



1.0 GENERAL

This specification covers all concreting operations related to:

- a) construction of new cast-in-place traffic signal and controller concrete foundations;
- b) construction of concrete pile extensions, and;
- c) repair of concrete foundations

in accordance with this Specification and as shown on the Drawings.

The Work to be done by the Contractor under this Specification shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as hereinafter specified.

Standard details forming part of this Specification include the following drawings:


F1	Foundation Type F1
F2	Foundation Type F2
F3	Foundation Type F3
F4	Foundation Type F5
E-002	Pile Extension Detail for Light Series Structures
E-002a	Pile Extension Detail for Heavy Series Structures
E-002b	Pile Foundation Repair for Light Series Structures
E-002c	Pile Foundation Repair for Heavy Series Structures
E-004a	Type IV Controller Base
E-005	Type V Controller / Power Pedestal Base

No additional payment shall be made for cleanup and site restoration as it is considered incidental to the Work of this Specification.

2.0 LAYOUT OF THE WORK

The Department shall lay out the center of pile foundations and the elevation to the top of concrete. The Contractor shall be responsible for providing offset markers or elevations prior to the start of construction.

The Contractor shall verify all layout is in accordance with the Drawings prior to the start of construction work.

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3.0 MATERIALS

3.1 General

Notwithstanding and in addition to Specification No. 1018M “Specifications for Placing Cast-in-Place Concrete Piles”, and Specification No. 1030(l) “Specifications for Reinforced Cast-in-Place Concrete”, the following shall apply.

The Contractor shall be responsible for the supply, safe storage, and handling of all materials set forth in this Specification.

All materials shall be handled and stored in a careful and workmanlike manner, to the satisfaction of the Engineer. Storage of materials shall be in accordance with CSA Standard A23.1 (latest edition).

3.2 Testing and Approval

All materials supplied under this Specification shall be subject to inspection and testing by the Engineer. There shall be no charge to the Department for any materials taken by the Engineer for testing purposes.

All materials shall be approved by the Engineer before any construction is undertaken. If, in the opinion of the Engineer, such materials in whole or in part, do not conform to the Specifications detailed herein or are found to be defective in manufacture or have become damaged in transit, storage, or handling operations, then such materials shall be rejected by the Engineer and replaced by the Contractor at his own expense.

3.3 Anchor Bolts and Setting Templates

Anchor bolts and anchor bolt setting templates (top and bottom) shall be supplied by the Department.

Anchor bolts shall be picked up and loaded by the Contractor’s forces at the Department’s stores located at 1550 Dublin Avenue, Winnipeg, Manitoba.

Anchor bolt setting template(s) shall be picked up and loaded by the Contractor’s forces at the Department’s Traffic Signal Workshop located at 8385 Wilkes Avenue, Headingly, Manitoba.

The Contractor shall contact the Department a minimum of 3 days prior to the pick-up of materials supplied by the Department to arrange a suitable time.



The top anchor bolt setting template shall be returned to 8385 Wilkes Avenue, Headingley, Manitoba within 5 days of Contract completion. The template shall be cleaned free of concrete residue and any other debris and returned to the Department in a "like-new" condition.

In the event of loss or damage to materials supplied by the Department, the cost of replacement materials shall be borne by the Contractor.

3.4 Anchor Bolt Extensions and Accessories

Anchor bolt extensions and accessories shall be supplied by the Department.

Anchor bolt extensions and accessories shall be picked up and loaded by the Contractor's forces at the Department's stores located at 1550 Dublin Avenue, Winnipeg, Manitoba.

The Contractor shall contact the Department a minimum of 3 days prior to the pick-up of materials supplied by the Department to arrange a suitable time.

3.5 Concrete

Concrete shall conform to Specification No. 1030 (I), "Specifications for Reinforced Cast-in-Place Concrete" and shall be the type therein described for cast-in-place piles.

3.6 Reinforcing Steel

Reinforcing steel shall be deemed to include all reinforcing bars, tie-bars, and dowels.


All reinforcing steel shall conform to the requirements of CSA G30.18, Grade 400 W, Billet-Steel Bars for Concrete Reinforcement. All reinforcing steel shall be new deformed billet steel bars.

3.7 Conduit

The conduit shall be 50 mm plastic pipe and 38 mm plastic pipe and shall include all incidentals, including watertight splice connections, where applicable.

