

**AMENDMENTS TO OPSS 928 (MAY 94) –
CONSTRUCTION SPECIFICATION FOR STRUCTURE REHABILITATION –
CONCRETE REMOVAL ¹**

OPSS 928 Unless otherwise specified in the specifications, all references to half- cell survey shall be omitted from this specifications.

OPSS 928.02 is deleted and amended with the addition of the following:

928.02 REFERENCES

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

City of Toronto Specifications

TS 905 Amendments to OPSS 905 – Construction Specification for
Steel Reinforcement for Concrete

OPSS 928.07.01 is amended by the addition of the following:

Scarifying shall not apply to removal of waterproofing by grinding.

OPSS 928.07.01 is amended by the addition of the following subsections:

928.07.01.01 Full Depth Asphalt and Waterproofing Removal

The Contractor shall remove all existing asphalt and waterproofing as indicated in the Special Specifications* and shall dispose of the removed material off site.

All removals of the existing waterproofing shall take place using mechanical methods other than grinding.

The actual depth of the existing asphalt is indicated in the Special Specifications* .

Also included as part of this work is the provision of all sawcuts in the asphalt at the locations indicated in the Special Specifications* .

1. All references to OPS specifications that have been amended (as noted in LIST T1) are superseded by references to the replacement City of Toronto specifications (as given in LIST T1).

* Note to Designer: Provide this information in the form of a Special Provision.

Rotary milling equipment is not permitted for the full depth removal of asphalt pavement from the concrete deck slab. Any damage to the structure due to the removal operations shall be repaired by the Contractor at his own expense to the satisfaction of the Commissioner. The Contractor should be prepared to provide additional effort to remove the waterproofing during cool weather.

928.07.01.02 Removal of Existing Waterproofing on Deck

The Contractor shall remove, by grinding, all existing waterproofing from the deck when, in the opinion of the Commissioner, the Contractor has been unable to remove using other methods. All material removed shall be disposed of off the site.

Rotary milling equipment will be permitted, provided the cut width does not exceed 1,000 mm and the amplitude of ridges over the milled surface does not exceed 2 mm. All grinders must be approved by the Commissioner before use.

Maximum removal depth of the existing concrete deck must not exceed 5 mm. Any concrete removed beyond this depth shall, at the Commissioner's discretion, be repaired by the Contractor at no additional cost to the Commissioner.

Prior to initiating this operation, a test patch shall be ground in the presence of the Commissioner, approximately 1,000 mm x 10,000 mm to verify the condition of the equipment and teeth.

OPSS 928.07.03 is superseded by the following:

928.07.03 Concrete Removal – Partial Depth

928.07.03.01 General

Typical locations and areas of removal are as shown on the drawings, however the actual locations and extent of removal will be determined on the site by the Commissioner employing one or more of the following techniques:

- (a) Visual observation; and
- (b) Sounding

928.07.03.02 Operational Constraints

928.07.03.02.01 General

Concrete shall be removed in such a manner as to prevent damage to adjacent concrete, other components and utilities that are to remain in place. Reinforcing steel, prestressing tendons, shear connectors, structural steel and other components that are to remain in place shall not be damaged or loosened. Hammers shall not come in contact with reinforcing bars in a manner which will cause debonding of bars in adjacent concrete areas not being repaired.

Concrete removal will not be permitted within 1 m of newly placed concrete for a period of 72 hours.

All effluent from the saw cutting operation shall be collected to prevent contamination of the environment.

928.07.03.02.02 Air Hammers

Concrete shall be removed using chipping and/or jack hammers. Jack hammers shall be used for the removal of concrete in front of and between the reinforcing bars. Only chipping hammers shall be used for the removal of concrete behind and within 25 mm of any reinforcing bars.

928.07.03.02.03 Air Compressors

Air compressors are permitted on the bridge deck during concrete removal operations, except that air compressors shall not be placed on deck areas where the reinforcing steel has been exposed.

The Contractor shall prevent contamination, by oil or other deleterious substances, of the concrete surfaces.

928.07.03.02.04 Management of Excess Materials

Excess materials resulting from performing the work required under this specification shall be removed and managed as specified in the Contract.

928.07.03.03 Access to Work Areas, Work Platform and Scaffolding

Access in conformance with subsection 928.07.02 shall be provided.

928.07.03.04 Removal of Concrete

All loose and delaminated concrete and concrete designated for removal shall be removed from areas as specified in the Contract and as specified by the Commissioner. When patching is required, the perimeter of the area to be removed shall be sawn to a depth of 25 mm or to the depth of the reinforcing steel bar, whichever is less. Saw cutting shall not be employed for removal areas to be subsequently covered by the work of shotcreting, refacing or concrete overlays.

Edges of removal areas, to receive shotcrete, shall have a 10 to 15 mm deep face oriented perpendicular to the original concrete surface.

Except when the Contract specifies a minimum depth of removal, when existing reinforcing steel is not exposed during concrete removal and sound concrete does not have to be removed in the area for other reasons, existing concrete shall not be removed more than that required to expose the surface of sound concrete.

Concrete removal shall extend below the reinforcing steel within the boundaries demarcated by the Commissioner in the following areas:

- (a) The entire area of spalls and delaminations.
- (b) All areas of exposed reinforcing steel.

