



**CONSTRUCTION SPECIFICATION FOR
CHAIN-LINK FENCE**

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772.01 SCOPE

This specification covers the requirements for the installation of chain-link fence.

772.01.01 Specification Significance and Use

This specification has been developed for use in municipal-oriented Contracts. The administration, testing, and payment policies, procedures, and practices reflected in this specification correspond to those used by many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

772.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

772.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

Ontario Provincial Standard Specifications, Construction

OPSS 904 Concrete Structures

Ontario Provincial Standard Specifications, Material

OPSS 1541 Chain-Link Fence Components

CSA Standards

W59-13 Welded Steel Construction (Metal Arc Welding)

ASTM International

A 123/A 123M-17	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A 780/A 780M-09 (2015)	Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
B 209-14	Aluminum and Aluminum-Alloy Sheet and Plate

For the purpose of this specification, the following definitions shall apply:

Barbed Wire means the twisted longitudinal wires, termed line wires, to which the barbs are attached.

Barbed Wire Arm means the metal arm to support the barbed wire.

Bottom Wire means the wire installed at the bottom of fence and fastened to the bottom of the fence fabric and extending throughout each section of fence between terminal posts.

Brace Band means a symmetrically formed strip of metal shaped to fit around a post and used with a carriage bolt and nut to attach the rail end or brace rail end to the post. Also, used for attaching barbed wire, tension wire, and other items to a terminal post.

Brace Rail means a tubular or fabricated steel section used for bracing terminal posts.

Corner Post means a terminal post when the direction of the line of fence changes in two or more directions.

Diagonal Brace Wire means the wire used for bracing terminal posts.

End Post means the fence post positioned at the ends of a section of fence.

Fence Post means an upright tubular or fabricated steel member for supporting fencing material.

Fitting means the mechanical connection of various designs, shapes, and metals to join fence components into an integral structure.

Gatepost means a terminal post on each side of a gate forming a gateway.

Hog Ring means a preformed open wire clip designed to close up into a ring to secure chain-link fabric to horizontal top and bottom wires.

Knuckled means the type of selvage obtained by interlocking adjacent wire ends in pairs and then bending the wire ends back into a closed loop.

Line Post means the fence post spaced at regular intervals between terminal posts throughout each section of fence.

Line Post Cap means a cap or top with a loop or hole used to position the top rail or top wire on top of the line posts. It also prevents water from entering the tubular post.

Marcelled Tension Wire means a type of wire manufactured with either a uniform helix or a series of waves put into the wire to facilitate tensioning the wire when installed to support the top or bottom of the chain-link fence fabric.

Post Sleeve means a specified length of tube or pipe set into a concrete retaining wall into which fence posts are placed.

Rail End means a cup-shaped fitting used with a brace band to connect the top rail or brace to a post.

Selvage means the edge finish on woven chain-link fabric joining pairs of pickets. The selvage may be knuckled or twisted.

Straining Post (or Pull Post) means a terminal post in a line of fence to brace a long stretch or to effect a change in elevation along a fence line.

Tension Band means an offset strip of metal shaped to fit around the terminal post and used with a carriage bolt and nut to attach the tension bar to the post.

Tension Bar means the bar used with tension bands to secure the fence fabric to a terminal post.

Terminal Post means end, gate, corner, and straining post.

Terminal Post Cap means a cap atop a post (end, gate, corner or straining post) that prevents water from entering the tubular post.

Top Rail means a tubular or fabricated steel section continuously joined by means of sleeves or couplings throughout all sections of fence extending between terminal posts.

Top Rail Sleeve means a fitting used to join two pieces of top rail when swedged top rail is not used.

Top Wire means the wire installed at the top of fence and extending continuously throughout all sections of fence between terminal posts.

Twisted means the type of selvage obtained by interlocking adjacent wire ends in pairs and then twisting the wire at least two turns with the wire ends above the twist.

Wire Ties means the wire used to tie chain-link fence fabric to line posts, bottom wires, and top rails or top wires.

772.05 MATERIALS

772.05.01 Chain-Link Fence

Chain-link fence components shall be according to OPSS 1541.

772.05.02 Concrete

Concrete shall have a nominal minimum 28-Day compressive strength of 20 MPa.

772.07 CONSTRUCTION

772.07.01 Site Preparation

Prior to the commencement of fencing operations, all debris shall be removed and ground undulations shall be corrected along the fenceline to obtain a smooth and uniform gradient.

All trees, stumps, and brush along the fenceline shall be cut off at ground level and all logs and overhanging branches that interfere with the installation of the fence shall be removed.

772.07.02 Chain-Link Fence

772.07.02.01 General

Chain-link fence shall be installed at locations specified in the Contract Documents.

