INTERDEPARTMENT MEMORANDUM

STATE OF ALABAMA HIGHWAY DEPARTMENT

1409 COLISEUM BOULEVARD MONTGOMERY, ALABAMA 36130

March 18, 1993

Construction Information Memorandum No. 1-93

TO: Division Engineers

FROM: William J. Hartzog
Construction Engineer

RE: Monitoring Concrete Volumes on Drilled Shafts

It will be necessary for project inspectors to monitor the concrete volume placed in any trial, test or production drilled shaft. It is important to confirm that cave-ins of the shaft walls have not occurred during the concrete placement particularly when placing tremie concrete or pumped concrete in slurry filled uncased holes. This can best be accomplished by careful monitoring of the concrete volume placed and the concrete level at frequent intervals so that actual concrete volume placed can be compared with the theoretical volume for the design shaft diameter.

The attached Form C-35, Drilled Shaft Pouring Record, should be used for recording the necessary data and plotting the required graphs.

The inspector should graph the theoretical volume of excavation prior to the pouring of a shaft. The theoretical volume per linear foot can be determined from the following table for the appropriate shaft diameter:

Shaft Volumes

Shaft Diameter (in.)	Volume per Linear Foot (cu. yd./L.F.)
24	0.12
30	0.18
36	0.26
42	0.36
48	0.47
54	0.59
60	0.73
66	0.88
72	1.05
78	1.23
84	1.43

90	1.64
96	1.86
108	2.36
120	2.91
132	3.52
144	4.19

During concrete placement the elevation of the top of concrete should be determined after each truck is poured out. This information along with the other required data should be filled out at that time on the attached form and plotted on the graph on the back of the form. Any large variance between the actual concrete volume and the theoretical volume implies possible problems such as necking or enlargement of the shaft and should be investigated to determine the cause.

The bottom tremie elevation should also be checked and recorded at the same time as the shaft elevations to insure that it is immersed at least 5 feet in the concrete at all times.

A completed Form C-35 is attached which details the proper method for recording the data and plotting the graphs for a drilled shaft.

Also attached is Form C-36, Test Drilled Shaft Loading Record. This form should be used in accordance with the specifications when a load test is required on a drilled shaft.

Distribution and frequency of submission of these forms should be made in accordance with the attached requirements.

RWH/glc

Attachment

cc: Mr. W. E. Page
Mr. Larry Lockett
Mr. W. F. Conway
Mr. G. M. Harper
File

		DISTRIBUTION				
FORM NO.	DESCRIPTION	PROJ. ENGR. TO DIST.	DIST. TO DIV.	DIV. TO CONST. BUR.	FREQUENCY OF SUBMISSION	REMARKS
C-35	Drilled Shaft Pouring Record	6	5*	3	Upon completion of shaft.	A sketch should be drawn on the report showing the location of the shaft. * 1 copy to Division Chief Bridge Inspector.
C-36	Test Drilled Shaft Loading Record	6	5*	3	Upon completion of test.	* 1 copy to Division Chief Bridge Inspector.

FORM C-35
03-18-93

STATE O. ALABAMA HIGHWAY DE. ARTMENT
DRILLED SHAFT POURING RECORD

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Road Between	and		
Contractor		Inspector	
Date	Bent No. & Lane: 2 S.B.L.	Shaft No.: 3	Kind of Soil
Diameter of Shaft: 84 inches	Shaft Volume per Linear Foot (V_{LF}): 1.43 cu. yds. / L.F.	Shaft Tip Elevation: 150.0	

Load Number	Quantity (Cu. Yds.)	Slump (In.)	Pouring Time Start	Pouring Time Finish	Concrete Elevation	Tremie Tip Elevation	Cylinder Number
1	8	8"	9:25 AM	9:40	154.9	150.0	19-21
2	8		9:47	9:55	160.5	150.0	
3	8		9:56	10:02	166.7	150.0	
4	8		10:03	10:15	172.8	150.0	
5	8		10:16	10:23	179.0	168.5	
6	8		10:25	10:35	183.6	168.5	
7	8	7½"	10:36	10:49	189.8	168.5	22-24
8	8		10:50	10:56	194.9	182.7	
9	8		11:00	11:08	198.1	182.7	
10	8		11:10	11:16	201.2	182.7	
11	8		11:17	11:20	205.0	196.3	
12	4		11:21	11:25 AM	206.5	196.3	
V_Q =	92						

