BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G45.155.1
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AT&T Co Standard

CONCRETE AND MORTAR
REINFORCED CONCRETE DETAILS

1. GENERAL

1.01 Reinforced concrete is produced by combining steel and concrete in such a manner that the two materials will work together in a structural member to give it the ability to withstand any expected loads. The successful combination of the two materials depends upon (a) the quality of the steel and the concrete, (b) the proper design of the structural member with regard to the computed loads and (c) careful construction methods which will ensure that the structural member is built in accordance with the design.

2. MATERIALS

2.01 The concrete used for reinforced concrete construction shall be Class 1A, 1B, 1C, or 1D concrete, whichever is appropriate, as discussed in G45.140.1.

2.02 Reinforcing bars shall conform to the requirements of the "Standard Specifications for Billet Steel Concrete Reinforcing Bars" or for "Rail Steel Concrete Reinforcing Bars" of the American Society for Testing Materials. If available, round deformed or square twisted bars shall be used in preference to plain round or square bars.

2.03 Metal reinforcement shall be free from loose, scaly rust or other coatings that might reduce or destroy the bond.

2.04 If practicable, reinforcing steel should be ordered from the warehouse cut and bent to fit the requirements of the job. Orders for bent bars should be accompanied by sketches showing the bending dimensions in detail.

2.05 When manhole construction is being done in congested streets where foreign obstructions might cause changes in the plan, it may be desirable to cut and bend the reinforcement in the field from stock lengths.

3. PLACING REINFORCEMENT

3.01 The reinforcement shall be placed in accordance with the instructions shown on the detail plans or as specified in G43.122.1, G43.124.1 and G43.126.1.

3.02 In general, the length of reinforcing bars in manholes shall be as follows:

(a) For floors and roofs, the reinforcing bars shall extend to within one inch of the outside surfaces of the walls as specified in G43.122.1 and G43.126.1.

(b) For walls, the vertical reinforcing bars shall extend from one inch below the top of the roof to the bottom of the floor and the horizontal bars shall extend to within one inch of the outside surfaces of the two adjacent walls as specified in G43.124.1.

(c) For framing openings in walls or roofs, the bars shall be of a length as indicated on the detail plans or as in G43.124.1 and G43.126.1.

3.03 Joints in reinforcing steel, if necessary, shall be made by lapping the bars side by side a distance of 50 diameters, as, for example:

25 inches for 1/2 inch bars,

32 inches for 5/8 inch bars,

38 inches for 3/4 inch bars, etc.

3.04 Lapping or crossing bars shall be tied together so that they will not be displaced during the pouring of the concrete. The tying may be done with 14 or 16 gauge soft annealed iron wire or with any other suitable metal clipping device designed for this purpose.

3.05 The main reinforcement for manholes shall be placed one inch from the inner surfaces of the floors, walls, and roofs and shall be supported by suitable means, as described in G43.122.1, G43.124.1 and G43.126.1 so that it will remain in that position during and after the pouring of the concrete.

4. EXPANDED METAL REINFORCING

4.01 If mesh reinforcement is used for manhole floors the material should be obtained in sheets wide enough to extend to within one or two inches of the sheeting or side walls of the excavation. Splices extending across the width of the manhole should be butted and tied with wire but need not be lapped.

4.02 For monolithic construction, the mesh should be supported at the proper height above the floor of the excavation by means of saddles or concrete blocks.

4.03 Cut out portions of mesh where necessary to accommodate sump, sewer connection, etc.

5. SPACING OF REINFORCEMENT

5.01 Reinforcing bars of the size specified shall be spaced in accordance with the detail plans or as shown in G43.122, G43.124 and G43.126.

5.02 The following is a tabulation showing the size and spacing of reinforcing steel in relation to the thickness of a one-way reinforced concrete slab using round deformed or square bars and Class 1 concrete, as specified in G45.140.1. The table may be used where it is desired to reinforce a concrete slab of given thickness when the reinforcement details are not shown elsewhere. The table will also be found useful where reinforcing bars of the size specified for the work are not immediately obtainable and substitution must be made in order to proceed with the job. For example, if 5/8 inch round deformed bars spaced 5 inches on centers are shown on the plan but this size is not available, by referring to the table it will be found that 3/4 inch round bars spaced either 7 or 7-1/2 inches on centers may be substituted. Where the table indicates a choice of spacings for the alternative size, as in the example, the shorter spacing—in this case 7 inches—should be used.

REINFORCED CONCRETE SLABS

One-Way Reinforcement
Class 1 Concrete as Specified in G45.140.1
Round Deformed or Square Twisted Bars

Thickness of Slab (Inches)	Spacing of Bars in Inches								
	Size of Round Bars (Inches)						Size of Square Bars (Inches)		
	3/8	1/2	5/8	3/4	7/8	1	1	1 1/8	1 1/4
6	3	5	8	11 1/2					
6 1/2		4 1/2	7	10 1/2					
7		4	6 1/2	9 1/2					
7 1/2		4	6	8 1/2	12				
8		3 1/2	5 1/2	8	11				
8 1/2		3	5	7 1/2	10 1/2				
9		3	5	7	9 1/2				
9 1/2		3	4 1/2	6 1/2	9	12			
10			4	6	8 1/2	11			
10 1/2			4	6	8	10 1/2			
11			4	5 1/2	7 1/2	10			
11 1/2			3 1/2	5 1/2	7 1/2	9 1/2	12		
12			3 1/2	5	7	9	11 1/2		
12 1/2			3 1/2	5	6 1/2	8 1/2	11		
13			3	4 1/2	6 1/2	8 1/2	10 1/2		
13 1/2			3	4 1/2	6	8	10		
14			3	4	6	7 1/2	10		
14 1/2				4	5 1/2	7 1/2	9 1/2	12	
15				4	5 1/2	7	9	11 1/2	
15 1/2				4	5	7	9	11	
16				3 1/2	5	6 1/2	8 1/2	10 1/2	
16 1/2				3 1/2	5	6 1/2	8	10 1/2	
17				3 1/2	4 1/2	6	8	10	
17 1/2				3 1/2	4 1/2	6	7 1/2	10	12
18				3	4 1/2	6	7 1/2	9 1/2	11 1/2
18 1/2				3	4	5 1/2	7	9	11
19				3	4	5 1/2	7	9	11
19 1/2				3	4	5 1/2	7	8 1/2	11
20				3	4	5	6 1/2	8 1/2	10 1/2
20 1/2					4	5	6 1/2	8	10
21					3 1/2	5	6 1/2	8	10
21 1/2					3 1/2	5	6	8	9 1/2
22					3 1/2	4 1/2	6	7 1/2	9 1/2
22 1/2					3 1/2	4 1/2	6	7 1/2	9
23					3 1/2	4 1/2	5 1/2	7	9
23 1/2					3	4 1/2	5 1/2	7	9
24					3	3	5 1/2	7	8 1/2