 2448-04 (6/20/2002)

		Material	Size/ Type	Pit # or Manufacturer	Specific Gravity	Absorp. Factor	Mix #1	Mix #2	Mix #3	Mix #4	Mix #5	Mix #6
Low S.P.	1020-30						1A43	3A22	3A32	3Y43		
Bridge #	89002, 89003, 89006	Cement	I	Holcim@Mason City, IA	3.15		507	455	481	549		
		Fly Ash	C	NSP@Eagan, MN	2.58		89	80	85	97		
Engineer	Clay Pitts	Slag										
		Other										
Inspector	Tom Sands	F Agg 1	Sand	123456	2.64	0.008	1372	1256	1229	1193		
		F Agg 2										
Contractor	Pebble Brothers	C Agg 1	3/4-	123456	2.70	0.014	1296	1345	1316	1276		
		C Agg 2	3/8-	134567	2.65	0.016	556	576	564	547		
Batch Plant	Quickmix - Mill City	C Agg 3										
		C Agg 4										
Report #	1	Admix 1	AEA	Euclid - AEA 92				17 oz./c.y.	14 oz./c.y.	14 oz./c.y.		
		Admix 2										
Week Ending	4/5/2003	Admix 3										
						Design Water	276	245	262	271		

Mix	Date	Location	Time	% Air	Slump (in)	Total Act. Water (lb/c.y.)	Cylinder/ Beam #	Air Temp °F	Concrete Temp °F	Water Ratio	W/C Ratio	Remarks
3Y43	4/1/2003	End Diaphragm, South	8:55 AM	6.2%	3.5	260	3	54	70	0.96	0.40	Bridge 89006
3Y43	4/1/2003	End Diaphragm, South	10:15 AM			258				0.95	0.40	Bridge 89006
3Y43	4/1/2003	End Diaphragm, South	11:15 AM	5.2%	3.75	252				0.93	0.39	Bridge 89006
3Y43	4/1/2003	End Diaphragm, South	1:25 AM	6.1%		254		59	72	0.94	0.39	Bridge 89006 AEA = 19 oz./c.y.
3Y43	4/2/2003	Wing Wall	8:15 AM	7.0%	3.5	250				0.92	0.39	Bridge 89002
3Y43	4/2/2003	Wing Wall	10:00 AM		3.75	245				0.90	0.38	Bridge 89002
3A22	4/3/2003	Curb and Gutter	10:20 AM	6.2%		212				0.87	0.40	
3A22	4/3/2003	Curb and Gutter	10:45 AM	5.8%	1.25	222				0.91	0.41	
3A22	4/3/2003	Curb and Gutter	11:15 AM		1	220				0.90	0.41	
3A32	4/3/2003	Curb and Gutter	12:30 AM	6.0%		242		68	70	0.92	0.43	
3A32	4/3/2003	Curb and Gutter	1:55 AM	5.8%	2	240		70	70	0.92	0.42	

Additional Remarks:

Mix Number	3/30/2003	3/31/2003	4/1/2003	4/2/2003	4/3/2003	4/4/2003	4/5/2003	Week Totals yd^3
1A43								
3A22					180.00			180.00
3A32					16.00			16.00
3Y43			185.00	72.00				257.00
Daily Totals yd^3			185.00	72.00	196.00			453.00

Inspector: Tom Sands Phone Number: 651-123-4567 Engineer/Supervisor: Clay Pitts

5-694.730 CONCRETE PAVING REPORTS AND WORKSHEETS

All of the reports and worksheets in sections 5-694.730 through 5-694.745 are used on concrete paving projects. These sections include descriptions and examples of each form. **To obtain a blank form, download a copy of the form from the Mn/DOT Concrete Engineering website at www.mrr.dot.state.mn.us/pavement/concrete/forms.asp.**

5-694.731 CONTRACTOR MIX DESIGN REQUEST FORM

A minimum of 15 days prior to the start of paving operations, the Contractor must submit a *Request for Concrete Mix Approval* and *Job Mix Formula (JMF)* to the Mn/DOT Concrete Engineering Unit for review and approval. The mix is designed by the Contractor based on a volume of 1 cubic meter (cubic yard) according to industry standard practice. The concrete should be designed as Grade A with a water cementitious ratio not greater than 0.40. The JMF contains proportions of materials and individual gradations of each material plus a composite gradation of all materials. The Contractor must also submit working range limits that are shown in the Contract. See Figures A and B 5-694.731 for examples of a Contractor Mix Design and JMF submittal.

5-694.732 PAVING CONTACT REPORT (Form 2164)

Prior to the beginning of a project, an Agency Representative shall perform a thorough on-site inspection of the concrete plant in order to complete a Concrete Paving Plant Contact Report. This Contact Report contains the information necessary to assure that the plant is able to produce concrete meeting specifications, and has a signature block for the Contractor Representative verifying that the plant will remain in that condition. See Figure A 5-697.732 (1-4).

5-694.733 CONCRETE BATCHING REPORT (Form 2152)

This form is for calculating and proportioning mixes by either Mn/DOT or Contractor Technicians. The moisture results are used by the Contractor to make adjustments to the mix design. The free moisture calculated by this test is used on the Microwave Oven Worksheet to determine the water/cementitious (w/c) ratio of the concrete. See Figure A 5-694.733.

REQUEST FOR CONCRETE MIX APPROVAL

Requested by C. Calloway Phone 612-345-6789

Firm Name TUV Paving

Agency Engineer/Inspector Tom Sanders S.P. 8901-23

Proposed Aggregate Sources

	CA #1	CA #2	CA #3	CA #4	Sand
Pit Number	#188888	#188888	#177777		#199999
Pit Name	Rock Island	Rock Island	Pebble Pit		Salinger
Nearest Town	St. Cloud	St. Cloud	St. Cloud		Freeport
Size	1 1/2"	3/4"	3/8"		
Sp.G. & Abs. (Provided by MN/DOT)	2.77 .003	2.74 .004	2.65 .012		2.62 .011

Proposed Cementitious Sources

	Cement	Fly Ash	Other
Manufacturer/Distributor	Graymatter	Asher	
Mill/Power Plant	St. Paul, MN	Carter, MN	
Type/Class	I	C	
Specific Gravity	3.15	2.60	

Proposed Mix Designs

MN/DOT Mix Number		3A21	3A41	3A21HE
Water (lb./C.Y.)		208	212	216
Cement (lb./C.Y.)		450	450	530
Fly Ash (lb./C.Y.)		130	140	70
Other Cementitious (lb./C.Y.)				
W/CM Ratio		0.36	0.36	0.36
Sand (Oven Dry, lb./C.Y.)		1090	1085	1095
CA #1 (Oven Dry, lb./C.Y.)		770	680	775
CA #2 (Oven Dry, lb./C.Y.)		910	985	870
CA #3 (Oven Dry, lb./C.Y.)		390	390	390
CA #4 (Oven Dry, lb./C.Y.)				
% Air Content		6.5%	6.5%	6.5%
Admix#1(oz/100#CMT;oz/yd^3)	Ajax	4.0 oz/yd^3*	3.5 oz/yd^3*	5.0 oz/yd^3*
Admix#2(oz/100#CMT;oz/yd^3)	WRXX	35.0 oz/yd^3	36.0 oz/yd^3	30.0 oz/yd^3
Admix#3(oz/100#CMT;oz/yd^3)				

*Must be adjusted to maintain air content

The above mixes are approved for use, contingent upon satisfactory site performance and continuous acceptability of all materials sources, by:

Max Designer — Concrete Engineering Specialist

4/1/2003 — DATE

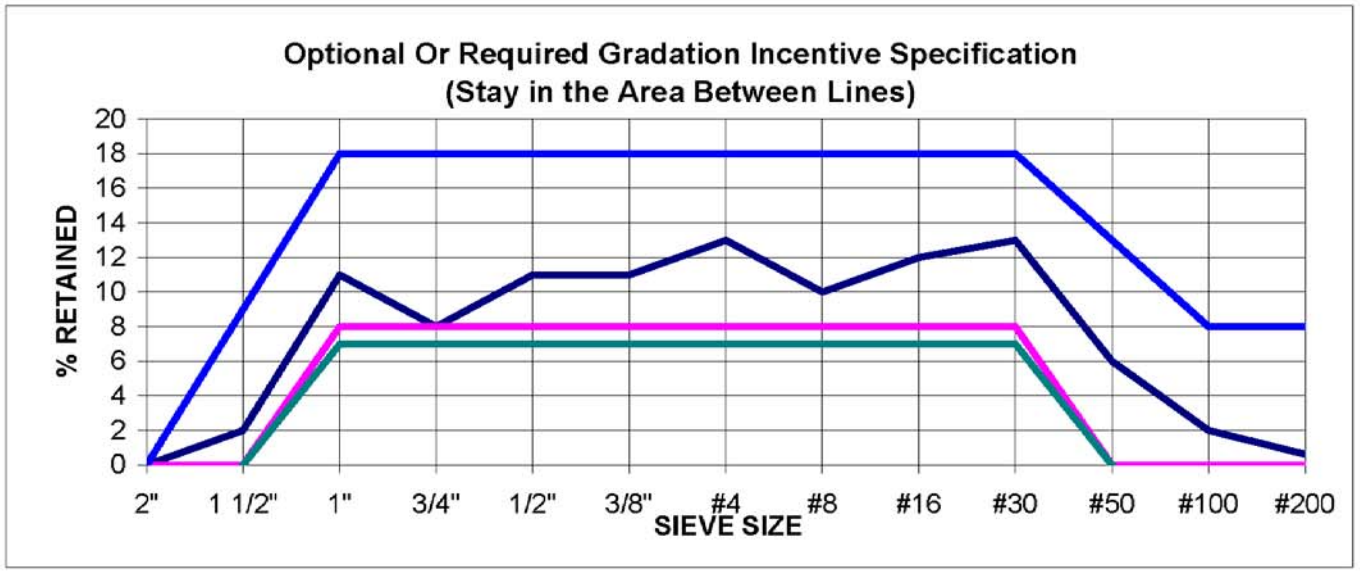
Comments:

8901-23 JMF submittal.xls
Job Mix Formula

AGGREGATE SIZE PROPORTION, %	CA #1 1 1/2" 14.00%	CA #2 3/4" 32.00%	CA #3 3/8" 12.00%	CA #4	FA #1 Sand 42.00%	FA #2	TOTAL % PASSING 100.00%	WORKING RANGE LIMITS	JMF WORKING RANGE		TOTAL % RETAINED
2"	100.0	100.0	100.0		100.0		**100**	± 5	95	100	**0**
1 1/2"	84.0	100.0	100.0		100.0		**98**	± 5	93	100	**2**
1"	7.5	100.0	100.0		100.0		**87**	± 5	82	92	**11**
3/4"	1.5	79.0	100.0		100.0		**79**	± 5	74	84	**8**
1/2"	1.1	46.0	92.0		100.0		**68**	± 5	63	73	**11**
3/8"	0.0	22.5	67.0		100.0		**57**	± 5	52	62	**11**
#4	0.0	2.1	7.5		100.0		**44**	± 5	39	49	**13**
#8	0.0	0.0	0.0		81.0		**34**	± 4	30	38	**10**
#16	0.0	0.0	0.0		52.0		**22**	± 4	18	26	**12**
#30	0.0	0.0	0.0		21.5		**9**	± 4	5	13	**13**
#50	0.0	0.0	0.0		7.0		**3**	± 3	0	6	**6**
#100	0.0	0.0	0.0		2.9		**1**	± 2	0	3	**2**
#200	0.0	0.0	0.0		0.9		**0.4**	1.6% max	0.0	2.0	**1**

Workability Factor
(% passing #8)
34

Coarseness Factor
(% retained above 3/8" / % retained above #8)
65



TP-2164-01 (3/2002) dual

Minnesota Department of Transportation

Contact Report – Paving 2003

Owner's Name: TUV Paving Date: 5/1/2003

Set Up Location: St. Cloud Phone: 612-987-6543

Plant Superintendent: Bill Batcher Fax: 612-987-3456

Prior to the production of Agency concrete **for a paving project**, an Agency Representative shall perform a thorough on-site inspection of the portable concrete plant to assure that the plant can produce concrete meeting Mn/DOT Specifications.

In addition, the Concrete Producer must also provide the following copies of documentation:

☑ **Lab Equipment Calibrations** Producer must check and calibrate the sieves prior to starting production. The date of calibration should be clearly marked on the equipment using the procedures described in the Mn/DOT Lab Manual 2001, 2002, 2008, and 2009.

☑ **Scale and/or Meter Calibrations** An approved scale company or the Minnesota Department of Public Service must check and calibrate the scales. They are checked each time a portable plant is set-up. Calibrations are made using the procedures described in the Mn/DOT Concrete Manual 5-694.431 and 5-694.433.

☑ **Batch Ticket** A computerized ticket that includes all Mn/DOT Specifications and supporting information.

