



Note: The MUNI published in November 2021 replaces OPSS 919 COMMON, November 2011 with no technical content changes.

CONSTRUCTION SPECIFICATION FOR FORMWORK AND FALSEWORK

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919.01 SCOPE

This specification covers the design and construction requirements for formwork, falsework, and temporary supports used in the construction and rehabilitation of structures.

919.01.01 Specification Significance and Use

This specification has been developed for use in municipal-oriented Contracts. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

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

919.01.02 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.

919.02 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 501	Compacting
OPSS 903	Deep Foundations
OPSS 906	Structural Steel

Ontario Provincial Standard Specifications, Material

OPSS 1010	Aggregates - Base, Subbase, Selected Subgrade, and Backfill Material
OPSS 1350	Concrete - Materials and Production
OPSS 1801	Corrugated Steel Pipe Products

CSA Standards

A23.3-04	Design of Concrete Structures
G40.20-04/40.21-04	General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel
G164-M92	Hot Dip Galvanizing of Irregularly Shaped Articles
O86-M84 (R1992)	Engineering Design in Wood
O121-08	Douglas Fir Plywood
O122-06	Structural Glued-Laminated Timber
S16-1969	Steel Structures for Buildings
S157/S157.1-05	Strength Design in Aluminum/Commentary on CSA S157-05, Strength Design in Aluminum
S269.1-1975 (R2003)	Falsework for Construction Purposes

National Research Council (NRC)

National Building Code of Canada-2005

919.03 DEFINITIONS

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

Bulkhead means the vertical form that supports the end width of a deck pour of concrete.

Certificate of Conformance means a document issued by the Quality Verification Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

Culvert means a structure that provides an opening through an embankment and in which roadway loads are distributed to the structure through fill or that is designated as a culvert in the Contract Documents.

Engineer means a professional engineer licensed by the Professional Engineers Ontario to practice in the Province of Ontario.

Exposed Surface means all external formed surfaces not to be covered by backfill material.

Falsework means any temporary structural support, including bracing, used to support all or part of the formwork or of the structure during its construction or rehabilitation until it becomes self-supporting.

Formwork means the mould into which the fresh concrete is placed.

Foundation means the ground immediately below the mudsills that supports the falsework or that portion of ground supporting the falsework piles.

Grade means:

- a) For steel, the designation of the quality of the steel that can be determined by referring to the appropriate CSA standard or by specimen testing.
- b) For wood, the designation of the quality of a piece of wood that can be determined by referring to the appropriate CSA Standard.

Hardwood means wood with a degree of hardness at least equal to a species, such as hard maple, oak, or beech.

Joist means one of a series of horizontal members, usually with narrow face up, to which form material is fastened.

Ledger means a horizontal flexural member usually supporting joists and resting on vertical supports.

Mudsill means a mat of timbers or a small footing on the ground used as a base from which the remainder of the falsework structure is erected.

Quality Verification Engineer (QVE) means an Engineer retained by the Contractor qualified to provide the services specified in the Contract Documents.

Shoring means a system of vertical or inclined supports for forms or structure components. Shoring may be wood or metal posts, scaffold-type frames, or various patented members or other system of falsework.

Stay-in-Place Forms means forms that are not removed.

Structure means any bridge, culvert, tunnel, retaining wall, wharf, dock, or guideway.

Stud means one of a series of usually vertical members used in framing to support the plywood or formwork fastened to it.

Timber means felled trees or logs suitable for conversion by sawing or otherwise or a piece of sawn lumber having a minimum nominal dimension greater than or equal to 125 mm.

Wood means lumber and timber.

919.04 DESIGN AND SUBMISSION REQUIREMENTS

919.04.01 Design Requirements

919.04.01.01 Formwork Design

Formwork design shall be according to CAN/CSA S269.3.

919.04.01.02 Falsework Design

Falsework design shall be according to CSA S269.1 and as specified herein.

The allowable stresses for wood design shall be according to CSA/CAN3-086.

The allowable stresses for structural steel design shall be according to CSA S16, except the stresses allowed may be increased by 15% for temporary loading.