Survey reference points or permanent property boundary markers shall not be disturbed or moved without the authorization of the Contract Administrator. When it is necessary to set posts adjacent to such points, the posts shall be placed on the roadway side of the property line as close as feasible to the monuments or markers.

772.07.02.02 Post Installation

772.07.02.02.01 General

All posts shall be installed plumb and to the depth specified in the Contract Documents.

Posts shall be cut to the required height above the ground to present a smooth and uniform profile. Line post spacing shall be in equal horizontal distances with a maximum of 3,000 mm between line posts.

All posts shall be fitted with waterproof metal caps designed to fit and fasten securely over the posts. All line post caps shall carry either the top rail or top wire as specified in the Contract Documents.

Corner posts shall be installed at horizontal deflections in the fence line of 10 degrees or more.

Straining posts shall be installed at equal intervals not exceeding 150 m. Additional straining posts shall be installed when changes in vertical alignment of the fence exceed 30 degrees.

772.07.02.02.02 Posts On Concrete Barrier

All posts installed on concrete barrier shall be according to the Contract Documents.

Each post shall be fabricated with a welded steel base plate grade 300W, hot dip galvanized according to ASTM A 123, and according to the Contract Documents. All welds shall be to a low hydrogen classification according to CSA W59. Manual electrodes shall be E7015, E7016, or E7018. All welds shall be continuous.

772.07.02.02.03 Footings

All posts shall be installed according to the Contract Documents.

Concrete placing, curing, and protection from the elements shall be according to OPSS 904.

772.07.02.03 Bracing

A brace rail or brace wire shall be placed diagonally across the panel at all ends and gateposts. Corner and straining posts shall be supported with diagonal braces placed on both sides of the post. The higher end of the diagonal brace shall be connected at the terminal post.

End fittings shall be secured by a 6 mm bolt placed through the fitting and braced at both ends of the brace.

772.07.02.04 Top Rails, Top Wires, and Bottom Wires

Top rails or top wires shall be installed as specified in the Contract Documents.

Top rails or top wires shall be fastened securely to line post tops using waterproof caps.

In sag locations, the post and cap shall be drilled and fastened with a self-tapping screw to ensure a secure fit.

Top rails shall be fastened to terminal posts with centre bands.

Top and bottom wires shall be stretched tight and securely fastened to terminal posts with turnbuckles and centre bands.

One turnbuckle shall be used between terminal posts.

772.07.02.05 Fence Fabric

Fence fabric shall not be installed until the concrete footings have cured for a minimum of 5 Days.

The fabric shall be stretched tight and securely fastened to terminal posts with steel tension bars and steel or aluminum tension bands. The longitudinal axis of the diamond pattern shall be perpendicular to the slope of the top rail or top wire.

The fabric shall be placed on the side of the post nearest the roadway with the barbed edge at the top, except on curves of 50 m or smaller radius, the fabric shall be placed on the side of the post away from the centre of the curve.

The fabric shall be securely fastened to the line posts, bottom wire, and top rail or top wire with wire ties. The fabric shall not be fastened to any diagonal braces.

Manually fastened round wire ties shall engage one strand of the chain-link fence fabric with one end of the tie by wrapping it with two 360 degree turns and then wrapping the body of the tie around the post or top rail a minimum of 180 degrees. The remaining end of the tie shall be secured to the second strand of the chain-link fence fabric by wrapping it with two 360 degree turns. The fabric and the main body of the tie shall be drawn tightly to the rail or post.

Power fastened wire ties shall engage two strands of the chain-link fence fabric at a diamond joint closest to the post or top rail. The manufacturer's installation instructions shall be followed to complete the operation. The ends shall be twisted three full twists or one and one half machine turns. The end of the tie shall be positioned on the post or rail so that it is parallel to the chain-link fence fabric.

The ends of wire ties shall not protrude beyond the vertical plane on either side of the chain-link fence fabric. Protruding ends of wire ties shall be removed.

The hog rings on top and bottom wires shall be installed according to the Contract Documents.

772.07.02.06 Barbed Wire

Barbed wire shall be installed when specified in the Contract Documents. The barbed wire shall be pulled taut to remove all slack and shall be firmly installed in the slots of the barbed wire arms. The ends of the barbed wire shall be securely connected at the terminal posts with brace bands. Barbed wire arms shall be installed with the arm pointing away from the roadway.

772.07.03 Gates

Gates shall be installed at locations and of the type and size as specified in the Contract Documents.

772.07.03.01 Gate Installation

Gates shall be constructed with the fabric on the side furthest from the roadway with the barbed edge at the top.

All gates shall have a chain hook to hold gates open and double gates shall have a steel gate centre rest with a drop bolt for the closed position.