☑ **Technicians**

Mn/DOT Certified Plant 1 Technician Whitey Walker Cert # 996633

Mn/DOT Certified Plant 1 Technician _____ Cert # _____

Mn/DOT Certified Plant 2 Technician Sandy Beaches Cert # 991188

Mn/DOT Certified Plant 2 Technician Cell phone # 612-987-1111

Agency Representative: Lee Bean

☑ Approved for concrete paving production on S.P. 8901-23

☐ Re-inspected and approved on _____ by _____

☐ Not approved for the following reason/s: _____

The Concrete Producer agrees to maintain all plant and laboratory equipment within allowable tolerances as set forth in the Mn/DOT Specifications, to have all required tests run by a Plant Level I Technician certified by Mn/DOT, and to have the Plant Level II Technician certified by Mn/DOT on site at all times or available at the plant site in a reasonable time frame when called.

After completing the Concrete Plant Contact Report, any procedural changes that cause non-compliance will result in cessation of further production of Agency concrete.

Verified by: Bill Batcher

Plant Representative

Plant and Lab

Type of Mixer:

Type of Plant: Ready Mix _____ Paving __X__

Make: __Rex__ Model: __S__

Condition: __Serviceable__

Single Drum ___ Dual Drum __X__

Max. mixer batch size __8__ yd^3

Batching Equipment: Make: __Seltec__ Model: __1A__

All Dump Trucks are equipped with vibrators (y/n): __Y__ (Spec 2301.3D)

Batch Ticket:

Computerized Batch Printout (y/n)**: __Y__ English/Metric Conversion: __Y__

NOTE: The (**) items are required

____ **a**. Name of Plant	____ **g**. Truck #	____ **m**. Admix Product Name
____ **b**. Contractor	__X__ **h**. Yd^3/load	____ **n**. Pit Number
__X__ **c**. Date	__X__ **i**. Yd^3/Cum	__X__ **o**. Admix Qty
__X__ **d**. Agency Project #	__X__ **j**. Mix Design	____ **p**. Design Wts
__X__ **e**. Mixing Time	____ **k**. Cement Brand & Mill	____ **q**. Design Water
__X__ **f**. Batch Time	____ **l**. Fly Ash Power Plant	__X__ **s**. W/C Ratio

__X__ **r**. **Target and Actual Batched Wts of all components; and Trim and Total Water Wts

Scale and Meter Information:

Material	Type	Make	Capacity	Graduation	Date of Scale and Meter Calibration
Cement	Digital	Seltec	10,000 lb.	5 lb.	4/30/2003
Fly Ash	Digital	Seltec	10,000 lb.	5 lb.	4/30/2003
Slag					
Aggregate	Digital	Seltec	40,000 lb.	20 lb.	4/30/2003
Water Scale					
Water Meter	Digital	Badger	300	1 gallon	4/30/2003

Plant Lab – Office (2301.3A2):

Dimensions	**Plant Office**	**Plant Lab Furnishings**
__X__ Total Floor Area (224 ft^2)	__X__ 2 Desks	__X__ Workbench (30 in. x 144 in.)
__X__ Total Lab Area (144 ft^2)	__X__ Sufficient Seating	__X__ Shelf Space (8 ft. x 8 in.)
__X__ Total Office Area (80 ft^2)	__X__ 2 file cabinets	
__X__ Areas Separated by a Wall	__X__ Working Telephone	

__X__ Working Fax Machine (with cellular capability or dedicated line)

__X__ Working Copy Machine (or Fax machine with copier)

Materials

Cementitious Materials:

Material	Supplier w/Mill	# of Silos	Capacity (tons)	Delivered To Hopper By (gravity, auger)
Cement	Graymatter @ St. Paul, MN	1	240	Auger
Fly Ash	Asher @ Carter, MN	1	75	Auger
Slag				
Other				

Automatic Cement Recording __y__

Admixtures:

Type	Supplier	Name of Product	Sampled At (dispensing tubes recommended)
A.E.A.	Adcon	Ajax	Dispensing Tube
Water Reducer	Adcon	WRXX	Dispensing Tube
Other			

Does AEA bulk storage tank hold at least 300 gallons (2301.3F1) __y__

Aggregates:

Material	Aggregate Class (A, B, C, R)	Supplier	Pit Location	Pit Number	Delivered By	In Plant storage (tons)
Sand		Salinger	Freeport	199999	Truck	20
3/4"+ (19mm+)	C	Rock Island	St. Cloud	188888	Truck	15
3/4"- (19mm-)	C	Rock Island	St. Cloud	188888	Truck	20
1/2"- or 3/8"- (12.5mm or 9.5mm)	C	Pebble Pit	St. Cloud	177777	Truck	5

Plant is fed by: Field hoppers __X__ How many __4__

Number of working bins __4__

Are stockpiles separated (y/n) __Y__

How many belts feed plant working bins __4__

Is turn head used (y/n) __N__

Aggregate sampled at: Belt __X__ Stockpile ____

Water:

Source:

__X__ City Water

____ Well Water

____ Other - What?_____

Proportioned by:

__X__ Meter

____ Scale

Can water be heated with a boiler (y/n) __N__

Temperature gauge location: __On Water Tank__

Equipment

Equipment:

Mechanical Shakers, Screens and Sieves

Box Screens: **Must have all screens listed below** **Calibrated on** 2/25/2003

X 2" (50mm)	X 3/4" (19.0mm)	X #4 (4.75mm)
X 1 1/2" (37.5mm)	____ 5/8" (16mm)*	X Bottom Pan
X 1 1/4" (31.5mm)*	X 1/2" (12.5mm)	X Mechanical Shaker
X 1" (25mm)	X 3/8" (9.5mm)	

*Sieves Not Required

NOTE: Additional fill-in sieves may need to be added to prevent overloading.

Brass Sieves: **Must have all sieves listed below** **Calibrated** on 2/25/2003

X 3/8" (9.5mm)	X #30 (600µm)	X Bottom Pan
X #4 (4.75mm)	X #50 (300µm)	X Mechanical Shaker
X #8 (2.36mm)	X #100 (150µm)	
X #16 (1.18mm)	X 2 - #200 (75µm)	

NOTE: Two #200 (75µm) sieves are needed, one is for shaking the gradation and the second is for washing the sample during the final steps of the gradation process.

Scales, Microwave Oven Equipment and Miscellaneous

Scales:

____ Dairy Scale	Calibrated on _____	**MINIMUM 55 lb CAPACITY**
____ Platform Scale	Calibrated on _____	**MINIMUM 55 lb CAPACITY**
X Electronic Scale	Calibrated on 2/25/2003	**MINIMUM 55 lb CAPACITY**
____ Triple Beam Balance including the needed Hanging Weights (1 - 500g and 2 - 1000g) Calibrated on_____		**MINIMUM 2600g CAPACITY**
X Electronic Scale	Calibrated on 2/25/2003	**MINIMUM 2600g CAPACITY**

Microwave Oven and Ancillary Equipment:

- X Microwave Oven with turntable or wave deflection fan (900 Watt)
- X Heat resistant glass pan (~ 9" x 9" x 2")
- X Plain weave fiberglass cloth (10 oz./yd^2 and 14 mils thick)
- X Metal scraper and grinding pestle

Miscellaneous:

- X 2" (50mm) Sample Splitter with 3 Pans
- X 3 Burners (minimum): Electric or Gas

TP 2152-02 (3/2001)

Minnesota Department of Transportation

Concrete Batching Report

Batch Plant TUV Paving Batch Plant Date 5/8/2003

Material		Sand	1 1/2	3/4	3/8								Average Free Water (Not Weighted)
A. Wt. Sample + Pan	Wet	722	2328	2336	1294								
B. Wt. Sample + Pan	Dry	692	2306	2298	1247								
C. Moisture Loss	A–B	30	22	38	47								
D. Tare Wt, Pan	-	145	300	300	145								
E. Dry Wt. Sample	B–D	547	2006	1998	1102								
F. Total Moisture Factor	C/E	.055	.011	.019	.043								
G. Absorb. Factor	-	.011	.003	.004	.012								
H. Free Moisture Factor	F-G	.044	.008	.015	.031								
I. Time Scales Set					8:50 a.m.								
		Mix No. 3A21			**Cement Wt.** 450			**Fly Ash Wt.** 130			**Design Water** 208		
J. Design Wt.	-	1090	770	910	390								
K. Total Moisture	FxJ	60	8	17	17								
L. Scale Setting	J+K	1150	778	927	407								
M. Free Moisture	HxJ	48	6	14	12								
Total Free Moisture				80									
		Mix No.			**Cement Wt.**			**Fly Ash Wt.**			**Design Water**		
J. Design Wt.	-												
K. Total Moisture	FxJ												
L. Scale Setting	J+K												
M. Free Moisture	HxJ												
Total Free Moisture													
		Mix No.			**Cement Wt.**			**Fly Ash Wt.**			**Design Water**		
J. Design Wt.	-												
K. Total Moisture	FxJ												
L. Scale Setting	J+K												
M. Free Moisture	HxJ												
Total Free Moisture													
		Mix No.			**Cement Wt.**			**Fly Ash Wt.**			**Design Water**		
J. Design Wt.	-												
K. Total Moisture	FxJ												
L. Scale Setting	J+K												
M. Free Moisture	HxJ												
Total Free Moisture													

5-694.734 CONCRETE W/C RATIO CALCULATION WORKSHEET

This worksheet is used to determine the water/cementitious ratio of the concrete. This information is needed for calculating the Contractor's incentives and disincentives for w/c ratio. A computerized version of this worksheet is available to download on the Mn/DOT Concrete Engineering Unit website at www.mrr.dot.state.mn.us/pavement/concrete/paving.asp.

Record all results on the Concrete W/C Ratio Calculation Worksheet. See Figure A 5-694.734 for a completed example. The abbreviations in bold caps listed after some of the instructions, correspond to the Concrete W/C Ratio Calculation Worksheet and are used in formulas on that worksheet.

A. Equipment Required for Microwave Oven Test (Supplied By Contractor)

- 900-watt microwave with a turntable or wave deflection fan and of sufficient size for glass pan
- Heat resistant glass pan approximately 9" x 9" x 2"
- Plain weave fiberglass cloth, 10 oz./yd and 14 mils thick
- Weighing scales for the microwave oven (5000 g min.) and the unit weight tests (100 lb. min.)
- Metal scraper and porcelain grinding pestle

B. Sampling Aggregates and Fresh Concrete Procedure

1. Take aggregate samples from belts for moisture content tests. Record results on the *Concrete Batching Report* (Form 2152). See Figure A 5-694.733.
2. Take sample of concrete from the batch representing the aggregates that were sampled for moistures. This is usually between four and ten loads from when the aggregate samples were taken for moisture testing. Ask the batchperson to help determine the correct interval. If a ready-mix truck that has the ability to add additional water is transporting the concrete, the concrete sample is taken at the point of placement in the field and protected from moisture loss until the test can begin, otherwise the fresh concrete is sampled at the plant.
3. Take samples large enough to run a unit weight test - 20 kg for a 0.007 m^3 (45 lb. for a 0.25 ft^3 bucket) and 1500 grams for a microwave oven test.

C. Unit Weight Test Procedure

1. Determine the volume of the unit weight bucket. It is typically written on the bucket. (**VOL)**
2. Weigh the unit weight bucket empty. (**BWT)**
3. On a level surface, fill container in 3 equal layers, slightly overfilling the last layer. Rod each layer 25 times with a 16 mm (5/8 in.) hemispherical end of rod, uniformly distributing strokes for a 14 L (0.5 ft^3) or smaller container. Rod each layer 50 times for a 28 L (1 ft^3) container.
4. Rod bottom layer throughout its depth without forcibly striking bottom of container.
5. Rod the middle and top layer throughout their depths and penetrate 25 mm (1 in.) into the underlying layer.
6. Tap the sides of the container smartly 10 to 15 times with the mallet after rodding each layer.
7. Strike off concrete level with top of container using a flat plate (or flat bar) and clean off rim.
8. Weigh the unit weight bucket with the concrete. (**CBWT)**
9. Calculate the unit weight. (**UW)**

D. Microwave Oven Test Procedure

1. The water content test must begin within 45 minutes after the water has contacted the cementitious material.
2. Weigh heat resistant glass pan and fiberglass cloth to the nearest 0.1 gram. (**WS)**
3. Weigh the pan, cloth and fresh concrete to the nearest 0.1 gram. (**WF)**
4. Microwave the sample at several time intervals until the sample has lost less than 1.0 gram within a two-minute interval. (5 min, 5 min, 2 min, 2 min, etc.) Break up the sample with grinding pestle between microwaving. (**WD)**
5. Calculate the **Water Content Percentage**. (**WC)**

$$WC\% = \frac{100 \times (WF - WD)}{(WF - WS)}$$

6. Calculate the **Total Water Content in Concrete**. (**WT)**

$$WT(kg/m^3) = WC \times UW$$

$$WT(lb/yd^3) = 27 \times WC \times UW$$

E. W/C Ratio Calculations

1. Calculate the **Total Absorbed Moisture** for all of the aggregates. The absorbed moisture content should remain the same throughout the project unless the mix design changes.

$$Absorbed\ Moisture\ (kg/m^3)\ or\ (lb/yd^3) = Oven\ Dry\ Batch\ Weight \times Absorption\ Factor$$