Deflection of beams shall be limited to $L/270$, where L is the span. The loading for deflection shall be the weight of concrete and formwork.

When deflection of a beam is 10 mm or more, provision shall be made to compensate for deflection. When provision is made to compensate for deflection, the deflection of the beams shall be limited to $L/240$, where L is the span. The tolerance shall be ± 5 mm.

Aluminum components shall be designed according to CAN3-S157.

Concrete components shall be designed according to CSA A23.3.

Where scaffolding, fabricated shoring, or patented accessories are used, the design shall be according to the manufacturer's recommendations.

Where another authority is involved, any additional requirements specified by the authority shall also be satisfied.

919.04.01.03 Vertical Loadings

Vertical loading shall be:

- a) The weight of the concrete being supported or 2.50 kN/m^2 on the horizontal projected area of the formwork, whichever is the greater.

- b) The weight of normal concrete, as it is placed, shall be considered as a liquid having a weight of 24.00 kN/m³.
- c) The weight of the formwork supported by the falsework or 0.50 kN/m² of the horizontal projected area, whichever is greater.
- d) The weight of workers, equipment, and tools that is to be supported during the concrete placing and finishing operations or 2.00 kN/m² of horizontal projected area of formwork whichever is greater. When motorized placing equipment is used this minimum load shall be increased to 3.00 kN/m².
- e) Load due to any special conditions of construction likely to occur.
- f) Loads for temporary supports as specified.

919.04.01.04 Horizontal Loading

The horizontal loadings shall include the effects of environmental factors, such as wind; the rate of placing of concrete; the temperature of the concrete; the effect of vibration of the concrete; the consistency of the mix; and other pertinent factors.

Wind pressures shall be based on those listed in the National Building Code of Canada using 1/30 probability for falsework and 1/10 probability for formwork with a gust factor of 2 and a minimum wind pressure of 0.8 kPa.

Notwithstanding the above, a minimum transverse and longitudinal force of 2% of vertical loading or 1.50 kN/m of deck edge applied at the mid-depth of the deck, whichever is greater, shall be used.

919.04.01.05 Tower Leg Loads

The vertical loads on the tower legs may be based on simple span assumptions. The loads supported by a tower leg may be assumed to be those loads applied to the area immediately above the tower leg that is bounded by lines located one halfway between each of the bays adjacent to the tower leg being considered.

When locating towers, the following criteria shall apply:

The maximum design load on one leg of a frame shall not exceed four times the design load on the other leg under full or partial loading conditions.

The maximum design load on one of the two frames making up a tower shall not exceed four times the design load on the opposite frame under any loading condition.

919.04.01.06 Minimum Bracing Requirements

The minimum bracing requirements are as follows:

- a) Connections Between Joists and Ledgers

Every fourth joist shall be connected to a ledger.

Ledgers on top of frames shall be axially continuous across the shoring system to evenly distribute horizontal forces to individual scaffold towers below. Ledgers with a splice designed to take the axial load are considered axially continuous.

- b) Bracing in the Transverse Direction

When the shoring height is composed of three frames or the shoring height is more than three times the tower width or the total shoring height is more than 5 m, one horizontal brace made continuous shall be installed on one face of each tower.

The brace shall be located at the mid-height of a two-frame tower and at the top of the second frame for a three-frame tower.

When shoring towers are adequately braced against transverse movement by tying to an adjacent structure or adjacent tower, the above height-to-width restriction applies only to the tower grouping.

When the shoring height is composed of more than three frames, at least one horizontal brace made continuous and one diagonal brace made continuous shall be attached to one transverse face of each tower for every three frames of shoring height. In addition, the maximum spacing of the horizontal brace shall be three times the tower width. The horizontal brace shall be located near the top of a frame. Diagonal braces on adjacent towers shall be installed in opposite directions.

When superelevation is 4% or greater, a horizontal transverse brace shall be attached to one tower face of the top frame in addition to the bracing required by the preceding paragraph.