1. Top of concrete elevation at completion of pour prior to trimming any excess : 206.5
2. Shaft length before trimming : L = 56.5 Ft.
3. Corresponding theoretical volume : $V_T = V_{LF} \times L$ = 80.80 Cu. Yds.
4. Volume of excess in last truck : V_E = 2 Cu. Yds.
5. Volume of overflow (if any) : V_O = 0 Cu. Yds.
6. Actual shaft volume before trimming : $V_A = V_Q - V_E - V_O$ = 90 Cu. Yds.
7. Overpour : $\frac{V_A - V_T}{V_T} \times 100$ = 11.4 %

REMARKS

1. Record any problems with the operation of the mixing plant, supply irregularities (concrete delays), or possible setbacks (loss of priming in the tremie, movement of reinforcing steel, difficulties with extraction of temporary casing, caving of shaft wall, etc.) on the back of this sheet in the space provided for observations.
2. A theoretical volume versus elevation line should be plotted on the graph on the back of this sheet prior to concrete placement.
3. The actual concrete placement curve should be plotted during construction of the shaft. An elevation check should be taken as each truck pours out and the data recorded above and plotted on graph.
4. Any large variations of the actual concrete placement curve from the theoretical placement line should be investigated.
5. Draw sketch on back of this sheet showing location of shaft.

Correct _____ Approved _____

Project Engineer — Division Engineer

FORM C-35
03-18-93

STATE OF ALABAMA HIGHWAY DEPARTMENT
DRILLED SHAFT POURING RECORD

Project Number		County	Division
Bridge Station	To Station	Bridge Identification Number	
Road Between		and	
Contractor		Inspector	
Date	Bent No. & Lane	Shaft No.	Kind of Soil
Diameter of Shaft	Shaft Volume per Linear Foot (V_{LF})	Shaft Tip Elevation	

Load Number	Quantity (Cu. Yds.)	Slump (In.)	Pouring Time		Concrete Elevation	Tremie Tip Elevation	Cylinder Number
			Start	Finish			

V_Q = ________

1. Top of concrete elevation at completion of pour prior to trimming any excess : ____________
2. Shaft length before trimming : L = ____________ Ft.
3. Corresponding theoretical volume : $V_T = V_{LF} \times L$ = ____________ Cu. Yds.
4. Volume of excess in last truck : V_E = ____________ Cu. Yds.
5. Volume of overflow (if any) : V_O = ____________ Cu. Yds.
6. Actual shaft volume before trimming : $V_A = V_Q - V_E - V_O$ = ____________ Cu. Yds.
7. Overpour : $\frac{V_A - V_T}{V_T} \times 100$ = ____________ %