2. Calculate the **Total Cementitious** in the concrete mix design.
3. Calculate the **Total Free Moisture** in the aggregates. The free moisture is calculated by the Agency using the moistures taken at the time just before the concrete was sampled.
4. Calculate the **Total Batch Water**. The batch water and temper water is usually reported on the computer screen and printed in Liters (gallons) for the entire batch. The total batch water for calculating w/c is based on the average water compared from 10 batch tickets/Certificate of Compliances surrounding the randomly selected batch ticket/Certificate of Compliance sample (4 previous tickets, ticket representing sample taken, and 5 following tickets.)
5. Calculate the **Actual Batch Water** used.

$$Actual\ Batch\ Water\ (kg/m^3) = \left(\frac{Total\ Batch\ Water}{Batch\ Size}\right)$$

$$Actual\ Batch\ Water\ (lb/yd^3) = \left(\frac{Total\ Batch\ Water \times 8.33\ lb/1\ gallon}{Batch\ Size}\right)$$

6. Calculate the **Total Mix Water** used.

$$Total\ Mix\ Water\ (kg/m^3)\ or\ (lb/yd^3) = Actual\ Batch\ Water + Total\ Free\ Moisture$$

7. Calculate the **W/C Ratio** of the concrete. Round to the nearest 0.01.

$$w/c\ ratio = \frac{Total\ Mix\ Water}{Total\ Design\ Cementitious}$$

8. Calculate the **Total Water in Concrete** used. **Compare to Total Water in Concrete (WT)**.

$$Total\ Water\ (kg/m^3)\ or\ (lb/yd^3) = Total\ Mix\ Water + Absorbed\ Moisture$$

9. Calculate **Maximum Batch Water Available**. Compare this to the batching computer.

$$Max.\ Batch\ Water(L) = \{[(Cement + Fly\ Ash + Slag) \times 0.40] - Total\ Free\ Moisture\} \times Batch\ Size$$

$$Max.\ Batch\ Water(gal) = \frac{\{[(Cement + Fly\ Ash + Slag) \times 0.40] - Total\ Free\ Moisture\} \times Batch\ Size}{8.33\ lb/1\ gallon}$$

F. Percent Passing the 4.75 mm (No.4) Sieve

Weight of Sample Passing 4.75 mm (No.4) Sieve from Microwave Oven Sample

1. Let microwave oven sample cool.
2. Sieve dried sample through a 4.75 mm (No.4) sieve into a bottom pan.
3. Calculate the percent passing the 4.75 mm (No.4) sieve.

Percent Passing 4.75 mm (No.4) Sieve from Total Mix (Contractor Mix Design)

Calculate the percent passing the 4.75 mm (No.4) sieve of all of the dry materials using the Contractor's mix design (aggregates, cement, fly ash, etc.).

$$\%Passing\ 4.75\ mm\ (No.4) = \left[\frac{\left(\begin{array}{c}(\%\ passing\ 4.75\ mm\ (No.4)\ from\ JMF \times (wt.\ of\ all\ CA\ and\ FA)) \\ + (wt.\ of\ all\ cementitous)\end{array}\right)}{Total\ wt.\ of\ all\ CA\ and\ FA\ and\ all\ cementitious}\right] \times 100$$

Correction Factor

1. Calculate the Correction Factor to compare the two results to verify that the sample of concrete was representative.

$$CF = \frac{1 - (\%passing\ 4.75\ mm\ (No.4)\ of\ microwave\ oven)}{1 - (\%passing\ 4.75\ mm\ (No.4)\ of\ mix\ design)}$$

2. Determine the **Adjusted Total Water in Concrete** Microwave Oven Sample by multiplying the **Correction Factor**, **CF** by **Total Water in Concrete**, **WT.**

3. Compare the **Adjusted Total Water in Concrete** Microwave Oven **(L)** to the **Total Water in Concrete** calculation from the batch ticket **(F)**.

5-694.735 AGGREGATE MOISTURE CONTENT CHART

Quality Control charts are a visual and statistical method of tracking aggregate moistures in order to achieve better quality control of the concrete. This chart is used as an aid for Contractor and Agency Plant Personnel. See Figure A 5-694.735.

5-694.736 W/C RATIO QUALITY CONTROL CHART

This chart is used to track the w/c ratio of the concrete through the entire project. See Figure A 5-694.736.

5-694.737 CONCRETE AGGREGATE WORKSHEET JMF (Form 21764)

This worksheet is used for calculating gradations on Paving Projects using Combined Total Gradations (JMF). There is a non-computerized and computerized version of this worksheet. See Figure A 5-694.737.

5-694.738 COMPOSITE GRADATION (WELL-GRADED AGGREGATE) CHART

Quality Control charts are a visual and statistical method of tracking gradations in order to achieve better quality control of concrete aggregates. The results of the Contractor's gradations are recorded on the well-graded aggregate chart. The percent retained for each required individual sieve from the composite gradation are graphed on this chart. Review the Special Provisions for your project to determine if well-graded aggregate is required or is an optional incentive. See Figure A 5-694.738.

5-694.739 INCENTIVE WORKSHEETS

The incentive/disincentive provisions only apply to materials provided for or produced by the Contractor's primary concrete paving plant. The primary paving plant is either a batch plant or a ready mix plant. They do not apply to materials provided for or produced by a secondary concrete plant providing concrete for minor work such as fill-ins or other work not provided by the Contractor's primary concrete plant.

These worksheets are used to determine the water/cementitious ratio and well-graded aggregate incentives and disincentives for a paving project. Refer to the Special Provisions and 5-694.532 for an explanation of lots and sublots for w/cm ratio. See Figure A 5-694.739.

The Agency's statistical analysis of samples for well-graded aggregate control incentive is based on a lot representing one days paving. The lot represents the cumulative average of the sublot values on each sieve. Compliance is based on Contractor's aggregate gradation test results as verified by Agency testing. See the Special Provisions and Figure B 5-694.739 for an example.

CONCRETE W/C RATIO CALCULATION WORKSHEET (ENGLISH)

BATCH SIZE (yd^3) 7.5

MIX DESIGN 3A21

	OVEN DRY WEIGHT	X ABS. FACTOR	= ABS. MOISTURE
COARSE AGG. (1 1/2)	770	0.003	2.31
COARSE AGG. (3/4)	910	0.004	3.64
COARSE AGG. (3/8)	390	0.012	4.68
COARSE AGG.			
SAND	1090	0.011	11.99
CEMENT	450		22.62 **TOTAL ABSORBED MOISTURE** (A)
FLY ASH	130		
SLAG			**TOTAL CEMENTITIOUS**
WATER	208		CEMENT + FLY ASH + SLAG = 580 LB. (B)

S.P.	8901-23
DATE	5/8/2003
TIME	8:50 AM
TICKET #'S	27-36
LOT #	3
TEST #	10
TESTER	L. Bean
ENGINEER	T. Sanders

WATER CALCULATION

(1 1/2) FREE MOISTURE	FROM CONCRETE BATCHING REPORT	6
(3/4) FREE MOISTURE	FROM CONCRETE BATCHING REPORT	14
(3/8) FREE MOISTURE	FROM CONCRETE BATCHING REPORT	12
FREE MOISTURE	FROM CONCRETE BATCHING REPORT	
SAND FREE MOISTURE	FROM CONCRETE BATCHING REPORT	48

TOTAL FREE MOISTURE IN AGGREGATE PER YARD 80 (C)

ACTUAL BATCH WATER USED PER YARD TOTAL BATCH WATER (GAL) x 8.33 / BATCH SIZE 133.6 (D)

TOTAL MIX WATER USED, BATCH + FREE: (C + D) 213.6 (E)

W/C RATIO, TOTAL MIX WATER / (CEMENT + FLY ASH + SLAG): (E / B) 0.37

TOTAL WATER IN CONCRETE, (TOTAL MIX + ABS): (A + E) 236.2 (F)

UNIT WEIGHT TEST

VOLUME OF UNIT WEIGHT BUCKET, **VOL**	0.25 ft^3	
WT OF UNIT WEIGHT BUCKET, **BWT**	7.95 lb.	
WT OF UNIT WEIGHT BUCKET AND CONCRETE, **CBWT**	43.5 lb.	
WT OF CONCRETE, (CBWT - BWT), **CWT**	35.55 lb.	
UNIT WEIGHT OF CONCRETE, CWT / VOL, **UW**	142.2 lb/ft^3	

MICROWAVE OVEN TEST

WT. OF PAN AND CLOTH, **WS**	1081.6	
WT. OF PAN, CLOTH AND FRESH CONCRETE, **WF**	2632.2	
WT. OF PAN, CLOTH AND DRY CONCRETE, **WD**	2539.3	
WATER CONTENT %, 100x(WF-WD)/(WF-WS), **WC**	6.0%	
TOTAL WATER IN CONCRETE, 27xWCxUW, **WT**	230.4 lb/yd^3 (G)	
	COMPARE (G) TO (F) ABOVE	

TOTAL BATCH WATER

TICKET #	BATCH WATER	TEMPER WATER
27	116	2
28	118	0
29	118	3
30	119	2
31	118	3
32	118	2
33	118	3
34	118	3
35	118	2
36	118	4
AVE.	117.9	2.4

TOTAL BATCH WATER 120.3

MAXIMUM BATCH WATER AVAILABLE

((B)*0.40]-C))*BATCH SIZE/8.33

136.9 gal

% PASSING #4 SIEVE

WT. OF SAMPLE PASSING #4 SIEVE, **W4**	706.3	
% PASSING #4, W4 / (WD - WS)	48.5 %	(H)
% PASSING #4 FROM JMF	44.0 %	(I)
% PASSING #4 FROM TOTAL MIX	52.7 %	(J)

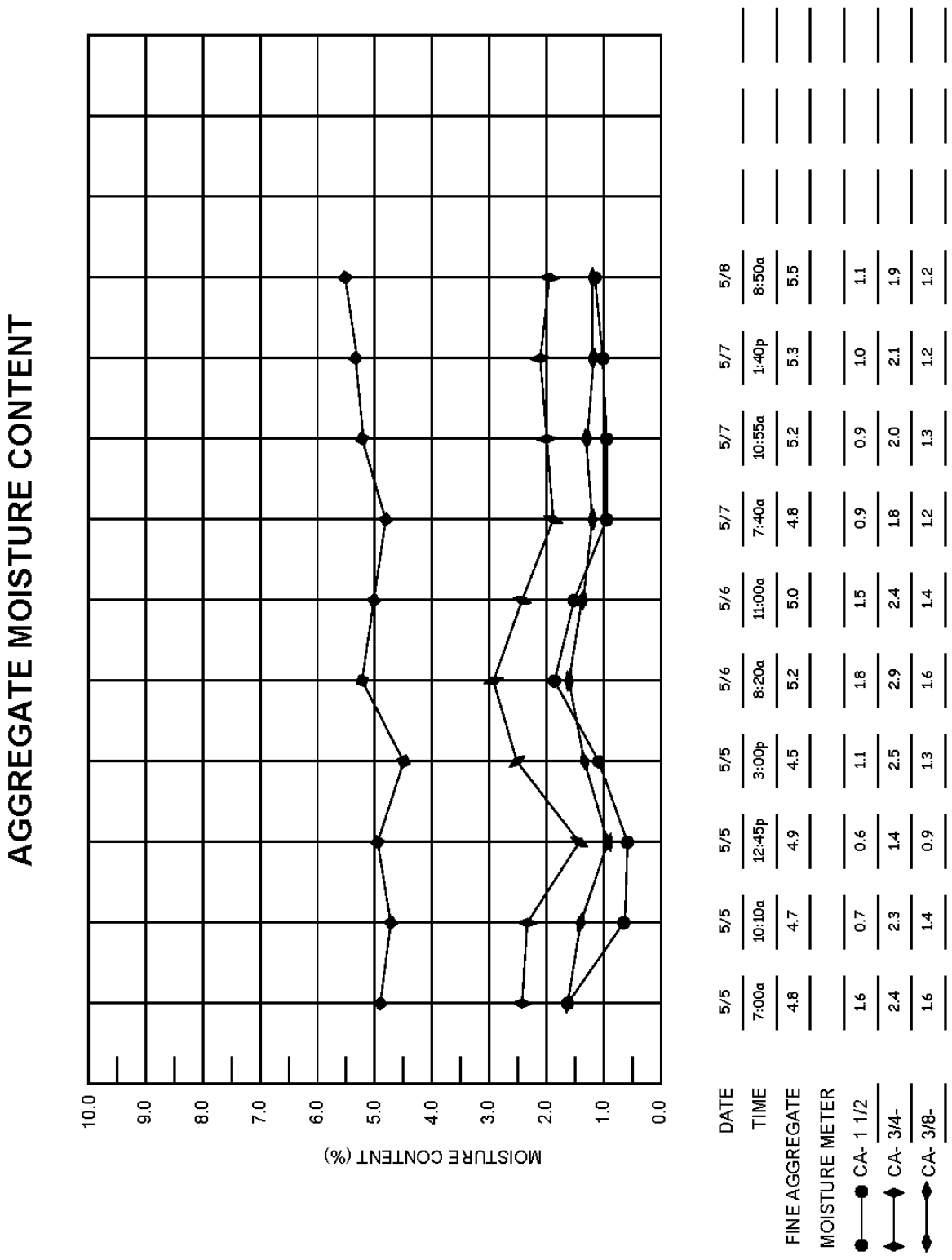
$$\left[\frac{[(\text{Wt. of CA + FA}) \times \text{I}) + \text{B})]}{(\text{Wt. of CA + FA}) + \text{B}}\right] \times 100$$

