

Rebar Detailing for Reinforced Concrete Construction by Rebar Detailing Experts

Reinforced concrete rebar detailing is shop/placing drawings of steel reinforcement for construction. Reinforced concrete rebar detailing is one of the most important aspects of reinforced concrete construction as the reinforced concrete rebar detailing outlines all the required information for the fabrication and placement of reinforced concrete rebars.

Reinforced concrete rebar was a innovation of the 19th century. The reinforced concrete rebars add tensile strength, allowing the creation of long, cantilevered concrete structures and thinner, less-supported concrete footings, slabs, beams and columns. The reinforced concrete rebars expedite construction times, since less concrete is required to pour such reinforced concrete structures.

When structural engineers prepare structural design drawings for reinforced concrete structures, they specify reinforced concrete rebar sizes, spacings, locations, and lap of steel. Reinforced concrete rebar detailing specify the quantity, description, placement, bending shapes with dimensions and laps of the reinforcing steel. It is very difficult to place reinforced concrete rebars using the structural engineering drawings and/or permit drawings.

Upon reviewing the information in the structural engineers' drawings, a rebar detailer creates detailed rebar drawings to guide the placers of reinforced concrete rebar to place the reinforced concrete rebar properly prior to concrete being poured to construct the reinforced concrete structure. The reinforced concrete rebar fabrication shop and onsite reinforced concrete rebar placement crew rely on the reinforced concrete rebar detailing to visualize the reinforced concrete structures. Each set of reinforced concrete rebars laid out by the rebar detailer on the shop drawings correspond to a specific bar mark which comprise a range of data including the number of rebars, rebar size, rebar shape and dimensions needed to meet the specifications in the reinforced concrete structure they were designed for. The fabrication shop uses the bar marks to fabricate the reinforced concrete rebars according to the specified details therein. Upon the reinforced concrete rebar is fabricated and sent to construction site, all information required for reinforced concrete rebar placement will be found on the drawings produced by the rebar detailer.

Incorrect reinforced concrete rebar steel placement may cause serious failure to reinforced concrete structures. For example, lowering the top rebars or raising the bottom rebars by 0.5 inch (1.2cm) more than that specified in a 6 inch (15cm) deep reinforced concrete slab may reduce the load-carrying capacity of the slab by 20%.

Reinforced concrete rebar must be properly secured to prevent displacement during concrete placement and other construction activities.

Reinforced concrete rebar placing drawings guide the contractor to place the reinforced concrete rebar correctly during the construction. Without proper reinforced concrete rebar placing drawings prepared by a licensed professional structural engineer, the contractor would waste a lot of reinforced concrete rebar and the quality of the reinforced concrete structure would become questionable.

The reinforced concrete rebar fabricated using the reinforced concrete rebar bending schedule prepared by our licensed professional structural engineers always fit in the reinforced concrete formwork without any problems. Reinforced concrete rebar bending schedule prepared by our licensed professional structural engineers is not only used for the fabrication of the reinforced concrete rebar, but also used by the office administration and accounts receivable staff for inventory, accounting and invoicing purposes.

Several applications are used to prepare bar bending schedules which can be directly fed into CNC machines that cuts and bends the reinforced concrete rebar to the desired lengths and shapes. Reinforced concrete rebar detailing also includes the schedule for the fabrication of the reinforced concrete rebars and placing/fixing sequence indicated, adding the elements required to support those reinforced concrete rebars during construction. Since the reinforced concrete rebar placing drawings are prepared in different ways, our licensed structural engineers will prepare proper rebar placing drawing to suit the contractor's rebar placing crew's style and expectations. Our inhouse reinforced concrete rebar detailers use American Concrete Institute (ACI) & Concrete Reinforcing Steel Institute (CRSI) guidelines, specifications and protocols for projects in United States, and we use American Concrete Institute (ACI) & Reinforcing Steel Institute of Canada (RSIC) guidelines, specifications and protocols for projects in Canada.

Common US specifications, published by ACI and ASTM, are:

- American Concrete Institute: "ACI 318-14 Building Code Requirements for Structural Concrete and Commentary", ISBN 978-0-87031-930-3 (2014)
- ASTM A82: Specification for Plain Steel Wire for Concrete Reinforcement
- ASTM A184/A184M: Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
- ASTM A185: Specification for Welded Plain Steel Wire Fabric for Concrete Reinforcement
- ASTM A496: Specification for Deformed Steel Wire for Concrete Reinforcement
- ASTM A497: Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement

- ASTM A615/A615M: Deformed and plain carbon-steel rebars for concrete reinforcement
- ASTM A616/A616M: Specification for Rail-Steel Deformed and Plain Rebars for Concrete Reinforcement
- ASTM A617/A617M: Specification for Axle-Steel Deformed and Plain Rebars for Concrete Reinforcement
- ASTM A706/A706M: Low-alloy steel deformed and plain rebars for concrete reinforcement
- ASTM A722/A722M: Standard Specification for High-Strength Steel Rebars for Prestressed Concrete
- ASTM A767/A767M: Specification for Zinc-Coated (Galvanized) Steel Rebars for Concrete Reinforcement
- ASTM A775/A775M: Specification for Epoxy-Coated Reinforcing Steel Bars
- ASTM A934/A934M: Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
- ASTM A955: Deformed and plain stainless-steel rebars for concrete reinforcement (Supplementary Requirement S1 is used when specifying magnetic permeability testing)
- ASTM A996: Rail-steel and axle-steel deformed rebars for concrete reinforcement
- ASTM A1035: Standard Specification for Deformed and Plain, Low-carbon, Chromium, Steel Rebars for Concrete Reinforcement

ASTM marking designations are:

- 'S' billet A615
- 'I' rail A616 "ASTM A616 / A616M - 96a Standard Specification for Rail Steel Deformed and Plain Rebars for Concrete Reinforcement (Withdrawn 1999, superseded by A996)".
- 'IR' Rail Meeting Supplementary Requirements S1 A616 "ASTM A616 / A616M - 96a Standard Specification for Rail Steel Deformed and Plain
- Rebars for Concrete Reinforcement (Withdrawn 1999, superseded by A996)".
- 'A' Axle A617 "ASTM A617 / A617M - 96a Standard Specification for Axle Steel Deformed and Plain Rebars for Concrete Reinforcement (Withdrawn 1999, superseded by A996)".
- 'W' Low-alloy — A706

Rebar cages are fabricated either on or off the project site typically using hydraulic benders and shears. However, for small or custom work a tool known as a Hickey, or hand rebar bender, is sufficient. The rebars are placed with rebar supports and concrete or plastic rebar spacers separating the rebar from the concrete formwork to establish concrete cover and ensure that proper embedment is achieved. The rebars in the cages are connected by spot welding, tying steel wire, or with mechanical connections.

For tying epoxy coated or galvanised rebars, epoxy coated, or galvanized wire is normally used, respectively. Rebar cages are normally tied together with wire, although spot welding of cages has been the norm in Europe for many years and is becoming more common in the United States. High strength steels for prestressed concrete cannot be welded.

U.S. Rebar Size Chart

bar size	Metric bar size (soft)	Linear Mass Density lb/ft	Linear Mass Density kg/m	Nominal diameter (in)	Nominal diameter (mm)	Nominal area (in ²)	Nominal area (mm ²)
#3	No.10	0.376	0.560	0.375 = 3/8	9.53	0.11	71
#4	No.13	0.668	0.994	0.500 = 1/2	12.7	0.20	129
#5	No.16	1.043	1.552	0.625 = 5/8	15.9	0.31	200
#6	No.19	1.502	2.235	0.750 = 3/4	19.1	0.44	284
#7	No.22	2.044	3.042	0.875 = 7/8	22.2	0.60	387
#8	No.25	2.670	3.973	1.000 = 8/8	25.4	0.79	510
#9	No.29	3.400	5.060	1.128 ≈ 9/8	28.7	1.00	645
#10	No.32	4.303	6.404	1.270 ≈ 10/8	32.3	1.27	819
#11	No.36	5.313	7.907	1.410 ≈ 11/8	35.8	1.56	1,006
#14	No.43	7.650	11.384	1.693 ≈ 14/8	43.0	2.25	1,452
#18	No.57	13.60	20.239	2.257 ≈ 18/8	57.3	4.00	2,581

Canadian Rebar Sizes

Metric bar designations represent the nominal bar diameter in millimeters, rounded to the nearest 5 mm.

Metric Rebar size	Linear Mass Density(kg/m)	Nominal diameter(mm)	Cross-sectional Area (mm ²)
10M	0.785	11.3	100
15M	1.570	16.0	200
20M	2.355	19.5	300
25M	3.925	25.2	500
30M	5.495	29.9	700
35M	7.850	35.7	1,000
45M	11.775	43.7	1,500
55M	19.625	56.4	2,500

Meticulous reinforced concrete detailing always has a significant impact on the construction of reinforced concrete structures including reinforced concrete footings, reinforced concrete slabs, reinforced concrete walls, reinforced concrete beams, reinforced concrete staircases etc.

Our expert competent licensed professional structural engineers are committed to deliver cost effective detailed stamped engineering reinforced concrete rebar placing drawings and reinforced concrete rebar bending schedules on time.

Our licensed professional structural engineers are very familiar with all the latest reinforcement concrete rebar placement and methods for the most practical, efficient and cost-effective reinforcement concrete rebar solutions.

Our licensed professional structural engineers who prepare detailed stamped engineering reinforced concrete rebar placing drawings and reinforced concrete rebar bending schedules, have clear understanding and expertise of the following:

- Locate tension and compression zones and draw bending moment diagrams
- Applicable code, the different standard bend shapes defined in the applicable code and the pin diameter recommended by the Code
- Standard hook lengths for different angles
- Lap lengths
- Calculation of development lengths & cut lengths
- General cover to be followed on top, bottom and side faces of a reinforced concrete beam
- Check for the existence of complications in the element like steps, size variations between continuous beams, Depth variations etc.
- Various rebar in a Typical continuous reinforced concrete beam
- where a Reinforced Concrete Rebar Detailer can lap top and bottom rebars? Where a Reinforced Concrete Rebar Detailer cannot lap top and bottom bars?
- Identify the locations of congestion of rebar occur and how to resolve any potential congestion of rebar
- Requirements to provide the rebar with special treatments including epoxy coating, end Threads for couplers etc.

To prepare detailed stamped engineering reinforced concrete rebar placing drawings and reinforced concrete rebar bending schedules, our licensed professional structural engineers need to know the following:

- Different reinforced concrete rebar sizes, stock lengths available for fabrication
- Reinforced concrete rebar would be bent onsite or at a shop
- Format of the required CNC reinforced concrete rebar list
- Maximum allowable weight and length for trucking and length limitations in shipping different shaped reinforced concrete rebars

Our reinforced concrete rebar detailers work closely with the structural and architectural designers, general contractors, fabricators, rebar providers and other stake holders to ensure the project moves forward on a timely manner within the budget.

Contact us for free competitive fee quotation for reinforced concrete rebar detailing for any projects in North America.

We can quote on a per reinforced concrete rebar detailing drawing or per tonne of reinforced concrete rebar basis.

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