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**Part 1      General**

**1.1      DESCRIPTION OF WORK**

- .1      The work shall consist of the supply and delivery of reinforcing steel and other hardware to the site, storage of reinforcing steel and associated hardware, and the placing of reinforcing steel.

**1.2      STANDARDS**

- .1      CSA International  
178 Rexdale Boulevard,  
Toronto, ON M9W 1R3

**1.3      QUALITY ASSURANCE**

- .1      The Engineer shall carry out such tests on construction and workmanship as he considers necessary at the Owner's expense except that:
  - .1      The Contractor shall furnish any and all test samples free of charge.
  - .2      In the case of manufactured products the Engineer may require evidence that samples of the product have recently been tested and have met the requirements of the relevant Clause or Standard.
  - .3      Where the Contractor cannot produce evidence satisfactory to the Engineer that a manufactured product or a particular lot of product meets the requirement of the relevant Clause or Standard, the Engineer may require the product to be tested. If the product fails to meet the relevant Clause or Standard, the Contractor shall pay for the cost of such testing
  - .4      The Engineer may request the Contractor to provide the Engineer with a certified copy of mill test reports for the steel supplied, including physical and chemical analysis.

**1.4      STORAGE**

- .1      Reinforcement shall be stored in bundles with identifying tags or markings on racks or sills that shall permit easy access for identification and handling and prevent it from becoming coated with any material which would adversely affect the bonding of concrete.

**1.5      INSPECTION**

- .1      Inspection of the work described in this Section shall be performed by the Engineer. In general, inspection shall be required before placing reinforcing steel and after placing reinforcing steel. The Contractor shall give the Engineer 24



hours notice prior to reinforcing steel inspection before final forms are put in place for placing concrete. The Engineer's review of the placement of steel does not relieve the Contractor of his responsibility for correctly placing and providing adequate support for the reinforcing steel.

## **1.6 SHOP DRAWINGS**

- .1 The Contractor shall submit shop drawings to the Engineer for review 10 calendar days prior to the commencement of related work and as per General Conditions Section 13.4b, prior to the placement of reinforcing steel. Review of the shop drawings shall not relieve the Contractor of his responsibility for errors or omissions on the shop drawings.
- .2 Shop drawings shall clearly indicate bar sizes, lengths, spacing, lap lengths, location and quantity of reinforcing steel, chairs, spacers and hangers. All bars shall be marked with an identification code to permit correct placement.
- .3 The shop drawings submitted shall bear the signature and stamp of a qualified professional Engineer, registered in the Province of Manitoba.

## **Part 2 Products**

### **2.1 MATERIAL**

- .1 REINFORCING STEEL
  - .1 Shall be Grade 400 steel, unless specified otherwise in Section 01001 of the Special Provisions or as indicated on the Plans, and shall conform to the requirements of the current CAN/CSA 23.1. All bars shall be deformed in accordance with the definition of deformed bars as given in the current CSA Standard G30.6, Minimum Requirements for the Deformations of Deformed Steel Bars for Concrete Reinforcement. All bars shall be identified as to Mark and Plan number with metal tags. The metal tags shall be firmly attached to their respective bundles and the identification shall be firmly, legibly and indelibly stamped thereon.
- .2 WELDED WIRE FABRIC
  - .1 Shall conform to the current CSA Standard G30.18, Welded Steel Wire Fabric for Concrete Reinforcement, and shall be of the gauge and spacing noted on the plans.
- .3 BAR SUPPORTS
  - .1 Shall be of commercially manufactured type CAN/CSA A23.1 Standard Clause 6.6 and shall be epoxy coated or galvanized, bent wire or plastic



chairs. For chairs over 200 mm in height, they shall be made of bent or welded steel bar.

.4 **SIDE FORM SPACERS**

- .1 Shall be of a type and material which will not cause blemishes, rust spots or spalling of the exposed surface.

**Part 3 Execution**

**3.1 PLACING AND SUPPORTING REINFORCING STEEL**

- .1 Reinforcement shall be placed accurately within the tolerances provided in Clause 3.2 and adequately supported before concrete is placed and shall be secured against displacement during placement operation. The reinforcement shall be supported by bar supports to assure proper concrete cover and spacing within the allowable tolerances before and during the placement of concrete.
- .2 Bar supports shall be sufficient in number and strength to carry the weight of reinforcement and prevent displacement by workmen and equipment before and during concrete placement. Side form spacers shall be used for all column and wall construction to secure reinforcement against displacement and maintain cover distance between reinforcement and vertical formwork.
- .3 Intersecting bars shall be tied positively by 1.625 mm (16 ga.) soft black iron wire annealed ties in a manner and at a number of locations sufficient to maintain the bars in the required position. Lap length and bar development lengths shall be to CAN/CSA A23.1 IM and CAN/CSA 23.2.
- .4 On bars 20 M or smaller welding shall not be permitted under any circumstances. With the prior written approval of the Engineer, larger bars may be secured by welding. Welding, if authorized, shall be in accordance with CAN/CSA W186.
- .5 Unless otherwise indicated on the Plans, the Contractor shall not cut or bend reinforcement during the placing of the steel. Minor modifications to individual bars may be made with the approval of the Engineer.
- .6 Reinforcement, at the time concrete is placed, shall be free from mud, oil, pitting, rust or other coatings that adversely affect bonding capacity. The Contractor shall remove any dry concrete that has been deposited on the steel during previous placement operations before additional concrete is placed.
- .7 Notwithstanding A23.1, the Contractor shall place reinforcing steel to provide proper minimum concrete cover as follows
- |    |                      |       |
|----|----------------------|-------|
| .1 | Suspended Slabs      |       |
|    | 10 M and 15 M bars   | 40 mm |
|    | 20 M and larger bars | 50mm  |



.2	Structural Base Slabs	
	Top Bars	50 mm
	Bottom Bars	75 mm
.3	Beams	
	Principle reinforcement	65 mm
	Stirrups and ties	50 mm
.4	Walls	50 mm

### 3.2 TOLERANCES

.1 Unless otherwise specified in Section 01001, Special Provisions, reinforcement shall be placed within the following tolerances.

- .1 For clear concrete protection of reinforcement  $\pm 12$  mm.
- .2 Where depth of a flexural member, thickness of a wall or smallest dimension of a column is:
  - .1 200 mm or less  $\pm 8$  mm
  - .2 Larger than 200 mm but less than 600 mm  $\pm 12$  mm
  - .3 600 mm or larger  $\pm 20$  mm

Lateral spacing of these bars shall be within  $\pm 30$  mm of the specified spacing.

- .3 For longitudinal location of bends and ends of bars + 50 mm
- .4 For longitudinal location at discontinuous ends of members  $\pm 20$  mm

### 3.3 WELDED WIRE FABRIC

- .1 Minimum side laps shall be 150 mm and minimum end laps shall be 150 mm, unless otherwise specified by the Engineer
- .2 Fabric steel shall be placed accurately in the position shown on the plans and shall be retained in such position by means of approved bar accessories and wire ties.
- .3 Alternatively, if approved by the Engineer, the fabric may be positioned in sequence in its proper position as the concrete is placed, but not lifted from below through previously placed concrete.