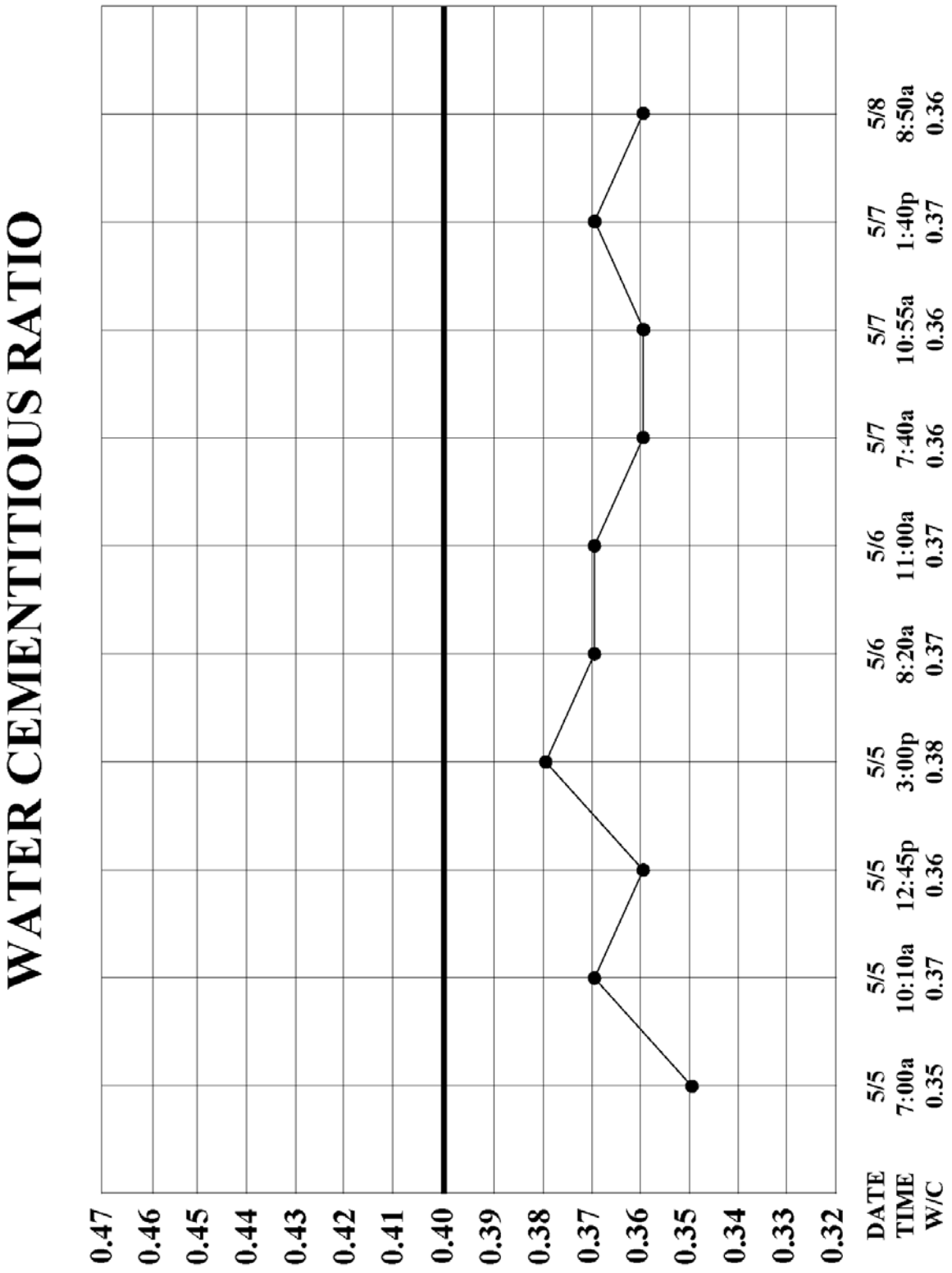
CORRECTION FACTOR

CF, 1 - H / 1 - J 1.09 (K)

ADJUSTED TOTAL WATER IN CONCRETE, G x K 251.1 (L)

COMPARE (L) TO (F) ABOVE


AGGREGATE MOISTURE CONTENT
MOISTURE CONTENT (%)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
DATE
TIME
FINE AGGREGATE
MOISTURE METER
CA- 1 1/2
CA- 3/4-
CA- 3/8-
5/5 7:00a 4.8 1.6 2.4 1.6
5/5 10:10a 4.7 0.7 2.3 1.4
5/5 12:45p 4.9 0.6 1.4 0.9
5/5 3:00p 4.5 1.1 2.5 1.3
5/6 8:20a 5.2 1.8 2.9 1.6
5/6 11:00a 5.0 1.5 2.4 1.4
5/7 7:40a 4.8 0.9 1.8 1.2
5/7 10:55a 5.2 0.9 2.0 1.3
5/7 1:40p 5.3 1.0 2.1 1.2
5/8 8:50a 5.5 1.1 1.9 1.2


WATER CEMENTITIOUS RATIO
0.47
0.46
0.45
0.44
0.43
0.42
0.41
0.40
0.39
0.38
0.37
0.36
0.35
0.34
0.33
0.32
DATE 5/5 5/5 5/5 5/5 5/6 5/6 5/7 5/7 5/7 5/8
TIME 7:00a 10:10a 12:45p 3:00p 8:20a 11:00a 7:40a 10:55a 1:40p 8:50a
W/C 0.35 0.37 0.36 0.38 0.37 0.37 0.36 0.36 0.37 0.36

Mn/DOT Concrete Aggregate Worksheet (JMF) Mn/DOT Form 21764-04 (3/2003)

S.P.	8901-23	Plant:	TUV Paving	Date:	5/8/2003	Aggregate Sources:		FA #1	199999	FA #2		
Engineer:	T. Sanders	Tester:	L. Bean	Time:	9:15 AM	CA #1	188888	CA #2	188888	CA #3	177777	CA #4

Sieve Analysis of Coarse Aggregate

	Test No.	10			Test No.	10			Test No.	10			Test No.	10		
	Sample Wt.	6868.10			Sample Wt.	4716.90			Sample Wt.	4495.60			Sample Wt.			
Aggregate	CA #1	1 1/2"			CA #2	3/4"			CA #3	3/8"			CA #4			
Fraction	Mix Prop.	14%			Mix Prop.	32%			Mix Prop.	12%			Mix Prop.			
Sieve Sizes	Weights		%	Grad.	Weights		%	Grad.	Weights		%	Grad.	Weights		%	Grad.
Pass - Ret.	Ind.	Cum.	Pass	Req.	Ind.	Cum.	Pass	Req.	Ind.	Cum.	Pass	Req.	Ind.	Cum.	Pass	Req.
2" - 1 1/2"	1360.50	6868.10	100.0%		0.00	4716.90	100.0%		0.00	4495.60	100%					
1 1/2" - 1 1/4"	2804.20	5507.60	80.2%		0.00	4716.90	100.0%		0.00	4495.60	100%					
1 1/4" - 1"	2240.10	2703.40	39.4%		117.80	4716.90	100.0%		0.00	4495.60	100%					
1" - 3/4"	342.60	463.30	6.7%		891.50	4599.10	97.5%		13.60	4495.60	100%					
3/4" - 5/8"	39.20	120.70	1.8%		1643.20	3707.60	78.6%		429.00	4482.00	100%					
5/8" - 1/2"																
1/2" - 3/8"	6.10	81.50	1.2%		851.00	2064.40	43.8%		1215.50	4053.00	90%					
3/8" - #4	2.80	75.40	1.1%		1112.70	1213.40	25.7%		2417.20	2837.50	63%					
#4 - Btm	72.60	72.60	1.1%		100.70	100.70	2.1%		420.30	420.30	9%					
Check Total	6868.10	± 100 g of Sample Wt			4716.90	± 100 g of Sample Wt			4495.60	± 100 grams of Sample Wt				± 100 grams of Sample Wt		

Sieve Analysis of Fine Aggregate

	Test No.	10		Test No.	10	
Aggregate	Sample Wt.	498.5		Sample Wt.		
Fraction	Mix Prop.	42%		Mix Prop.		
Sieve Sizes	Weights		%	Weights		%
Pass - Ret.	Ind.	Cum.	Pass	Ind.	Cum.	Pass
3/8" - #4	0.0	497.8	100.0%			
#4 - #6	76.4	497.8	100.0%			
*#6 - #8						
#8 - #16	146.7	421.4	84.7%			
#16 - #30	145.2	274.7	55.2%			
#30 - #50	86.3	129.5	26.0%			
#50 - #100	30.0	43.2	8.7%			
#100 - #200	5.5	13.2	2.7%			
*#200 - Btm	1.2	7.7	1.5%			
Loss by Washing	6.5	6.5	1.3%			
Check Total	497.8	± 2 g of Sample Wt			± 2 g of Sample Wt	

Percent Passing #200 Sieve Test

	CA #1	CA #2	CA #3	CA #4	FA #1	FA #2
(A) Dry weight of original sample					498.4	
(B) Dry weight of washed sample					491.9	
(C) Loss by washing (A-B)					6.5	
(D) % Passing #200 (C/A)*100					1.3	

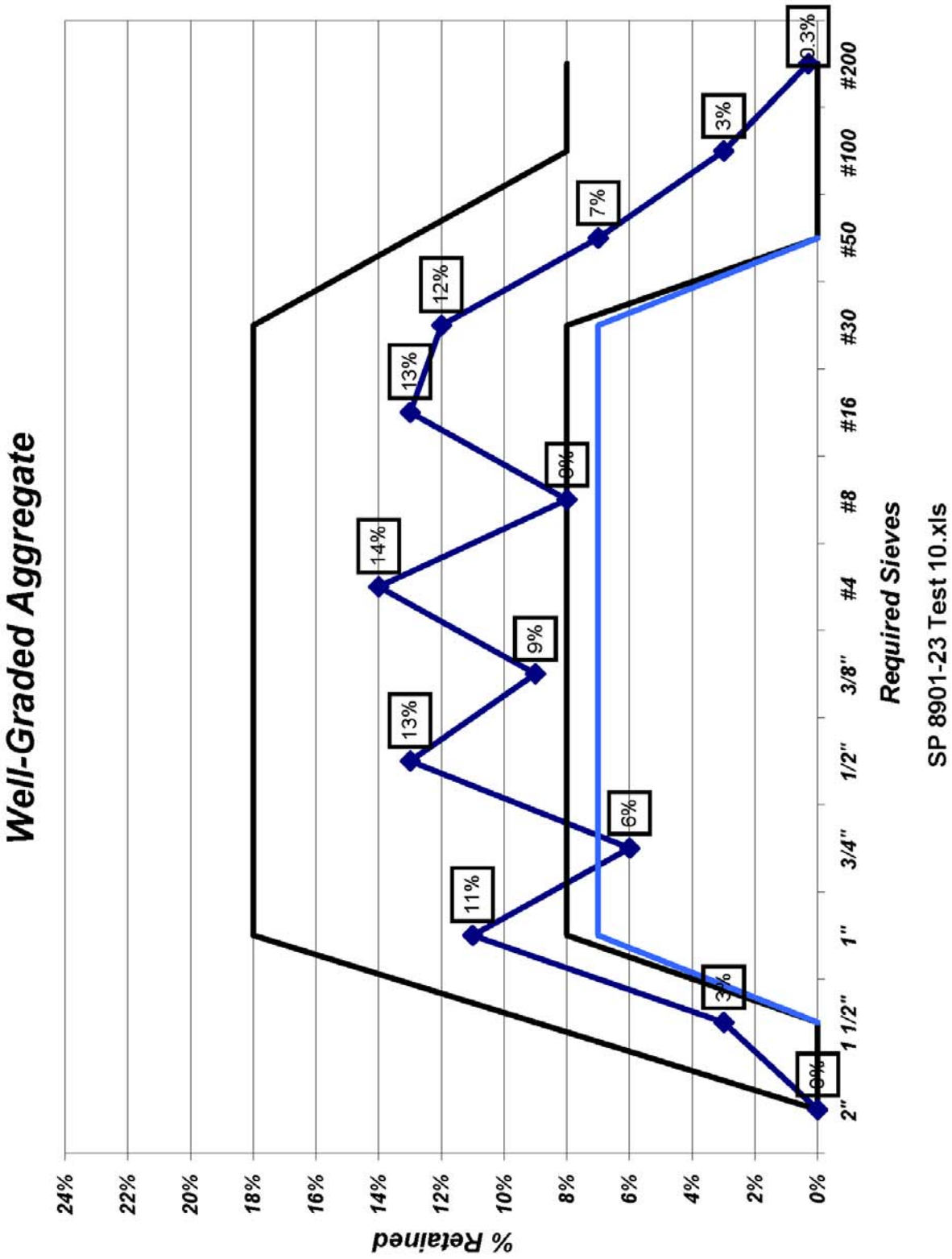
Additional Remarks or Comments

Composite Gradation for Job Mix Formula

Aggregate	CA #1	CA #2	CA #3	CA #4	FA #1	FA #2		Comp.		JMF		
Fraction	1 1/2"	3/4"	3/8"				Total	Grad. Req.	Working	Working		Total
Prop. %	14%	32%	12%		42%		% Passing	JMF	Range	Range		% Retained
2"	14.0%	32.0%	12.0%		42.0%		100%	100	± 5	95	100	0%
1 1/2"	11.2%	32.0%	12.0%		42.0%		97%	98	± 5	93	100	3%
1"	0.9%	31.2%	12.0%		42.0%		86%	87	± 5	82	92	11%
3/4"	0.3%	25.2%	12.0%		42.0%		79%	79	± 5	74	84	7%
1/2"	0.2%	14.0%	10.8%		42.0%		67%	68	± 5	63	73	12%
3/8"	0.2%	8.2%	7.6%		42.0%		58%	57	± 5	52	62	9%
#4	0.2%	0.7%	1.1%		42.0%		44%	44	± 5	39	49	14%
#8					35.6%		36%	34	± 4	30	38	8%
#16					23.2%		23%	22	± 4	18	26	13%
#30					10.9%		11%	9	± 4	5	13	12%
#50					3.7%		4%	3	± 3	0	6	7%
#100					1.1%		1%	1	± 2	0	3	3%
#200					0.6%		0.6%	0.6	± 1.6% max	0.0	2.2	0.4%