REMARKS

1. Record any problems with the operation of the mixing plant, supply irregularities (concrete delays), or possible setbacks (loss of priming in the tremie, movement of reinforcing steel, difficulties with extraction of temporary casing, caving of shaft wall, etc.) on the back of this sheet in the space provided for observations.
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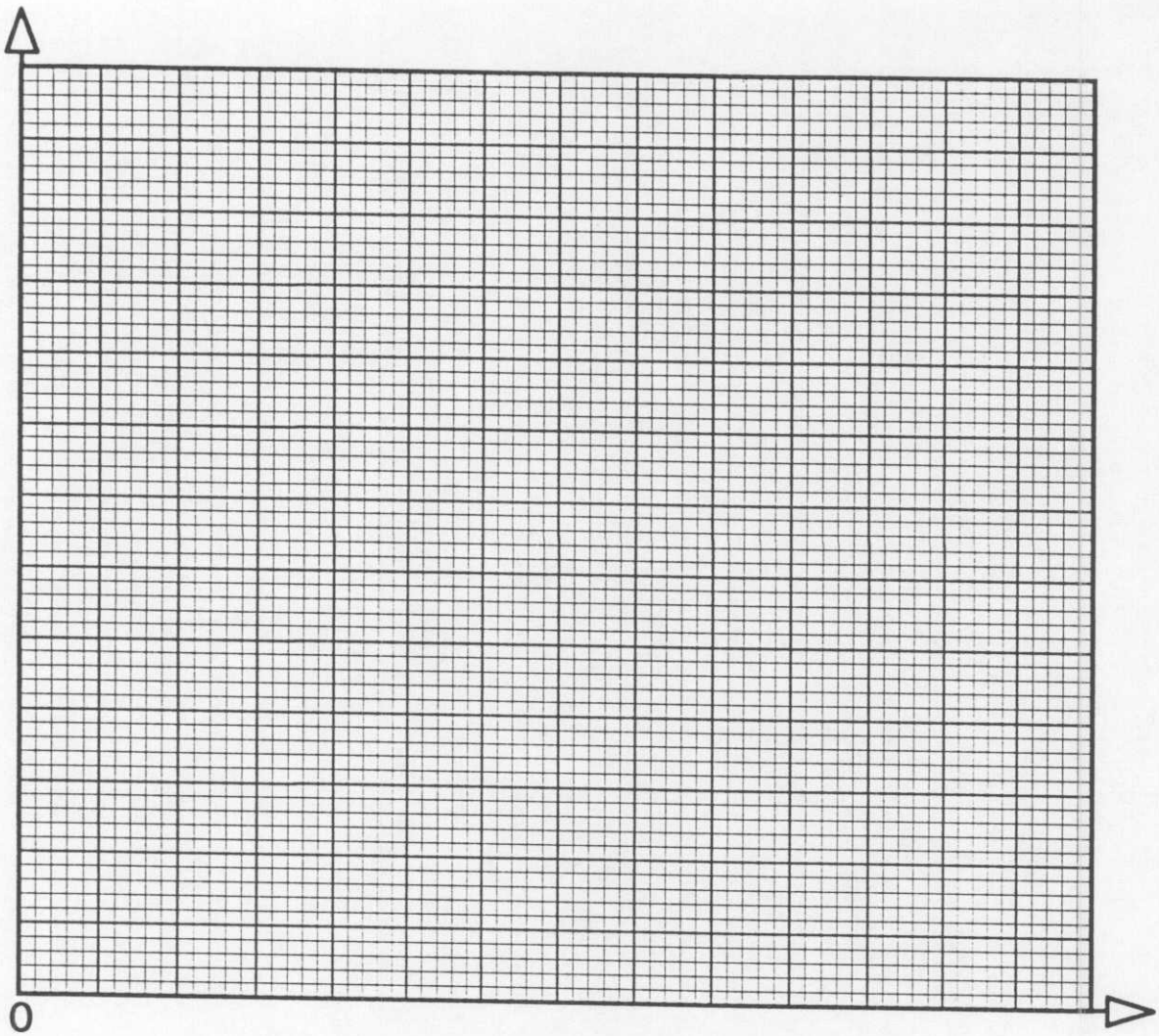
5. Draw sketch on back of this sheet showing location of shaft.

Correct ______________________________ **Approved** ______________________________

Project Engineer **Division Engineer**



OBSERVATIONS:

LOCATION OF SHAFT:

Copy on back
of Form C-35

FORM C-36

Revised 03-12-93

STATE OF ALABAMA HIGHWAY DEPARTMENT
TEST DRILLED SHAFT LOADING RECORD

Project Number	County	Division

Location of Shaft: Station , Feet Lt. or Rt.	Bridge Identification Number
Contractor	Inspector

Date	Diameter of Shaft (Inches)	Bottom of Shaft Elevation	Top of Shaft Elevation

Design Load (Tons)	Test Load (400% of Design Load) (Tons)	Ground Line Elevation	Length of Shaft (Feet)

Elapsed Time (Min : Sec)	Increment Of Load (Tons)	Total Accumulated Load (Tons)	Settlement At Telltale; Gage #1 (Inches)	Settlement At Telltale; Gage #2 (Inches)	Settlement At Telltale; Gage #3 (Inches)	Settlement At Telltale; Gage #4 (Inches)	Settlement At Top of Shaft; Gage #5 (Inches)	Settlement At Top of Shaft; Gage #6 (Inches)	Movement Between Test Plate & Top of Shaft:Gage #7 (Inches)	Settlement From Reference Scale (Inches)
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