4.0 EQUIPMENT

All equipment shall be of a type approved by the Engineer and shall be kept in good working order.

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The Contractor shall provide all the required equipment for the projects of this contract. Failure to provide the required equipment for any of the project sites of this contract will result in work stoppage for the Contractor until all the required equipment is at the project site.

- a) Auger \ Coring equipment.
- b) Sleeving equipment
- c) Trenching equipment to provide a single trench (Width – minimum 100 mm and up to a maximum of 300 mm) x (Depth – minimum 1000 mm).
- d) Horizontal directional drill only, shall be required for electrical conduit installations.
- e) Hydro vac equipment only. Hydro vac equipment shall be required for exposure of all underground utilities, Department Traffic Signal underground equipment, and new concrete pile foundation installations near any underground utilities, and Department Traffic Signal underground equipment.
- f) Backhoe and operator.
- g) Compressor, hoses, jackhammer, drill complete with bits capable of installing 38 mm electrical conduit.
- h) Plate Compactor or Jumping Jack Compactor shall be required equipment on all project sites of the Contract.
- i) Portable water pump and hose shall be required equipment on site for all the concrete pile foundation installations of the contract in the event that water is encountered.
- j) Portable electric concrete vibrator shall be required equipment on site for all concrete work of the Contract – minimum length required 2 meters.
- k) Saw cutting equipment for vehicle detector loop installation.
- l) All required construction signs and stands for the Contract – condition of signs and stands shall meet Department Specifications.
- m) Portable electric generator to power electrical equipment and tools.

5.0 CONSTRUCTION METHODS

5.1 General

Notwithstanding and in addition to Specification No. 1018M “Specifications for Placing Cast-in-Place Concrete Piles”, and Specification No. 1030(l) “Specifications for Reinforced Cast-in-Place Concrete”, the following shall apply.

The construction methods described in this section shall be applicable to



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- 1) construction of new cast-in-place traffic signal and controller concrete foundations;
- 2) construction of concrete pile extensions, and;
- 3) repair of concrete foundations.

5.2 Commencing Work

The Contractor shall notify the Project Supervisor at least three working days prior to commencing work at any location.

5.3 Scheduling of Work

Construction operations and sequence shall be subject to the approval of the Engineer.

Where services of other Contractors or Agencies are required, in connection with the satisfactory execution of the work, the Contractor shall notify all parties involved.

No extra compensation will be paid to the Contractor for any inconvenience or extra expense incurred as a result of delay by others.

5.4 Traffic Control

The Contractor shall provide traffic control in accordance with the latest edition of the Department's "Specifications for Traffic Control" – Level II Modified, gateway assemblies not required.


5.5 Location and Alignment of Foundations

Foundations shall be placed in the positions shown on the Drawings and as directed by the Engineer in the field.

The deviation of the axis of any finished pile shall not differ by more than one percent from the vertical.

5.6 Buried Utilities

The Contractor shall exercise extreme caution when constructing the pile foundations in the vicinity of existing buried utilities. The Contractor shall be responsible for obtaining the exact location of the buried utilities from the appropriate Utility Authority prior to installing the foundations.

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The proposed locations of the concrete foundations may be changed by the Engineer if they interfere with the buried utilities.

The Contractor shall be responsible for all costs that may be incurred for repair/rectification of any damage caused to the existing buried utilities as a result of the Contractor's operations in constructing cast-in-place concrete foundations, as determined by the Engineer.

The Contractor shall be responsible for all underground utility clearances, and the Department underground traffic signal plant clearances for the various Contract projects. At the request of the Engineer the Contractor shall make available all the utility clearance documents for each Contract project. The Contractor shall expose all underground utilities and the Department underground traffic signal plant with only hydro vac equipment before any underground electrical conduits are installed. The Engineer on site shall inspect the exposed underground utility before the installation of any underground electrical conduits. Sand shall be used to backfill the excavated area of the exposed underground utility, or exposed underground traffic signal plant.

5.7 Restoration of Adjacent Property

The restoration of existing concrete sidewalks/medians and curbs, as well as boulevard median, paving stone, or sodding, required as shown on the Drawings, will be incidental to the construction of cast-in-place concrete foundations, and no separate payment will be made.

Sidewalk or median concrete paving shall be saw cut at least 300 mm all around from the edge of pile and restored flush with adjacent surface level after the foundation work has been completed. An isolation joint shall be provided in accordance with Plan No. MISC-3.