Workability Factor (WF)
(% Passing #8)
36

Coarseness Factor (CF)
(% retained above 3/8"/
% retained above #8)
66


Well-Graded Aggregate
% Retained
24%
22%
20%
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
2"
1 1/2"
1"
3/4"
1/2"
3/8"
#4
#8
#16
#30
#50
#100
#200
Required Sieves
SP 8901-23 Test 10.xls
0%
3%
11%
6%
13%
9%
14%
8%
13%
12%
7%
3%
0.3%

W/C RATIO INCENTIVE CALCULATION (ENGLISH)

LOT #	TEST #	DATE TESTED	W/C RATIO	YD^3 REPRESENTED BY TEST	YD^3 BATCHED FOR LOT	AVE W/C FOR LOT	PAY FACTOR	MEASURED YD^3 FOR LOT	INCENT/ DISINCENT
1	1	5/5/2003	0.35	1000					
1	2	5/5/2003	0.37	1000					
1	3	5/5/2003	0.36	1000					
1	4	5/5/2003	0.38	982.5					
					3982.5	0.36	$3.00	3980	$11,940.00
2	5	5/6/2003	0.37	1000					
2	6	5/6/2003	0.37	697.5					
2	7	5/7/2003	0.37	1000					
2	8	5/7/2003	0.36	1000					
2	9	5/7/2003	0.35	550					
					4247.5	0.36	$3.00	4241	$12,723.00
3	10	5/8/2003	0.37	1000					
3	11	5/8/2003	0.35	1000					
3	12	5/8/2003	0.37	958					
					2958	0.36	$3.00	2955	$8,865.00

GRADATION INCENTIVES

DATE TESTED	LOT #	TEST #	2"	1½"	1"	¾"	½"	3/8"	#4	#8	#16	#30	#50	#100	#200	8-18 INCENTIVE	7-18 INCENTIVE	FAILURE	PAY FACTOR	MEAS. C.Y. FOR POUR	MEAS. C.Y. FOR LOT	INCENTIVE
5/5	1	1	0	3	11	7	14	9	13	8	14	11	8	4	0.5							
5/5	1	2	0	4	13	8	13	8	12	8	13	12	7	2	0.4							
5/5	1	3	0	5	12	9	12	9	14	7	11	13	8	3	0.3							
5/5	1	4	0	4	10	9	12	8	15	8	13	12	6	3	0.3							
Ave.	**1**		**0**	**4**	**12**	**8**	**13**	**8**	**14**	**8**	**13**	**12**	**7**	**3**	**0.4**	X			**2.00**	**3980**	**3982.5**	**$7960.00**
5/6	2	5	0	4	12	7	11	9	15	7	12	11	7	3	0.4							
5/6	2	6	0	5	10	8	12	8	14	8	13	11	6	2	0.5							
5/7	2	7	0	5	14	7	12	7	14	8	12	13	5	5	0.3							
5/7	2	8	0	6	13	7	13	9	13	9	14	12	7	3	0.2							
5/7	2	9	0	6	12	8	12	10	14	8	14	12	7	3	0.4							
Ave.	**2**		**0**	**5**	**12**	**7**	**12**	**9**	**14**	**8**	**13**	**12**	**6**	**3**	**0.4**		X		**.50**	**4241**	**4247.5**	**$2120.50**
5/8	3	10	0	3	11	6	12	9	14	8	13	12	7	3	0.4							

5-694.740 CEMENT RECORD (Form 2157)

This form is used for concrete paving projects only. Do not use this form when the concrete is obtained from a ready-mix plant. Use this form for recording all cementitious materials including cement, fly ash, and slag received and used on the paving project. This form is a useful tool for calculating the required cementitious cut-offs per Mn/DOT Specification 2301.3F2. See Figure A 5-694.740.

5-694.741 CONCRETE TEST BEAM DATA (Form 2162)

The Agency should submit this form to the Mn/DOT Concrete Engineering Unit each week showing all beam breaks during that week of concrete paving production. See Figure A 5-694.741.

5-694.742 FIELD CORE REPORT (Form 24327)

This form is used by Field Personnel to summarize the location of cores taken in concrete pavement and is submitted to the Mn/DOT Office of Materials Laboratory. See 5-694.691 and Figure A 5-694.742.

5-694.743 TEST REPORT ON CONCRETE CORES (Form 24324)

This form is used by Mn/DOT Office of Materials Laboratory Personnel to report core thickness measurements and compressive strengths. See Figure A 5-694.743.

TP-2157-04 (3/2000)

Minnesota Department of Transportation

Cement Record

S.P. 8901-23 Plant: TUV Batch Plant – St. Cloud Engineer: T. Sanders Page: 1

Load No.	Invoice Number	Date Unloaded	Manufacturer	Source/Mill	Lbs./Shipment	Lbs. Shipped to Date
1	370002	5-2-03	Graymatter	St. Paul, MN	51,750	
2	370006	"	"	"	50,890	
3	370008	"	"	"	52,200	
4	370011	"	"	"	53,000	
5	370013	"	"	"	51,010	
6	370014	"	"	"	52,700	
7	370018	"	"	"	51,800	
8	370021	"	"	"	54,550	
9	370022	"	"	"	52,100	
10	370026	"	"	"	52,750	522,750
11	370027	"	"	"	51,800	
12	370028	"	"	"	52,100	
13	370031	"	"	"	52,650	679,300
14	370034	5-3-03	"	"	53,080	
15	370037	"	"	"	52,140	
16	370038	"	"	"	52,000	
17	370040	"	"	"	53,010	
18	370042	"	"	"	51,800	
19	370045	"	"	"	52,450	
20	370047	"	"	"	51,350	
21	370048	"	"	"	50,800	
22	370049	5-5-03	"	"	51,240	1,147,170
23	370051	"	"	"	52,100	
24	370055	"	"	"	51,750	
25	370059	"	"	"	52,100	1,303,120
26	370060	5-6-03	"	"	52,010	
27	370063	"	"	"	53,120	
28	370069	"	"	"	51,980	1,460,230

TP-2157-04 (3/2000)

Minnesota Department of Transportation

Cement Record

S.P. 8901-23 Plant: TUV Batch Plant – St. Cloud Engineer: T. Sanders Page: 2

Load No.	Invoice Number	Date Unloaded	Manufacturer	Source/Mill	Lbs./Shipment	Lbs. Shipped to Date
					From previous page	1,460,230
29	370071	5-6-03	Graymatter	St. Paul, MN	51,500	
30	370072	"	"	"	51,970	
31	370076	"	"	"	52,060	
32	370078	"	"	"	53,010	
33	370082	"	"	"	49,980	
34	370084	"	"	"	50,860	
35	370085	"	"	"	51,020	
36	370089	"	"	"	52,100	
37	370091	"	"	"	52,540	
38	370098	"	"	"	49,880	
39	370101	"	"	"	48,620	2,023,770

MINNESOTA DEPARTMENT OF TRANSPORTATION

PLANT LOCATION TUV Batch Plant – St. Cloud CEMENT RECORD

Date	S.P.	Insp.	Mix Design	Lbs/yd^3	Total yd^3 (1)	Sub-Total lbs. (2)	Waste lbs. (3)	Total lbs. Used Today (4)	Lbs. Accountable To Date (5)	Lbs. received to Date (6)	Lbs. Diff. + or – (7)	% Diff. + or – (8)
												Ind.
5-5-03	8901-23	LB	3A21	450	1155	519,750	+500	520,250	520,250	522,750	+2500	+0.48%
							Scale					
←						Cement	Cut Off	#1				→
5-5-03	8901-23	LB	3A21	450	2827.5	1,272,375	-500	1,271,875	1,792,125			
							Scale					Overall
5-6-03	8901-23	LB	3A21	450	505	227,250	+1950	229,200	2,021,325	2,023,770	+2445	+0.12%
							Scale		520,250	522,750		Ind.
									1,501,075	1,501,020	-55	-0.004%
←						Cement	Cut Off	#2				→
5-6-03	8901-23	LB	3A21	450	3742.5	1,684,125	-1950	1,682,175	3,703,500			
							Scale					

(1) Used that date; (2) lb/yd/^{3} x total yd^3; (3) Spilled, wasted or concrete not used; (4) Includes waste; (5) Actual cement used including waste; (6) Same as kg shipped to date; (7) Difference between accountable and received, 6 – 5; (8) Percent overrun or underrun (7÷5) x 100; If received (6) is more than accountable (5) – an overrun exists (+ positive number), if accountable (5) is more than received (6) – an underrun exists (- negative number) and must be addressed as stipulated in Specification 2301.3F2

TP 2162-04 (2/2003)

Minnesota Department of Transportation

Concrete Test Beam Data

Low State Proj. No. 8901-23 Date 5/5/2003

Project Engineer T. Sanders Contractor TUV Paving

Brand of Cement: Graymatter Mill of Cement: St. Paul, MN Type: I

Source/Type of Fly Ash: Asher@ Carter, MN Source of Other (Slag, etc):

Source of Fine Agg.: #199999 - Salinger Source of Coarse Agg.: #188888 - Rock Island

Source of Coarse Agg.: #177777 - Pebble Pit

BEAM NO.	STATION	DATE MADE	MIX NO.	TEST DATE	AVE. WIDTH "B"	AVE. DEPTH "D"	TOTAL TEST LOAD (PSI)	AREA CORR. FACTOR (%)	MOD. OF RUPT. (PSI)	AGE
1a	32+50	5/5/03	3A21	5/8/03	6.05	6.00	431	-0.01	427	3 day
1b	"	5/5/03	3A21	5/12/03	6.05	6.05	545	-0.06	512	7 day
1c	"	5/5/03	3A21	6/2/03	6.00	6.10	610	-0.03	592	28 day
2a	57+00	5/5/03	3A21	5/8/03	5.95	6.05	460	-0.01	455	3 day
2b	"	5/5/03	3A21	5/12/03	6.05	6.12	590	-0.04	566	7 day
2c	"	5/5/03	3A21	6/2/03	6.00	6.12	735	-0.04	706	28 day
3a	81+50	5/6/03	3A21	5/9/03	6.00	6.03	440	-0.01	436	3 day
3b	"	5/6/03	3A21	5/13/03	6.05	6.18	575	-0.07	535	7 day
3c	"	5/6/03	3A21	6/3/03	6.00	6.05	670	-0.02	657	28 day
4a	106+50	5/7/03	3A21	5/14/03	6.05	6.20	605	-0.05	575	7 day
4b	"	5/7/03	3A21	6/4/03	6.00	6.10	740	-0.06	696	28 day
5a	131+50	5/7/03	3A21	5/10/03	6.02	6.02	580	-0.01	574	3 day
5b	"	5/7/03	3A21	5/14/03	6.00	6.20	635	-0.03	616	7 day
5c	"	5/7/03	3A21	6/4/03	6.00	6.10	715	-0.03	694	28 day
6a	155+00	5/8/03	3A21	5/12/03	6.03	6.10	490	-0.04	470	4 day
6b	"	5/8/03	3A21	5/15/03	6.00	6.15	605	-0.07	563	7 day
6c	"	5/8/03	3A21	6/5/03	6.05	6.05	735	-0.04	706	28 day
7a	180+50	5/8/03	3A21	5/12/03	6.00	6.15	455	-0.05	432	4 day
7b	"	5/8/03	3A21	5/15/03	6.05	6.12	540	-0.05	513	7day
7c	"	5/8/03	3A21	6/5/03	6.00	6.15	690	-0.03	669	28 day
8a	205+50	5/12/03	3A21	5/19/03	6.05	6.18	575	-0.07	535	7 day
8b	"	5/12/03	3A21	6/9/03	6.00	6.20	635	-0.03	616	28 day
9a	230+50	5/12/03	3A21	5/19/03	6.10	6.15	565	-0.02	554	7 day
9b	"	5/12/03	3A21	6/9/03	6.00	6.05	665	-0.02	652	28 day
10a	255+00	5/13/03	3A21	5/16/03	6.00	6.20	495	-0.06	465	3 day
10b	"	5/13/03	3A21	5/20/03	6.00	6.15	605	-0.05	575	7 day
10c	"	5/13/03	3A21	6/10/03	6.00	6.10	740	-0.03	718	28 day