Concrete shall be removed to a uniform depth of 25 mm behind the first layer of reinforcing steel. Concrete surrounding the second layer of reinforcing steel shall also be removed locally to provide a minimum clearance of 25 mm all around the reinforcing steel. All other concrete removal beyond the second layer of reinforcing steel shall be carried out only when directed by the Commissioner.

Where reinforcing steel is exposed, concrete removal shall extend along the reinforcing steel to the point where it is free from heavy rust. Concrete covering the reinforcing steel at the edge of the repair area will be sounded by the Commissioner for local delaminations before removal operations are completed.

Where the area of concrete removal with exposed reinforcing steel exceeds 2 m², the reinforcing steel shall be retied at every second intersection point and shall be supported to maintain the steel mat in its original location. Supports conforming to TS 905.05 shall be placed as required and tied securely to the reinforcing steel.

To facilitate measurement for payment, the Contractor shall provide the Commissioner with metal straight edges.

OPSS 928.07.04.01.01 is superseded by the following:

928.07.04.01.01 General

The asphalt and waterproofing shall be removed as part of the concrete removal work. The asphalt may be removed together with the concrete or separately. The general operational constraints, for Concrete Removal – Partial Depth applies to this work as well.

OPSS 928.07.04.01.05 is superseded by the following:

928.07.04.01.05 Air Compressors

Air compressors are permitted on the bridge deck subject to conformance with the requirements specified under Concrete Removal – Partial Depth.

OPSS 928.07.05 is superseded by the following:

928.07.05 Concrete Removal – Expansion Joint Assemblies

The existing expansion joint assemblies including joint filler materials and surrounding concrete shall be removed in conformance with the contract drawings and subsection 928.07.04.

OPSS 928.09.01.01 is amended by the addition of the following subsections:

928.09.01.01.01 Full Depth Asphalt and Waterproofing Removal

The measurement for Full Depth Asphalt and Waterproofing Removal shall be in square metres to the nearest 0.1 m² as measured on site by the Commissioner. The measurement will not include areas of the deck slated for concrete removal – full depth, such as but not limited to the existing expansion joints.

928.09.01.01.02 Removal of Existing Waterproofing on Deck

The item Removal of Existing Waterproofing on Deck is a provisional item and as such will only be paid with the prior approval of the Commissioner.

The measurement for Removal of Existing Waterproofing on Deck shall be in square metres, to the nearest 0.1 m², as measured on site by the Commissioner. The measurement shall include only those areas as indicated by the Commissioner to be ground, and will not include areas of the deck slated for concrete removal – full depth such as, but not limited to, the existing expansion joints.

OPSS 928.09.01.02 is superseded by the following:

**928.09.01.02 Concrete Removal – Partial Depth
Concrete Removal – Full Depth**

928.09.01.02.01 By Area

Measurement will be of the area of the concrete removed in square metres. The depth of the removal shall be as specified in the Contract.

The total area will be calculated to the nearest 0.1 m².

928.09.01.02.02 By Volume

Measurement for payment will be of the volume of concrete removed in cubic metres excluding that material removed locally to provide the 25 mm clearance behind the second layer of reinforcing steel.

The average depth of removal shall be measured to the nearest 0.5 cm.

The total volume will be calculated to the nearest 0.01 m³.

OPSS 928.10 is superseded by the following:

928.10 Basis of Payment

**928.10.01 Scarifying – Item
Full Depth Asphalt and Waterproofing Removal – Item
Removal of Existing Waterproofing On Deck – Provisional
Item**

Payment at the contract price for the above tender item, shall be full compensation for all labour, equipment and materials to do the work.

928.10.02 Access to Work Area, Work Platform and Scaffolding – Item

Concrete Removal – Partial Depth

- Concrete Removal – Substructure, Vertical – Item
- Concrete Removal – Substructure, Horizontal – Item
- Concrete Removal – Substructure, Soffit – Item
- Concrete Removal – Deck, Partial Depth – Item
- Concrete Removal – Deck, Soffit – Item
- Concrete Removal – Parapets, Inside Face – Item
- Concrete Removal – Parapets, Outside Face – Item
- Concrete Removal – Beam, Vertical – Item
- Concrete Removal – Beam, Soffit – Item

Concrete Removal – Full Depth

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- Concrete Removal – Ballast Wall – Item
 - Pier Removal – Item
 - Pier Cap Removal – Item
 - Column Removal – Item
 - Concrete Removal – Deck Full Depth – Item
 - Concrete Removal – Diaphragms – Item
 - Complete Deck Removal – Item
 - Expansion Joint Removal – Item
 - Approach Slab Removal – Item
 - Median Removal – On Deck – Item
 - Median Removal – On Grade – Item
 - Slope Paving Removal – Item

Payment at the contract price for the above tender item, shall be full compensation for all labour, equipment and materials to do the work, including abrasive blast cleaning (as per TS 929) of all concrete and reinforcing steel prior to placing concrete.

When the Contract does not contain a separate item for providing access to work, the contract price for the concrete removal items requiring the access shall include full compensation for all labour, equipment and material to provide such access.