Guide to Presenting Reinforcing Steel Design Details

Reported by Joint ACI-CRSI Committee 315

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This document guides designers of concrete structures how to determine information and design details that are required to prepare reinforcing steel fabrication details and placing drawings. The guide stresses the importance of this information to ensure that the reinforcing steel detailer effectively and accurately captures the intent of the designer, presenting it in a manner that is clear and unambiguous to the reinforcing steel fabricator and placer. Recommendations are also provided concerning the review of placing drawings.

Keywords: concrete structures; design details; detailing; engineering drawings; fabrication details; placing drawings; reinforcement; reinforcing steel; tolerances.

CONTENTS

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CHAPTER 1—INTRODUCTION AND SCOPE

1.1—Introduction

The purpose of this document is to guide the licensed design professional (LDP) in determining the information a reinforcing steel detailer requires to properly prepare reinforcing steel fabrication details and placing drawings. Guidance to the LDP is provided on how to present that information on their structural drawings so that the design intent is effectively and accurately conveyed.

The intent of this guide is to encourage clarity and consistency in reinforcing steel design details to help improve the quality and uniformity of steel reinforcement detailing, fabrication, and installation. It is intended to facilitate clear communication between LDPs, reinforcing steel detailers, fabricators, and placers by encouraging clear presentation of design details and information. Information presented is consistent with the requirements and recommendations of several ACI documents, including ACI 318, ACI 301, ACI 117, ACI 131.1R, and ACI 132R.

1.2—Scope

This guide provides general and specific information, as well as illustrative design details that are required for steel-reinforced concrete members such as slabs, beams, and columns. The importance of this information is emphasized to ensure that the reinforcing steel detailer effectively and accurately captures the intent of the LDP, and presents it in a manner that is clear and unambiguous to the reinforcing steel fabricator and placer. Recommendations are also provided concerning the review of placing drawings by the LDP.

CHAPTER 2—NOTATION AND DEFINITIONS

2.1—Notation

A_g = gross area of concrete section, in.^{2} (mm^2) where for a hollow section, A_g is the area of the concrete only and does not include the area of the void(s)
A_{st} = total area of nonprestressed longitudinal reinforcement, including bars or steel shapes and excluding prestressing reinforcement, in.^{2} (mm^2)
b = width of member, in. (mm)
d = distance from extreme compression fiber to centroid of tension reinforcement, in. (mm)
d_{agg} = nominal maximum size of coarse aggregate, in. (mm)
d_b = nominal diameter of bar or wire, in. (mm)
f_c' = specified compressive strength of concrete, psi (MPa)
f_y = specified yield strength for nonprestressed reinforcement, psi (MPa)
h = overall thickness, height, or depth of member, in. (mm)
ℓ_d = development length in tension of deformed bar, deformed wire, or plain and deformed welded wire reinforcement, in. (mm)
ℓ_{dh} = development length in tension of deformed bar or deformed wire with a standard hook measured from outside end of hook, point of tangency toward critical section, in. (mm)
ℓ_{ext} = straight extension at the end of a standard hook, in. (mm)
V_u = factored shear force

2.2—Definitions

ACI provides a comprehensive list of definitions through an online resource, ACI Concrete Terminology. The definitions provided herein complement that resource.

design details—drawings or other information presented by the licensed design professional (LDP) defining steel reinforcement sizes, locations, clearances, splices, geometry, points of termination, relationships, and tolerances.

detailer—person, firm, or corporation producing the reinforcing steel fabrication details and placing drawings based on the design drawings and design details for the structure.

detailing—the process of determining fabrication details based on design details.

fabrication details—dimensions and geometry of steel reinforcement determined for fabrication.

fabricator—person, firm, or corporation producing the reinforcing steel cut and bent to needed dimensions and geometry.

federated model—a building information model (BIM) that electronically links, but does not merge, single-discipline models together for analysis or presentation; the model databases remain distinct and are not combined into a single database.

placing drawings—detailed drawings that give the quantity, size, dimensions, spacing, locations, and other information required for reinforcement fabrication and installation.

CHAPTER 3—GENERAL CONSIDERATIONS

3.1—Building information modeling (BIM)

3.1.1 *Introduction to BIM*—Building information modeling is a three-dimensional process used to generate and manage digital models of buildings and other structures. This process is used by those who plan, design, and build structures, as well as those who manage these facilities. The process involves creating and maintaining intelligent models with attributes that represent characteristics of a facility and contain parametric data about the elements within the model. Many software packages exist that fall within the definition