MIX NO.	AGE	AVERAGE STRENGTH
3A21	3	471 psi – 5 beams
3A21	7	554 psi – 10 beams
3A21	28	670 psi – 10 beams

SPECIAL NOTES:

cc: Project Engineer
Concrete Engineer
District Engineer

INSPECTOR *L. Bean*

24327-03 (1/2002)

Minnesota Department of Transportation

Field Core Report

Date 5/30/2003

Project Number 8901-23 | T.H. 999 | Proj. Engineer T. Sanders

Project Location TH 11 to CSAH 88 | Type of Construction Conc. Pvmt. | Paving Contractor TUV Paving

Mix Designation 3A21 | Req'd Thickness 8" | Anticipated Strength 3900 psi

Field Core Number	Location			Corrected Location			Lane	Field Height	Date Poured	Date Cored	Steel Locat. (if any)	Remarks
	Station	Offset		Station	Offset							
		LT	RT		LT	RT						
21	32+40	10					EBL	8 1/4"	5/5/03	5/30/03		
22	37+60		11					8 1/4"	5/5/03	5/30/03		
23	40+50	2						7 3/4"	5/5/03	5/30/03		
24	42+70		4					8"	5/5/03	5/30/03		
25	47+50	3						8 1/4"	5/6/03	5/30/03		
26	57+40		2					8 1/4"	5/6/03	5/30/03		
27	55+80	12						8 1/2"	5/6/03	5/30/03		
28	64+70		5					8 1/2"	5/6/03	5/30/03		
29	65+00	2						8 1/4"	5/6/03	5/30/03		
30	77+30		5					8"	5/7/03	6/2/03		

STATE OF MINNESOTA DEPARMENT OF TTRANSPORTATION
Office of Materials
Test Report on Concrete Pavement Cores

Project No. 8901-23 T.H. 999 Location TH 11 to CSAH 88 Date 5/30/2003
Proj. Engr. T. Sanders Contractor TUV Paving Date Sawed Soak Start Break Date

Core #	Station	Station Change If Any	Postition	Roadway	Lab. W.M. Depth	Field W.M. Depth	Field Ht. (In.)	Avg. Lab. Ht. (In.)
2003-001	32+40		10 L	E.B.L.			8.25	8.30
002	37+60		11 R	"			8.25	8.25
003	40+50		2 L	"			7.75	7.80
004	42+70		4 R	"			8.00	7.95
005	47+50		3 L	"			8.25	8.20
006	57+40		2 R	"			8.25	8.25
007	55+80		12 L	"			8.50	8.55
008	64+70		5 R	"			8.50	8.50
009	65+00		2 L	"			8.25	8.30
010	77+30		5 R	"			8.00	8.05

Core #	Date Poured	Date Broken	Age in Days	Cap Ht. (In.)	Diameter (In.)	Area (Sq. In.)	Breaking Load (Lbs.)	Actual (P.S.I.)	H / D	Corr. Factor	Corr. for H / D (P.S.I.)	Age Corr. Factor	Corr. to 60 Days (P.S.I.)
2003-001	05/05/03	07/03/03	59	7.98	4.01	12.6293	74,980	5,937	1.99	0.9992	5,932	1.002	5,944
002	"	"	"	7.95	4.00	12.5664	77,350	6,155	1.99	0.9992	6,150	1.002	6,163
003	"	"	"	7.76	4.00	12.5664	76,420	6,081	1.94	0.9952	6,052	1.002	6,064
004	"	"	"	7.85	3.99	12.5036	69,810	5,583	1.97	0.9976	5,570	1.002	5,581
005	05/06/03	07/07/03	62	7.92	4.01	12.6293	77,560	6,141	1.98	0.9984	6,131	0.996	6,107
006	"	"	"	7.90	4.01	12.6293	68,430	5,418	1.97	0.9976	5,405	0.996	5,384
007	"	"	"	7.95	4.00	12.5664	69,120	5,500	1.99	0.9992	5,496	0.996	5,474
008	"	"	"	7.95	4.00	12.5664	78,710	6,264	1.99	0.9992	6,259	0.996	6,233
009	"	"	"	7.88	4.01	12.6293	68,920	5,457	1.97	0.9976	5,444	0.996	5,422
010	05/07/03	"	61	7.83	4.01	12.6293	65,440	5,182	1.95	0.9960	5,161	0.998	5,151

Anticipated Strength (P.S.I.) 3,900
Req'd. Thickness (In.) 8.00
Req'd. Steel Location
Average Cylinder PSI. on this page: 5,752
Average Cylinder PSI. from all pages: 5,752

Copies to: Concrete Engr.
Proj. File
T. Sanders
TUV Paving

Report approved by *Mack Truck*
Material Inspection & Testing Engineer

10 - 1088

5-694.744 WEEKLY CONCRETE REPORT (Form 2448)

This form is a summary of data relating to concrete production including mix design, test results, quantities, etc. and is submitted weekly to the Mn/DOT Concrete Engineering Unit. An interactive computerized version is available on the website which has point and click capabilities, drop down boxes, and automatic calculations.

Item numbers listed below correspond to the numbers on Figure A 5-694.744. See Figure B 5-694.744 for a completed example of a *Weekly Concrete Report* for paving.

Instructions for Completing the Weekly Concrete Report

Item 1: Low S.P.
Use the lowest S.P. or S.A.P. Number for project. Do not create separate reports for each S.P. on a project.

Item 2: Bridge #
If concrete was placed on any part of a bridge structure, list the Bridge Number.

Item 3: Engineer
List the name of the Project Engineer or Project Supervisor.

Item 4: Inspector
List the name of the Chief Inspector responsible for the concrete listed in the weekly report.

Item 5: Contractor
For Ready-Mix list the Concrete Contractor. For paving jobs list the Paving Contractor.

Item 6: Batch Plant
For Ready-Mix Concrete, list the name and the city of the plant. If there is more than one plant with the same name, list the plant number (i.e. Togo Ready-Mix No. 3). If the concrete comes from 2 different plants - 2 *Weekly Concrete Reports* are required.

Item 7: Report #
Number the reports for each project sequentially starting with Number 1.

Item 8: Week Ending
Enter last date (M/D/YY) (Saturday) of current construction week.

Item 9: Size/Type
List the type of cement (I, II, or III).
List the fly ash class (C or F).
List the grade of slag (100 or 120).
Other is for microsilica, etc.
List the size fractions of aggregate (sand, 3/4-, 3/4+, CA-50, etc.).
For Admixtures list the type (A, B, A(MR), etc.)

Item 10: Pit # or Manufacturer
The cement, fly ash, pit numbers, and other admixture information are found on the Certificate of Compliance. The pit number is also found on the Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 11: Specific Gravity
This number is found on the Mix Design issued by the Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design. Use specific gravity of 2.58 for fly ash used at Ready-Mix Plants. Use the individual fly ash specific gravity for paving projects.

Item 12: Absorption Factor
This number is found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 13: Mix Designation and Design Weights
List the mix designation and oven dry design weights for each mix. These weights are found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design. List the admixture dosage. This number can be found on the Certificate of Compliance or the Paving Batch Ticket.

Item 14: Design Water
This weight is found on Mix Design issued by Mn/DOT Concrete Engineering Unit or Paving Contractor's Approved Mix Design.

Item 15: Mix
List the mix designation for the load tested.

Item 16: Date
List the date (M/D/YY) the concrete was placed.

Item 17: Location
List stations for paving jobs. List component name for other work, i.e. W. Abutment, Pier Col #1, SE Wingwall, etc.

Item 18: Time
Indicate the time that the concrete was batched. To display time correctly, type in the actual time, then space, then A or P (8:42 P).

General Notes on Items 19-24

Record ALL concrete tests on this page. Record extra tests taken in addition to those required by the "Schedule of Materials Control." DO NOT list any test averages, instead, list each test INDIVIDUALLY. Attach additional sheets if necessary.

Item 19: % Air
Record the air content to the nearest 0.1%. Compare results with specification 2461.4A4b. Air contents should range between 5% and 8% with a target of 6.5%.

Item 20: Slump
Record the slump to the nearest 5 mm (1/4 in.). Compare the results with Specification 2461.4A4a.

Item 21: Total Actual Water
Indicate the total water in kilograms per cubic meter (pounds per cubic yard) of concrete. This is the sum of the total water printed on the batch ticket and any additional water added at the plant and/or job site divided by the batch size.

Item 22: Cylinder/Beam No.
Indicate the field number of the test specimen. For cylinders, list the field ID number submitted on the *Cylinder ID Card* (Form 2409).

Item 23: Air Temperature
Indicate the ambient air temperature at the time the concrete tests were taken.

Item 24: Concrete Temperature
Indicate the concrete temperature at the time the concrete tests were taken.

Item 25: Water Ratio
This number is determined by dividing the total actual water (Item 21) by the design water (Item 14). This number should not be more than 1.04.

$$\text{Water Ratio} = \frac{\text{Total Actual Water}}{\text{Design Water}}$$

Item 26: Water/Cementitious Ratio
This number is determined by dividing the total actual water (Item 21) by the total design cementitious. Total cementitious includes cement, fly ash, slag, etc.

$$\text{Water/Cement Ratio} = \frac{\text{Total Actual Water}}{\text{Total Design Cementitious}}$$

Item 27: Remarks
List additional information or comments, i.e. change in air added at plant or jobsite, why some test results are out of spec, or where an air test was taken, etc.

Item 28: Additional Remarks
This space is for additional remarks that may have come up during the week that may affect the quality of the concrete.

Item 29: Mix Number
Enter the mix designations used on the project during this week.

Item 30: Date
List the date for each day of the week.

Item 31: Daily Totals
Enter daily totals in cubic meters (cubic yards) for each mix design used.

Item 32: Daily Totals (m^3 or yd^3)
List the daily totals in cubic meters (cubic yards) for all mixes.

Item 33: Weekly Totals (m^3 or yd^3)
List the total quantities for each mix.

Item 34: Grand Total
List the sum total of cubic meters (cubic yards) of concrete placed during the week.

Item 35: Inspector
Handwritten signature of person who filled out the *Weekly Concrete Report*.

Item 36: Phone Number
Phone number of person who filled out the *Weekly Concrete Report*.

Item 37: Engineer/Supervisor
The Project Engineer or Project Supervisor signs the completed report after they have reviewed the document for accuracy.

Mn/DOT WEEKLY CONCRETE REPORT (ENGLISH) - Form 2448-04 (6/20/2002)

Low S.P. 1	Material	Size/ Type	Pit # or Manufacturer		Specific Gravity	Absorp. Factor	Mix #1	Mix #2	Mix #3	Mix #4	Mix #5	Mix #6
							13					
Bridge # 2	Cement	9	10		3.15		13					
	Fly Ash	9	10		11		13					
Engineer 3	Slag	9	10		11		13					
	Other	9	10		11		13					
Inspector 4	F Agg 1	9	10		11	12	13					
	F Agg 2	9	10		11	12	13					
Contractor 5	C Agg 1	9	10		11	12	13					
	C Agg 2	9	10		11	12	13					
Batch Plant 6	C Agg 3	9	10		11	12	13					
	C Agg 4	9	10		11	12	13					
Report # 7	Admix 1	AEA	10				13					
	Admix 2	9	10				13					
Week Ending 8	Admix 3	9	10				13					
						Design Water	14					

Mix	Date	Location	Time	% Air	Slump (in)	Total Act. Water (lb/c.y.)	Cylinder/ Beam #	Air Temp °F	Concrete Temp °F	Water Ratio	W/C Ratio	Remarks
15	16	17	18	19	20	21	22	23	24	25	26	27

Additional Remarks:	Mix Number	30	30	30	30	30	30	30	Week Totals yd^3
28	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	29	31	31	31	31	31	31	31	33
	Daily Totals yd^3	32	32	32	32	32	32	32	34

Inspector: 35 Phone Number: 36 Engineer/Supervisor: 37

Mn/DOT WEEKLY CONCRETE REPORT (ENGLISH) - Form 2448-04 (6/20/2002)

Low S.P.	8901-23	**Material**	**Size/ Type**	**Pit # or Manufacturer**		**Specific Gravity**	**Absorp. Factor**	**Mix #1**	**Mix #2**	**Mix #3**	**Mix #4**	**Mix #5**	**Mix #6**
Bridge #		**Cement**	I	Graymatter@St. Paul, MN		3.15		450	450	530			
		Fly Ash	C	Asher@Carter, MN		2.60		130	140	70			
Engineer	T. Sanders	**Slag**											
		Other											
Inspector	S. Stone	**F Agg 1**	Sand	#199999 - Salinger, Freeport		2.62	0.011	1090	1085	1095			
		F Agg 2											
Contractor	TUV Paving	**C Agg 1**	1 1/2"	#188888 - Rock Island, St. Cloud		2.77	0.003	770	680	775			
		C Agg 2	3/4"-	#188888 - Rock Island, St. Cloud		2.74	0.004	910	985	870			
Batch Plant	TUV Batch Plant - St. Cloud	**C Agg 3**	3/8"-	#177777 - Pebble Pit, St. Cloud		2.65	0.012	390	390	390			
		C Agg 4											
Report #	1	**Admix 1**	AEA	Ajax AEA									
		Admix 2	A	WRXX									
Week Ending	5/10/2003	**Admix 3**											
							Design Water	208	212	216			