When the shoring height is greater than 20 m, guy wires shall be installed. The spacing of the guy wires shall not be greater than 15 m horizontally.

c) Bracing in the Longitudinal Direction

When the shoring height is composed of three frames or the total height is more than 5 m, one horizontal brace made continuous shall be installed spaced horizontally not more than 6 m apart. The brace shall be located at the top of the first frame of a two-frame tower and the top of the second frame of a three-frame tower.

When the shoring height is composed of four frames or more, horizontal braces and diagonal braces made continuous shall be attached on a tower and spaced horizontally not more than 6 m apart. The lowest brace shall be located no higher than the third frame and additional braces shall be spaced vertically at the top of every third frame thereafter.

When the bridge is on a longitudinal grade of 4% or greater, braces parallel to the grade shall be attached to one tower face of the top frame and spaced not more than 6 m apart horizontally.

d) Tie Back Bracing - Falsework Opening Towers

The falsework opening towers shall be longitudinally braced to two rows of scaffold towers behind them according to the Bracing in the Longitudinal Direction requirements above, regardless of the height, and shall be continuously braced transversely.

919.04.01.07 Mudsills

The mudsills shall be designed such that the settlement of mudsills shall not exceed 12 mm.

919.04.02 Submission Requirements

919.04.02.01 Working Drawings

919.04.02.01.01 General

Working Drawings shall be submitted for all falsework used in the construction or rehabilitation of structures, except for culverts less than 3 m in span.

Working Drawings are required for the following formwork:

- a) Inside forms for post-tensioned decks;
- b) Bulkheads in post-tensioned decks 2.0 m or greater in height;
- c) All columns and walls, 2.4 m or greater in height, of abutments, piers, and retaining walls.

Working Drawings for other formwork shall only be submitted, when specified in the Contract Documents.

Formwork and falsework shall not be supported by, braced to, or come in contact with another structure unless written permission is received from the owner of the other structure. In order to obtain written permission, 3 copies of Working Drawings shall be submitted to the owner of the other structure showing the support locations and imposed loads as they are applied to that structure and certify that the structure can safely support all the imposed loads from the Contractor's method of construction. Prior to a submission, an Engineer's seal and signature shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

During formwork and falsework construction, the Contractor shall have a copy of the Working Drawings at the site.

919.04.02.01.02 Falsework

The Contractor shall submit 3 sets of falsework Working Drawings to the Contract Administrator at least 1 Day prior to commencement of erection of falsework, for information purposes only. Prior to making a submission, the seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

Where multi-discipline engineering work is depicted on the same Working Drawing and the design or design-checking Engineer or both are unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional design and design-checking Engineers as necessary.

When other authorities are involved, 1 set of Working Drawings shall be submitted for each authority at least 5 weeks prior to the commencement of falsework construction.

The Working Drawings for the falsework for each structure shall include all details of all falsework to be erected.

Falsework Working Drawings shall include at least the following:

- a) Longitudinal, lateral, vertical, live, impact, and anticipated construction loads used in the design.
- b) Allowable bearing capacity of the soil beneath the mudsills.
- c) Maximum column loads.
- d) Deflection diagrams for beams having a deflection of 10 mm or more.
- e) The grade and actual size of all structural materials.
- f) Posts, connections, bracing and welding sufficiently detailed to demonstrate compliance with the structural analysis and erection requirements.
- g) Fully detailed frame shoring.

- h) Type and mass of moving or stationary equipment to be supported by the falsework.
- i) Sequence, method, and rate of concrete placement.
- j) All proprietary equipment sufficiently identified to demonstrate compliance with the structural analysis and erection requirements.
- k) Full details and locations of all splices.
- l) Method of maintaining rotational and lateral stability of bridge girders.
- m) Vertical stiffening details and lateral restraint for ledgers and subledgers.
- n) Lateral restraint details for falsework supporting beams spanning openings.
- o) Fluid concrete loads, assumed for design purposes.
- p) Location of screed rail supports and design load.
- q) Anticipated settlement of falsework, including settlement of mudsill.

919.04.02.01.03 Formwork

The Contractor shall submit 3 sets of formwork Working Drawings to the Contract Administrator at least 1 Day prior to commencement of erection of formwork, for information purposes only. Prior to making a submission, the seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents and sound engineering practices.