The surface grade within the required gate sweep area shall be low enough to permit free movement of the gate.

772.07.04 Marking

Identification plates, provided by the material supplier, shall be securely attached to the completed fence installation at the following intervals:

- a) At the start and end of each fence installation.
- b) At a maximum interval of 300 m.

The fence identification plate shall be located within 300 mm of a terminal post with the top of the plate located approximately 300 mm from the top of the fence fabric. The maximum dimensions of the plate shall be 200 by 200 mm. The plate shall be made from 0.81 mm thick anodized aluminum sheet according to ASTM B 209 series 1100 or 5005-H34.

Each fence identification plate shall be engraved with the following information:

- a) Contract number.
- b) Name or trademark of fence Subcontractor.
- c) Name or trademark of fence supplier (i.e., supplier(s) of fence fabric and posts)
- d) Date of completed installation (i.e., yyyy-mm).

The height of the letters and numerals shall be within the range of 6 to 32 mm.

772.07.05 Zinc Coating Repairs

Cut ends, field drilled holes, and damaged areas of hot dip galvanized coatings on galvanized components shall be repaired according to ASTM A 780.

772.07.06 Site Restoration

After fence installation, the site shall be cleaned and trimmed and the ground restored to a neat and original condition existent prior to the fencing operations.

772.07.07 Management of Excess Material

Management of excess material shall be according to the Contract Documents.

772.08 QUALITY ASSURANCE

772.08.01 Construction

The Contract Administrator may perform a spot visual inspection to determine conformance with the workmanship, design, and dimensional requirements of this specification.

Failure to conform to the specification may result in a partial or complete inspection of the installation and removal and replacement of all defective workmanship or materials.

772.08.02 Material Certification

Certificates of compliance for each fence component used in the installation shall be provided to the Contract Administrator. The certificate of compliance shall indicate that the material was manufactured, sampled, tested, and inspected in accordance with the reference specification and has been found to meet the requirements.

Each certificate of compliance shall include the following information typed on company letterhead:

- a) Manufacturer's name or trademark.
- b) General description of the component.
- c) Reference specification for material (e.g., CGSB 138.1 Fence Fabric for Chain-Link Fence).
- d) Signed and dated by the manufacturer's authorized representative.

All certificates of compliance shall be assembled and submitted to the Contract Administrator prior to completion of the Work.

772.08.03 Material Sampling

The Contract Administrator may obtain and test samples to ensure compliance with the specifications. Products represented by the test samples that are not in compliance shall be removed from the Work Area and replaced.

772.09 MEASUREMENT FOR PAYMENT

772.09.01 Actual Measurement

772.09.01.01 Chain-Link Fence

Measurement of chain-link fence shall be by length in metres along the contour of the ground for the actual length of fence installed and shall include gate openings.

772.09.01.02 Gates

For measurement purposes, a count shall be made of the number of gates installed, regardless of the size and type. Double gates shall be counted as one gate.

772.09.02 Plan Quantity Measurement

When measurement is by Plan Quantity, such measurement shall be based on the units shown in the clauses under Actual Measurement.

772.10 BASIS OF PAYMENT

**772.10.01 Chain-Link Fence - Item
Gates - Item**

Payment at the Contract price for the above tender items shall be full compensation for all labour, Equipment, and Material to do the work.

772.10.02 Removals and Replacements

Costs associated with any required removals and replacements of defective workmanship or materials shall be the Contractor's responsibility at no cost to the Owner.

**Appendix 772-A, April 2019
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Chain-link fence locations. (772.07.02.01)
- Locations of top rail or top wire to be used. (772.07.02.02.01)
- Barbed wire locations. (772.07.02.06)
- Gate locations, type, and size. (772.07.03)

The designer should consider the placement of the fence fabric in relation to the post when the fence is located between two roadways and when snow loading from ploughing operations could separate the fence fabric from the post, (e.g., freeway and service road).

When chain-link fence is located adjacent to a highway, a top rail represents a potential spearing hazard. The default installation method will be to install chain-link fence with top wire. For those installations where the chain-link fence will be installed in a non-roadside installation (e.g., park, recreation facility, storm water management facility, etc.), when, as a minimum, the chain-link fence is located beyond the clear zone, the designer may specify a top rail when desired. (772.07.02.02.01 and 772.07.02.04)

See MTO Roadside Design Manual for additional information.

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

OPSD 972.101	Fence, Chain-Link, Component - Barbed Wire
OPSD 972.102	Fence, Chain-Link, Component - Gate
OPSD 972.130	Fence, Chain-Link, Installation - Roadway
OPSD 972.131	Fence, Chain-Link, Installation - Concrete Barrier
OPSD 972.132	Fence, Chain-Link, Details and Table