Mix	**Date**	**Location**	**Time**	**% Air**	**Slump (in)**	**Total Act. Water (lb/c.y.)**	**Cylinder/ Beam #**	**Air Temp °F**	**Concrete Temp °F**	**Water Ratio**	**W/C Ratio**	**Remarks**
3A21	5/5/2003	25+50	7:15 AM	7.5%				68	74			
3A21	5/5/2003	29+00	8:30 AM	6.8%	1 1/4							
3A21	5/5/2003	32+50	9:45 AM	6.6%			1A, 1B, 1C	72	76			
3A21	5/5/2003		10:15 AM			201				0.97	0.35	Microwave Oven/Batch Ticket w/c ratio
3A21	5/5/2003	36+00	10:30 AM	6.8%								
3A21	5/5/2003	39+50	11:25 AM	6.2%								
3A21	5/5/2003	43+00	12:15 PM	7.0%				75	78			
3A21	5/5/2003		1:00 PM			212				1.02	0.37	Microwave Oven/Batch Ticket w/c ratio
3A21	5/5/2003	46+50	1:15 PM	6.9%								
3A21	5/5/2003	50+00	2:00 PM	6.7%								Front of Paver
3A21	5/5/2003	50+00	2:10 PM	5.9%								Behind Paver
3A21	5/5/2003		2:30 PM			208				1.00	0.36	Microwave Oven/Batch Ticket w/c ratio
3A21	5/5/2003	53+50	3:15 PM	6.8%								
3A21	5/5/2003	57+00	4:15 PM	7.2%			2A, 2B, 2C	70	74			
3A21	5/5/2003	60+50	5:00 PM	6.7%								
3A21	5/5/2003		5:20 PM			218				1.05	0.38	Microwave Oven/Batch Ticket w/c ratio
3A21	5/5/2003	64+00	5:45 PM	6.9%								
3A21	5/5/2003	67+50	6:00 PM	7.5%								
3A21	5/6/2003	71+50	7:10 AM	7.2%								
3A21	5/6/2003	75+00	8:25 AM	7.1%	1							

Additional Remarks:

Mix Number	5/4/2003	5/5/2003	5/6/2003	5/7/2003	5/8/2003	5/9/2003	5/10/2003	**Week Totals yd³**
3A21		3980.00	1691.00	2550.00	2955.00			11176.00
3A41								
3A21HE								
Daily Totals yd³		3980.00	1691.00	2550.00	2955.00			11176.00

Inspector: S. Stone **Phone Number:** 612-345-8888 **Engineer/Supervisor:** T. Sanders

5-694.750 IDENTIFICATION CARDS

Colored-coded cards are used for sample identification. They are designed to provide space for all pertinent information. Fill in all the information requested on the card.

5-694.751 ID CARD - SAMPLE (Form 2410)

Use this ID card for submitting various samples to the Laboratory. This pink card is used for submitting aggregate samples, curing compounds, concrete treating oil, and various other concrete products. Do not use this card for submitting cement, fly ash, slag, or concrete cylinders.

Numbers correspond to the ID sample card. See Figure A 5-694.751.

Check with the District Lab for further instructions.

Item 1: Date Sampled
Date the sample was taken.

Item 2: Field I.D.
Any identification assigned to the sample by field personnel or the individual submitting the sample.

Item 3: Spec No./Type and Spec Yr.
Specification number and year that applies to the test results.

Item 4: Mix Design Report #
Not required for Certified Ready-Mix or Concrete Paving.

Item 5: Type of Project
Check appropriate type of project.

Item 6: Proj. No.
Identify the project number(s).

Item 7: Br No.
Identify the appropriate bridge number(s) if applicable.

Item 8: Submitted by
Individual submitting the sample.

Item 9: Tel. No.
Submitter's telephone number.

Item 10: Proj. Eng.
Project Engineer assigned to the project(s). (This may be a county or city engineer)

Item 11: Fax No.
Fax number of submitter.

Item 12: County/City
Responsible Agency, if not Mn/DOT

Item 13: District No.
Mn/DOT District where the project is located.

Item 14: T.H. No.
Trunk Highway on which the project is located.

Item 15: Type of Material and Use
Structure(s) and/or use(s).

Item 16: Mix Proportions
The proportion of a composite that this sample represents.

Item 17: Pit. No./Name
Mn/DOT pit number of aggregate material.

Item 18: Legal Description
Not required for ready-mix or paving

Item 19: Manufacturer/Contractor
Not used for aggregate samples.

Item 20: Lot No.
Not used for aggregate samples.

Item 21: Location
Ready-mix or paving plant name and location.

Item 22: Sample Taken from
Location the sample was taken (stockpile, belt, hopper).

Item 23: Tests Required
List the test(s) required. Be specific. Do not use routine, normal, etc..

Item 24: Remarks
Any notes or additional information the submitter would like to convey to the lab.

Item 25: Date Received
Date Received is for lab use.

Mn/DOT TP-02410-02 **LAB I.D. NUMBER**	Minnesota Department of Transportation **Sample Identification Card**
	Date Sampled **5-8-2003 [1]** Field I.D. **10C [2]**
	Spec No./Type **3126 [3]** Spec Yr. **2000 [3]**
	Mix Design Report # **[4]**
☑ S.P.	Proj. No.: **8901-23 [6]** Br No.: **[7]**
☐ S.A **(5)**	Submitted by: **L. Bean [8]** Tel. No.: **320-345-9876 [9]**
☐ Co/City	Proj. Eng.: **T. Sanders [10]** Fax No.: **320-345-9999 [11]**
☐ Maint	County/City: **[12]** District No.: **District 3B [13]** T.H. No.: **10 [14]**
	Type of Material and Use: **Sand- Concrete Paving Aggregate [15]**
	Mix Proportions: **14% - 1 1/2" 32% - 3/4" 12% - 3/8" 42% - Sand [16]**
	Pit. No./Name: **199999 – Salinger [17]** Legal Description: **[18]**
	Manufacturer/Contractor: **TUV Paving [19]** Lot No.: **[20]**
	Location: **TUV Batch Plant – St. Cloud [21]**
	Sample Taken from: **Belt [22]**
	Tests Required: **Gradation [23]** Date Received:
	Remarks: **Well-Graded Aggregate Incentive [24]**
	PLEASE FILL OUT COMPLETELY(OVER)

	[1]PERCENT PASSING Field Result No. 10	[2]Job Mix/Spec. Required Class Comp.	JMF Mix Des.
50 mm(2")		100	100
37.5 mm(1 1/2")		97	100
31.5 mm(1 1/4")			
25.0 mm(1")		86	85
19.0 mm (3/4")		79	75
16.0 mm(5/8")			
12.5 mm (1/2")		67	65
9.5 mm(3/8")	100	58	55
4.7 mm(#4)	100	44	43
3.35 mm (#6)			
2.36 mm(#8)	84.7	36	34
2.00 mm(#10)			
1.18 mm(#16)	55.2	23	21
850 um (#20)			
600um (#30)	26.0	11	9
425 um (#40)			
300 um (#50)	8.7	4	4
180 um (#80)			
150 um (#100)	2.7	1	1
75 um (#200)	1.5	1.0	1.2
W.M. / F.M.			
200 / 1" Ratio (75 um/25 mm)			
Remarks:			
Loss by washing 1.3% - % Passing #200			

[1] Report field result in percent passing, not weight retained.
[2] See specification book, job mix formula, or mix design report.

Figure A 5-694.751

5-694.752 ID CARD - CEMENT SAMPLES (Form 24300)

A yellow cement sample I.D. card is used for submitting either cement or slag samples and must accompany each sample.

Mn/DOT TP-24300-02 (4-98)
LAB I.D. Number

Minnesota Department of Transportation
Cement Sample Identification Card

Date Sampled: **4-1-2003** .
Date Received: **4-2-2003** .
Field ID: **2** .

☑ S.P. Proj. No.: **1020-30** Br. No. **89002** .
S.A.P. Submitted By: **Tom Sands** .
Co./City Proj. Eng.: **Clay Pitts** .
Maint. .

Brand: **HOLCIM** Mill/Plant: **MASON CITY, IA** Type: **I** .
Rail or Truck No. **IXTL 32890** Shippers Invoice No.: **987987** .
Ready-Mix Plant: **QUICKMIX –MILL CITY** .
Remarks:

1. Fill card out COMPLETELY in INK
2. Place card in ID card envelope (Form Mn/DOT TP-02407-02)
3. Attach envelope to cement sample. NOT inside.

Front

CEMENT TEST RESULTS			
3 Day Compressive Strength		Req'd	
7 Day Compressive Strength		Req'd	
Gillmore Initial Time of Set		Req'd Not Less Than	
Gillmore Final Time of Set		Req'd Not More Than	
Soundness	Req'd	Air Content	Req'd
Blaine		Req'd	
COPIES TO	CHARGE OUT	REMARKS _____. _____. _____. Date _____. Laboratory Chief	

Back

5-694.753 ID CARD - FLY ASH SAMPLES (Form 24308)

A yellow fly ash sample I.D. card must accompany each sample.

Mn/DOT 24308 (5-98) Minnesota Department of Transportation **Fly Ash Sample ID Card**	
Date Sampled **4-1-2003**	Date Received **4-2-2003**
S.P. No. **1020-30**	
Submitted By **Tom Sands**	Proj. Engr. **Clay Pitts**
Distributor/Supplier **Lafarge**	
Power Plant **NSP-Eagan**	Class **C**
Rail or Truck **ASH 456 999**	Shippers Invoice **067891**
Ready-Mix Plant **QuickMix –Mill City**	Field I.D. **2**
1. Fill card out **COMPLETELY** in **INK** 2. Place this card in ID envelope (Form 2407). 3. Attach envelope to sample, **NOT** inside.	

Front

Fly Ash Test Results	REQUIREMENTS
Specific Gravity	± 0.12
% Retained on 45 µm (#325)	30.0% Max. Ret.
Soundness	0.80 Max.
Strength Activity 7 day	75% Min. Of Control
Strength Activity 7 day	75% Min. Of Control
Loss of Ignition	3% Max

Copies To	Charge Out	REMARKS _____. _____. _____. Date _____. Laboratory Chief

Back

5-694.754 ID CARD - CONCRETE TEST CYLINDER (Form 2409)

A green cylinder identification card must accompany every cylinder submitted to the Laboratory. The card must contain all data requested. Place the card inside an envelope provided for this purpose and then insert into the sample bag with the cylinder.

Mn/DOT TP-02409-01 (4-98)
LAB I.D. Number

Minnesota Department of Transportation
Concrete Cylinder Identification Card

Date Made: **4-1-2003**
Field ID: **3**
Mix No. (3Y43, etc.): **3Y43**

☑ S.P. Proj. No.: **1020-30** Br. No.: **89002**
S.A.P. Submitted By: **Tom Sands** Tel. No.: **(612) 345-6789**
Co./City Proj. Eng.: **Clay Pitts** Res. Eng.: **Bob Loams**
Maint. County/City: _____ Dist. No.: **Metro West**
Part of Structure: **End Diaphragm**
Source of Ready-mix: **QuickMix – Mill City** Job Mix
Remarks: **28-day break**

DO NOT WRITE BELOW THIS LINE
Date Received:

Break Date	Load	P.S.I./ MPa	Mold	Results Phoned

Front

INSTRUCTIONS

1. See Concrete Manual 5-694.511.
2. Fill in front of card completely.
3. If early break is desired, request under "Remarks".
4. Place this card in ID card envelope (Form Mn/DOT TP-02407-02).
5. Improperly finished or improperly molded cylinders will not be broken by the laboratory.

Back

5-694.760 BRIDGE REPORTS

5-694.761 CONCRETE MOBILE CALIBRATION WORKSHEET

The Concrete Mobile calibration worksheets are used to calibrate a standard Concrete Mobile. Instructions for calibrating the Concrete Mobile are found in 5-694.454 and blank forms are available on the Mn/DOT Concrete Engineering Unit website at www.mrr.dot.state.mn.us/pavement/concrete/forms.asp.

A Concrete Mobile calibration worksheet example is shown in Figure A 5-694.761 (1-4). Results of the calibration example are plotted in Figure D 5-694.454. Assumed constants are 70 revolutions and 30 seconds per 45 kg (100 lb.) of cement. A trap rock is assumed for the coarse aggregate to establish a specific gravity (2.97).

The data calculated in the calibration example was selected to show a "spread" of points that will still result in a reasonably straight line. Normally, the data is closer in agreement.