Where multi-discipline engineering work is depicted on the same Working Drawing and the design or design-checking Engineer or both are unable to seal and sign the Working Drawing for all aspects of the work, the drawing shall be sealed and signed by as many additional design and design-checking Engineers as necessary.

When other authorities are involved, 1 set of Working Drawings shall be submitted for each authority at least 5 weeks prior to the commencement of falsework construction.

The Working Drawings shall show all necessary design and construction details, including the grade and size of materials used and the pressure diagrams used in the design.

919.04.02.02 Foundation Information

919.04.02.02.01 Falsework Foundation Design Report

Three copies of a Falsework Foundation Design Report shall be submitted to the Contract Administrator. The report shall bear the seal and signature of an Engineer, shall include the rationale used to determine the soil bearing capacity, and shall include the following information:

- a) The soil bearing capacity.
- b) Site preparation details.

A Falsework Foundation Design Report is not required when the mudsill bears on mass concrete poured directly on bedrock or when the mudsill bears on compacted Granular A of depth 1.0 m or less placed directly on bedrock.

919.04.02.02.02 Interim Inspection after Construction of Falsework Foundation

Upon completion of the falsework foundation and prior to installation of falsework, the Quality Verification Engineer shall conduct an interim inspection of the work to verify that the falsework foundation has been constructed according to the Falsework Foundation Design Report and issue the Contractor written permission to proceed with the work.

919.04.02.03 Proprietary Shoring, Forms, and Accessories

When proprietary shoring, forms, and accessories are used, the manufacturers' allowable loads with supporting test data shall be submitted with the Working Drawings.

919.04.02.04 Splices for Stay-In-Place Forms

Details of the method of joining round stay-in-place forms shall be shown on the Working Drawings.

919.04.02.05 Revised Submissions

When falsework design considerations or field conditions necessitate amendments to the falsework, revisions shall be resubmitted according to the Working Drawings clause.

919.05 MATERIALS

919.05.01 General

Forms and falsework shall be constructed of wood, metal, or concrete.

919.05.02 Wood

Wood shall be according to CSA/CAN3-O86.

919.05.03 Plywood

Plywood for formwork shall be 7 ply, 17 mm minimum thickness exterior grade Douglas Fir Plywood according to CSA O121.

For exposed surfaces, the finish side shall be medium density overlay plywood; however, this finish is not required in the following locations:

- a) The underside of a deck between girders.
- b) The ends of decks.
- c) The face of ballast walls.
- d) The internal faces of a culvert.

919.05.04 Structural Glued-Laminated Timber

Structural glued-laminated timber shall be exterior grade according to CAN/CSA O122.

919.05.05 Metal

Structural steel shall be according to CAN/CSA G40.20/G40.21 and be of the grade shown on the Working Drawings.

Aluminum shall be according to CSA-S157 and be of the alloy and temper shown on the Working Drawings.

Used metal shall be in good condition. All previous fabrication, adversely affecting the required strength, shall be corrected.

919.05.06 Concrete

Concrete shall be according to OPSS 1350.

919.05.07 Accessories

All accessories used shall comply with the details shown on the Working Drawings or with the recommendations of the manufacturer of the specified accessory.

Deck hangers and hardware left in place, either exposed or embedded in concrete within 20 mm of its surface, shall be hot dip galvanized.

All form ties left in place in barrier and parapet walls shall be hot dip galvanized, coated with an approved material, or non-corrodible. Where stainless steel reinforcement is used within the form, all form ties left in place in barrier and parapet walls shall be of stainless steel type 304.

The maximum diameter of plastic cones for form ties shall be 30 mm.

Hot dip galvanizing shall be according to CAN/CSA G164-M.

919.05.08 Void Tubes

Corrugated steel pipe shall be according to OPSS 1801 and need not be coated.

The thickness of the plate in the corrugated pipe shall be as follows:

- a) Diameters equal to or less than 900 mm - 0.9 mm thick.
- b) Diameters over 900 mm to 1200 mm - 1.1 mm thick.

Steel void forms shall have an outside diameter, top of corrugation to top of corrugation, equal to the diameter of the voids shown on the Working Drawings.

Paper fibre tubes shall be coated, spiral wound, wood fibre paperboard manufactured with waterproof glue.

919.05.09 Granular A

Granular A shall be according to OPSS 1010.

919.07 CONSTRUCTION

919.07.01 Formwork

919.07.01.01 General

Forms shall be smooth; clean; free from warps, splits, holes, and bulges; and constructed and maintained to be mortar tight.

919.07.01.02 Exposed Surfaces

Forms for exposed surfaces shall be new, except that forms may be re-used for exposed surfaces providing their condition is such as to produce a surface equal to one that would be attained using new materials. Where possible, plywood used on exposed surfaces shall be in full sheets and, except when used to form the underside of deck slabs for slab-on-girder construction, shall be so arranged that the face grain is perpendicular to the studs or joists.

919.07.01.03 Studs, Joists, and Decking

Studs and joists shall be spaced not more than 400 mm on centres. Edges of abutting sheets shall be nailed to the same stud or joist with 50 mm nails at not more than 200 mm centres. When used to form the underside of deck slabs in post-tensioned slab and rigid frame bridges, the joints between sheets abutting over joists shall be staggered a minimum of 400 mm. When prefabricated form panels are used, adjacent panels shall be placed such that the joints are maintained flush.

919.07.01.04 Form Release Oil

Non-staining form release oil shall be applied to the faces of forms against which concrete is to be placed. The form release oil shall be applied before placing reinforcement.

919.07.01.05 Ties

When internal form ties are used, concrete cover to any metal left upon removal of the forms shall be 20 mm minimum.

All ties, securing stay-in-place forms in position and extending below the deck soffit shall be loosened before any stressing commences.

Holes left in the deck soffit after removal of hanger coil rods shall be left open.

919.07.01.06 Exposed Corners

All exposed corners on concrete work and the edges of the box void slabs on the soffit of the structure shall be chamfered. The chamfer shall have a vertical and horizontal dimension of 20 mm.

919.07.01.07 Stay-in-Place Forms

Stay-in-place forms shall only be used when specified in the Contract Documents or under the following conditions:

- a) Round void tubes of metal in cast-in-place hollow prestressed concrete decks and round void tubes of metal or paper fibre in precast prestressed hollow slab deck units.

Where round voids are used, individual lengths shall be joined by an inner or outer sleeve or other method. Details of the method of joining shall be submitted to the Contract Administrator, for information purposes only.

- b) Box voids in precast concrete box girder deck units less than 1.2 m in depth.

919.07.02 Falsework

919.07.02.01 General

Sound adjustable falsework shall be built such that the structure remains true to line and grade after anticipated settlement.

Mudsills shall not be placed until the Contractor has a set of falsework Working Drawings on site.

The use of tack welds for hangers or other attachments to structural steel is not allowed, except that tack welds may be used on shear studs where it is not detrimental to the connection between the stud and the structural steel.

All welding of structural steel shall be according to OPSS 906.

919.07.02.02 Foundation Work

The falsework structure shall be supported on mudsills, structure footings, or piles.

Where the existing ground is unable to take the applied loads, piles driven according to OPSS 903 shall be used to support the falsework.

Where a timber pile in a falsework bent is too short, the Contractor shall cut off all the piling in the bent to the same elevation and cap the bent. An extension bent shall then be constructed. A pile splice shall only be used with the approval of the Contract Administrator.

Where steel piles are used in a falsework bent, a splice designed and fabricated for 100% of the pile section may be used to make up the required length of any pile.

All caps shall be continuous for the entire length of the bent or sliced as approved by the Contract Administrator. When splices in caps are approved, they shall be located at the centreline of a pile.

For traffic openings, a minimum horizontal space of 1.0 m shall be provided between the back face of the concrete barrier and the front edge of the mudsill.

A levelling pad consisting of a minimum of 100 mm of Granular A, compacted according to OPSS 501, or of poured in place concrete shall be placed under mudsills on bedrock to provide a level surface.