5-694.762 WEEKLY REPORT OF "LOW SLUMP CONCRETE" (Form 21412)

DO NOT report low slump concrete for bridge deck overlays on the *Weekly Concrete Report*. The *Weekly Report of "Low Slump Concrete"* (Form 21412) was developed for this operation. The Field Inspector completes the report for the Project files. The testing rates for gradations, air, slump, and cylinder requirements are on the back of the form. The back of the form contains instructions for slump tests, necessary waste calculations, and mix design data. See 5-694.450 and Figure A 5-694.762 (1-2).

Concrete Mobile CALIBRATION WORK SHEET
(Obtain from The Concrete Engineering Unit)

Low SP **0103-86010**

Concrete Mobile Serial Number: **1** Owned By: **Real Good Concrete Company**

Calibrated By: **Commander D.A. Caswell** Date Calibrated: **June 1, 2003**

Concrete Mobile Constants: 45 kg (100 lb.) cement per ~~70~~ 72.4 revolutions at ~~30~~ 31 seconds.

Aggregate Sources: Conc. S & G Fine Aggregate and Conc. Trap Rock Coarse Aggregate.

Step 1 - Cement Check (Pre-load the Belt, etc. for the first run)
Number of revolutions required 210 Run 1
Quantity of Cement and Weight of Container..... 152.9 kg (337.0 lb.)
Weight of Container..... 18.6 kg (41.0 lb.)
Quantity of Cement..... 134.3 kg (296.0 lb.) 6 (A)

A. If quantity of cement is between 45 and 46 kg (100 - 102 lb.), proceed to Step 2.
If not make two more runs. Run 2 Run 3

Quantity of Cement and Weight of Container....153.8 kg(339.0 lb.) 152.4 kg (336.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.) 18.6 kg (41.0 lb.)

Quantity of Cement..... 135.2 kg(298.0 lb.) 133.8 kg (295.0 lb.)

Add cement quantities for the three runs and divide by 3 = 44.8 kg (98.77 lb.) 6 (B)

B. If average quantity of cement is between 45 and 46 kg (100 - 102 lb.), proceed to Step 2.
If not, correct as follows:

$$\text{New Meter Count} = \frac{\text{Previous meter Count x 46 kg (102 lb.)}}{\text{Average Cement Weight (B)}}$$

$$\frac{\text{New Meter Count}}{\text{45 kg (100 lb.) Cement}} = \frac{\text{3x70 x 46 kg}}{\text{134.4 kg}} \text{ or } \frac{\text{3x70 x 102 lb.}}{\text{296.3 lb.}} = \text{72.4 Revolutions}$$

$$\text{New Time Constant} = \frac{\text{New Meter Count x Previous Time Constant}}{\text{Previous Meter Count}}$$

$$= \frac{72.4 \times 30.0}{70} = 31.0$$

Empty Cement Bin.

Step 2 - Sand and Stone Dial Checks

A. Standard Concrete Mobile - use 76.2 mm x 76.2 mm x 203.2 mm (3” x 3” x 8”) hard wood block (provided by Contractor).
Sand and Stone Dial Pointers should read between 6.2 and 6.6.

B. Magnum Concrete Mobile - use 42.86 mm (1-11/16”) hard wood block (provided by Contractor).
Sand Dial Pointer should read between 7.8 and 8.0.
Stone Dial Pointer should read between 7.4 and 7.6.

Step 3 - Aggregate Calibration
Number of revolutions required 72.4 (Meter Count per 45 kg (100 lb.) Cement)

A. Fill Sand Bin (Cement Bin and Stone Bin must be empty)

Sand Dial Pointer set at 2.0 (6.0 Magnum) (Pre-load the Belt).

Run 1

Quantity of Sand and Weight of Container..... 66.7 kg (147.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Sand..... 48.1 kg (106.0 lb.)

Sand Dial Pointer set at 3.0 (7.5 Magnum) (Pre-load the Belt).

Run 2

Quantity of Sand and Weight of Container..... 87.5 kg (193.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Sand..... 68.9 kg 2 (152.0 lb.)

Sand Dial Pointer set at 4.0 (9.0 Magnum) (Pre-load the Belt).

Run 3

Quantity of Sand and Weight of Container..... 130.0 kg (227.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Sand..... 84.4 kg (186.0 lb.)

Plot Sand Dial Settings vs. Quantity of Sand. (See Figure D 5-694.454, Concrete Manual.)

B. Fill Stone Bin (Cement Bin and Sand Bin Empty)

Stone Dial Pointer set at 3.0 (7.0 Magnum) (Pre-load the Belt).

Run 1

Quantity of Stone and Weight of Container..... 72.6 kg (160.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Stone..... 54.0 kg (119.0 lb.)

Stone Dial Pointer set at 4.0 (9.0 Magnum) (Pre-load the Belt).

Run 2

Quantity of Stone and Weight of Container..... ..... 96.6 kg (213.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Stone..... 78.0 kg (172.0 lb.)

Stone Dial Pointer set at 5.0 (11.0 Magnum) (Pre-load the Belt).

Run 3

Quantity of Stone and Weight of Container..... 113.9 kg (251.0 lb.)

Weight of Container..... 18.6 kg (41.0 lb.)

Quantity of Stone..... 95.3 kg (210.0 lb.)

Plot Stone Dial Setting vs. Quantity of Stone. (See Figure D 5-694.454, Concrete Manual.)

Step 4 - Admixture Calculations

HiFlo System - Water Reducer (8 parts solution).

A. Time Constant (Seconds/45 kg (100 lb.) Cement) 31.0

B. Milliliters (Ounces) of Water Reducer/45 kg (100 lb.) Cement - 90 ml (3.0 oz)
(Based on Manufacturer's Recommendations)

C. Determine Cement Discharged/Minute (45 kg units (100 lb.))
60) A = 1.94

D. Milliliters (Ounces) of Water Reducer Required/Minute
B x C = 170 ml (5.82 oz)

E. Milliliter (Ounces) of Solution Required/Minute
D x 8 = 1350 ml (46.6 oz)

F. Number of Liters (Quarts) of Solution Required/Minute
E) 1000 ml (Liter) or (32 oz) (Quart) = 1.35 Liters (1.5 Quarts)

HiFlo Setting (from HiFlo Chart) 1.6

NOTE: The HiFlo setting will remain constant as long as the Time Constant remains and the Water Reducer Dose is not changed.

Form 2448, Weekly Concrete Report, requires the amount of Air Entraining agent per m^3 (yd^3). This is obtained as follows:

B x 496 kg (836 lb.) Cement / 45 kg (100 lb.) = 990 ml (25.1 oz) Water Reducer/m^3 (yd^3).

LoFlo System - Air Entraining Agent (11 parts solution)

The LoFlo setting is obtained by trial and error based on air content of the mix as determined by the air meter. Use a trial setting of 0.8 and adjust to obtain 6.5% air (3U17A Concrete Mix).

Form 2448 requires the amount of Air Entraining agent per m^3 (yd^3). This is obtained as follows:

G. Milliliters (Ounces) of Solution/Minute (from LoFlo Chart) 650 ml (22 oz) to obtain 6.5% air content.

H. Milliliters (Ounces) of Air Entraining Agent/Minute
G) 11 = 60 ml (2 oz)

I. Milliliters (Ounces) of Air Entraining Agent/45 kg (100 lb.) Cement
H) C = 31 ml (1 oz)

Air Entraining Agent m^3 (yd^3) = I x 496 kg (836 lb.) Cement / 45 kg(100 lb.) = 342 ml (8.4 oz)

TP 21412-04 (7/2003)

Minnesota Department of Transportation

Weekly Report of "Low Slump Concrete"

Low S.P. Number: 0132-50199 Engineer: D. Greenlight Report Number: 1
Contractor: TIMEWILTELL INC. Inspector: J. Reliable Mixer Type & Serial: Genuine Batchers #75mn76876IF
Admixture (AEA): Adcon Air Entrainer 100 Average oz/cwt Week Ending: 7/12/30
Admixture (Water Reducer): Water Reducer: RDH20 Average oz/cwt 2.0 Paddle Type Mixer-Volume Per Batch: 3 yd³
Aggregate Source CA: Rock Island #188888 FA: Salinger #199999 Concrete-Mobile-Revolution to Produce 1 yd³ 590

	Date	7/11/03	7/11/03				
DATA APPLICABLE TO BOTH MIXERS:							
Air Test Results	Air (Percent)	6.5	6.5				
	Location	Br 50199 0.002	Br 50199 0.024				
	Air (Percent)	5.7					
	Location	Br 50199 0.012					
Test Specimen	Cyliner ID	6-33					
	Location	Br 50199 0.002					
	Cylinder ID	7-33	8-33				
	Location	Br 50199 0.012	Br 50199 0.024				
	Cylinder ID						
	Location						
Gradation	CA ID	1	2				
	Location	Stockpile	Stockpile				
	FA ID	3	4				
	Location	Stockpile	Stockpile				
Slump Tests	Slump	3/4"					
	Location						
	Slump						
	Location						
	Slump						
	Location						
CONCRETE-MOBILE							
Cement Meter Register and Batching	Start		0				
	End		39001				
	yd³ Batched		41.5				
	Waste		3.0				
	yd³ Used		38.5				
	yd³ Placed		346.5				
PADDLE TYPE MIXER							
Batch Date	Number Batches						
	Total Volume Batched						
	Waste						
	yd³ Used						
	yd³ Placed						
Cement Record (Indicate Kilograms or Bags)	Quality at Start						
	Delivered today						
	Total						
	Waste						
	Used for Slurry						
	Used for Mix						
	Quality Remaining						
Water	Average Water/yd³						

Aggregate Grading*

Date	7/11/03	7/11/03		
Spec.	3137	3126		
5/8" or 3/8"	100%			
1/2" or No. 4	97%	100%		
3/8" or No. 8	69%	97%		
No. 4 or No. 16	12%	78%		
No. 30		50%		
No. 50		15%		
No. 100		2.8%		

- Enter preliminary gradations on Report 1 only.

Remarks (Problems in placing, curing, etc.)

Remarkable difference between Previous and new Time constant.

Report by: J. Reliable

Checked by: R. Eagle-Eye

Signed: D. Greenlight
Engineer

WEEKLY REPORT OF "LOW SLUMP CONCRETE"

This is to be used for "Low Slump Concrete" produced by continuous mixers or paddle type mixers at the job site. The sections of the form that apply to the particular type of mixer designated. Continuous mixers (concrete-mobiles) control the batching by volumetric proportioning and each mixer requires calibration for the specific aggregates to be used for the project. Paddle type mixers control the batching by weighing the ingredients prior to mixing.

1. Low Slump Concrete Mix Design 3U17A

Strength	- 5600 psi concrete at 28 days			
Water	- 270 pounds	106002	Ortonville Stone	(Sp.G 2.64) – 1369 pounds
Air	- 6.5 percent	117001	Sioux Quartzite	(Sp.G 2.65) – 1374 pounds
Cement (C/V = 0.70)	- 836 pounds (Sp.G 3.15)	152003	New Ulm Quartzite	(Sp.G 2.63) – 1364 pounds
FA	- 1374 pounds, Concrete Sand (Specification 3126)	173006	St. Cloud Granite	(Sp.G 2.72) – 1411 pounds
CA *	- CA, Class A (Specification 3137):	187002	Granite Falls Granite	(Sp.G 2.67) – 1385 pounds
Slump	- 3/4 in. ± 1/4 in.	194009	Dresser Trap Rock	(Sp.G 2.97) – 1540 pounds
Water Reducer	- Must be a Mn/DOT Approved Water Reducer - Use Manufacturer's Recommendations for Dosage Rate			

* If a coarse aggregate other than listed is to be used, the concrete mix shall be obtained from the Concrete Engineering Section.

2. Aggregate Tests

a) A minimum of one gradation of stockpiled aggregates shall be run prior to commencing operations and each time aggregate is delivered to the site.
b) Submit one laboratory sample for gradation for both fine and coarse aggregate monthly during operations.

3. Moisture Control of Aggregates

The amount of moisture (water) in the mix is controlled by the slump. (The mix produced by the concrete mobile must be allowed to hydrate 4 - 5 minutes in order to measure the true slump.) A minimum of one slump test shall be made at the start of each day. Other slump tests will be taken when the consistency of the mix changes due to varying moisture in the aggregates at the job site or whenever the aggregate stockpile is replenished (a minimum of two/day is recommended, see Materials Control Schedule). Aggregates shall be well drained and protected from the elements to maintain moisture uniformity.

4. Other Tests

See Materials Control Schedule.

5. Cement Record (Paddle Type Mixer Only)

The cement record shall be maintained in the spaces provided. A positive cement cut-off is required at the end of each week's operations or at the completion of the overlay project. Indicate whether the cement is measured by pounds or bags.

6. Yield and Batching

a) Continuous mixers. Calibration of the equipment will include the determination of the number of cement meter revolutions required to produce 1.0 yd^3 of mix for yield (see Concrete Manual) and batching records. This value is then used to determine the quantity of concrete produced during the day's pour.
b) Paddle type mixers. Batch sizes will be determined by the capacity of the mixer. The quantity batched will be determined by the volume per batch and the number of batches produced during the day's pour.

The inspector is required to estimate the amount of concrete wasted and to calculate the volume placed during the day. The yd^2 of overlay produced during the day shall also be recorded.