Where the ground is sloped and the Contractor elects to excavate steps, the slopes between the horizontal steps shall not be steeper than 1H:1V. A minimum horizontal width of 300 mm shall be provided between the mudsill and the top edge of slope.

Reduction of the bearing capacity of existing ground or compacted fill, due to water or ice, shall be prevented by suitable drainage or protection.

919.07.02.03 Wooden Shoring

All wooden posts shall be solid, not built up. Where splicing is necessary, the posts shall be cut square and the two pieces shall be in full contact over the splice. Scabbing shall be provided on all four faces of a post to be spliced. Each post shall be braced in two directions both above and below the splice immediately adjacent to the scabbing. Splices on adjacent posts shall be staggered.

Splicing of round posts shall not be permitted.

Bracing material shall be at least 38 x 89 mm lumber except for cross bracing for side forms where 19 x 138 mm lumber may be used. Bracing shall be nailed to each post with at least two 100 mm nails for 38 x 89 mm lumber and two 75 mm nails for 19 x 138 mm lumber. Splicing of bracing shall not be permitted.

Wedges used for purposes of falsework adjustment or to facilitate removal shall be hardwood.

919.07.02.04 Metal Shoring

Erection of metal frame shoring shall be according to CSA S269.1.

The maximum extension of jacks shall not exceed the lesser of the manufacturer's recommendations or 600 mm.

Shims used for levelling mudsills shall be fir plywood or solid lumber.

Wedges used to provide full bearing in U-heads shall be hardwood.

919.07.03 Temporary Supports

The construction of temporary supports shall be as specified in the Contract Documents.

919.07.04 Screed Rail Supports in Slab on Girder Construction

In slab-on-girder construction, screed rail supports shall not be located outside the centreline of the web of the outside girders.

When screed rail supports are not located over the webs of girders, a system of support shall be installed such that the deflection of the system under the load of the screed machine shall not exceed 5 mm.

919.07.05 Certificate of Conformance

Certificates of Conformance shall be submitted for all formwork and falsework for which Working Drawings are submitted.

A completed Certificate of Conformance shall be submitted to the Contract Administrator upon completion of formwork and falsework installation and before any concreting takes place. The Qualification Verification Engineer's seal and signature shall be affixed on the completed Certificate of Conformance confirming that the formwork and falsework have been installed in general conformance with the Working Drawings and Contract Documents.

919.07.06 Removal of Formwork, Falsework, and Temporary Supports

All formwork and falsework shall be removed. When authorized by the Contract Administrator, piles used for falsework may be left in place provided the top is 1.2 m below the finished grade or ground level or is at least 0.6 m below a streambed.

The method and sequence of removal of the formwork and falsework shall be such that it permits the concrete to take up the stresses gradually.

Falsework shall not be removed from post-tensioned structures until the post-tensioning is completed.

When a component is not post-tensioned, falsework may be removed after the concrete has attained a minimum strength of 20 MPa.

Formwork shall not be removed until the concrete has attained a minimum strength of 20 MPa; however, formwork for cast-in-place barrier walls and parapet walls may be removed 24 hours after completion of the placement.

Where insulation is used, the side forms may be slackened off 24 hours after concrete placement to help control temperature.

Removal of temporary supports shall be as specified in the Contract Documents.

919.07.07 Management of Excess Material

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

919.10 BASIS OF PAYMENT

919.10.01 Formwork and Falsework

The Contract price for the concrete tender item directly associated with formwork and falsework shall include full compensation for all labour, Equipment, and Material to do the work.

919.10.02 Temporary Support - Item

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

Appendix 919-A, November 2021 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:

- Stay-in-place forms. (919.07.01.07)
- Construction of temporary supports. (919.07.03)
- Removal of temporary supports. (919.07.06)

The design should determine if the following is required and, if so, it should be specified in the Contract Documents:

- Submissions of other formwork Working Drawings. (919.04.02.01.01)

OPSS 919 contains information written for provincial contracts. To ensure completeness of municipal Contract Documents, the designer should invoke Appendix 919-B. The appendix contains supplemental requirements that modify OPSS 919 so it can be used by a municipality in its contracts.

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 3310.100	Deck, Girders, Concrete, Method of Obtaining Screed Elevations
OPSD 3311.100	Deck, Girders, Steel, Method of Obtaining Screed Elevations
OPSD 3332.100	Deck, Round Voids, Form Supports and Tie Downs
OPSD 3333.100	Deck, Round Voids, Drains
OPSD 3333.101	Deck, Trapezoid Voids, Drains
OPSD 3390.100	Deck, Drip Channel
OPSD 3390.150	Falsework Clearance to Traffic Lanes
OPSD 3940.150	Figures In Concrete, Warning Message, Layout
OPSD 3940.151	Figures In Concrete, Warning Message Letters
OPSD 3940.200	Figures In Concrete, Site Number and Date Layout

**Appendix 919-B, November 2009
FOR USE IN MUNICIPAL CONTRACTS, WHEN REFERENCED IN THE CONTRACT DOCUMENTS**

Note: This is a non-mandatory Additional Information Appendix intended to provide supplementary requirements for the OPS specification in a municipal contract, when the appendix is invoked by the Owner. It is written in mandatory language to permit invoking it by reference in the Contract Documents. If the appendix has not been invoked by reference in the Contract Documents, it does not apply.

Supplemental Requirements for Using OPSS 919 in Municipal Contracts

OPSS 919, Formwork and Falsework, is amended as follows:

919.03 Definitions

Section 919.03 is amended by the deletion of the definitions for Certificate of Conformance and for Quality Verification Engineer.

Section 919.03 is amended by the addition of the following:

Certificate of Installation means a document issued by the design Engineer or design-checking Engineer confirming that the specified components of the Work are in general conformance with the requirements of the Contract Documents.

919.04.02.01.02 Falsework

The first paragraph of clause 919.04.02.01.02 is deleted in its entirety and replaced by the following:

The Contractor shall submit 5 sets of Working Drawings to the Contract Administrator at least 14 Days prior to commencement of the erection of falsework. Prior to making a submission, the seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

919.04.02.01.03 Formwork

The first paragraph of clause 919.04.02.01.03 is deleted in its entirety and replaced by the following:

The Contractor shall submit 5 sets of Working Drawings to the Contract Administrator at least 14 Days prior to commencement of the erection of formwork. Prior to making a submission, the seals and signatures of a design Engineer and a design-checking Engineer shall be affixed on the Working Drawings verifying that the drawings are consistent with the Contract Documents.

919.04.02.02.02 Interim Inspection after Construction of Falsework

Clause 919.04.02.02.02 is deleted in its entirety and replaced by the following:

Upon completion of the falsework foundation and prior to installation of falsework, the design Engineer or the design-checking Engineer shall conduct an interim inspection of the work to verify that the falsework foundation has been constructed according to the Falsework Foundation Design Report and issue the Contractor written permission to proceed with the work.

Appendix 919-B

919.04.02 Submission Requirements

Subsection 919.04.02 is amended by the addition of the following:

919.04.02.06 Return of Submissions

Two copies of each submission shall be returned as one of the following:

- a) Stamped with the wording that allows for permission to construct. In this case, work can commence on receipt of the drawings by the Contractor.
- b) Stamped with the wording that allows for permission to construct as noted. In this case, work can start on receipt of the drawings by the Contractor. The drawings shall be updated as noted and shall be sealed and signed by the design Engineer and the design-checking Engineer stating the drawings have been revised according to the noted comments.
- c) Showing only required changes. In this case, the drawings shall be updated as required and the submission process repeated.

919.07.05 Certificate of Conformance

Clause 919.07.05 is deleted in its entirety and replaced by the following:

919.07.05 Certificate of Installation

Certificates of installation shall be submitted for all formwork and falsework for which Working Drawings are submitted.

A completed certificate of installation shall be submitted to the Contract Administrator upon completion of the formwork and falsework installation prior to the placement of concrete. The design Engineer or design-checking Engineer's seal and signature shall be affixed on the completed certificate of installation confirming that the formwork and falsework have been installed in general conformance with the Working Drawings and Contract Documents. The certificate of installation shall also certify that the interim milestone inspections have been completed as specified in the Contract Documents.