During the course of the work, the Contractor shall keep the workplace in a neat and tidy condition, satisfactory to the Engineer. The Contractor shall, upon the completion of the work, remove all temporary structures and clean away all rubbish, surplus, and waste material remaining on or about the workplace, satisfactory to the Engineer.

If these requirements are not met, the Engineer shall give notice requiring the Contractor to remedy the situation. Should the Contractor fail to remedy the situation within 48 hours of receipt of this notice, the Engineer shall cause the situation to be remedied at the expense of the Contractor.



6.0 CONSTRUCTION METHODS FOR NEW CONCRETE FOUNDATIONS

6.1 General

Notwithstanding and in addition to Specification No. 1018M “Specifications for Placing Cast-in-Place Concrete Piles”, and Specification No. 1030(l) “Specifications for Reinforced Cast-in-Place Concrete”, the following shall apply.

The construction methods described in this section shall be applicable to construction of new cast-in-place traffic signal and controller concrete foundations;

6.2 Forms

The top 610 mm of the concrete pile foundations shall be formed with tubular forms (Sonotube).

A minimum of 75 mm of clear cover shall be provided to all embedded reinforcing steel.

The forms shall be sufficiently rigid to prevent lateral or vertical distortions from the loading environment to which they shall be subjected. Forms shall be set to the design grades, lines, and dimensions, as shown on the Drawings.

6.3 Installing Anchor Bolts

The anchor bolts shall be aligned with the steel concrete pile foundation template matching the bolt holes in the traffic signal structure base plate. The traffic signal arm alignment shall be determined by the Engineer on site.

29 mm, 32 mm and 50 mm diameter anchor bolts have a pre-fabricated anchor bolt setting template (top setting template) attached to the top of the anchor bolts supplied by the Department.

Prior to placement of concrete, the top setting template shall be oiled (both inside and out) for ease of removal and cleaning. Extreme care shall be used in this operation.

Following removal of the top setting template, the template shall be cleaned and returned to the Department.

29 mm diameter and 50 mm diameter anchor bolts have a pre-fabricated anchor bolt brace (bottom setting template) attached to the bottom of the anchor bolts supplied by



the Department. The bottom setting template is cast-in-place in the concrete foundation.

The pre-fabricated anchor bolt brace (bottom setting template) for 50 mm diameter anchor bolts shall be held in place by the top and bottom nuts of the 50 mm diameter anchor bolts, whereas for 29 mm diameter anchor bolts the bottom template sits on the curved ends of the 29 mm diameter anchor bolts.

Placement of anchor bolts without the steel concrete pile foundation template and pre-fabricated anchor bolt brace (bottom setting template) where required shall not be permitted.

The anchor bolts shall not be tied or otherwise in contact with reinforcing steel.

The threaded portion of the anchor bolts projecting above the concrete surface shall be taped with light gauge PVC electrical tape, before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

6.4 Installation of Electrical Conduits in Concrete Pile Foundation

The supply and installation of electrical conduits shall be considered incidental to the Work of this Specification.

The installation of electrical conduits into the traffic signal concrete pile foundation shall be installed by licensed electricians. Four (4) electrical conduits consisting of (2 – 50 mm) and (2 – 38 mm) shall be installed in each concrete pile foundation as shown on the Drawings. The electrical conduits shall enter 900 mm minimum below ground level and shall protrude through the centre of the concrete pile foundation. The (2 – 38 mm) electrical conduits shall be installed as spares and shall be plugged with an approved electrical conduit plug, or electrical tape at each end and protected to ensure future accessibility.

An additional (1 – 13 mm) electrical conduit supplied by the Contractor shall be installed by licensed electricians in the centre of each concrete pile foundation as directed by the Engineer not shown on the drawings.

6.5 Installation of Grounding Conductor

The grounding conductor shall be installed by licensed electricians.

The copper clad ground rod (3.0 m) and ground wire supplied by the Department shall be installed adjacent (within 1.0 m) to each concrete traffic signal concrete pile



foundation. The #6 bare copper ground wire shall be connected to the ground rod with a ground rod clamp. The ground wire shall then be installed through the (13 mm) conduit to the centre of the traffic signal concrete pile foundation and terminated above the concrete pile foundation in a 1.0 m coil.

The installation of the grounding conductor shall be considered incidental to the Work of this Specification.

6.6 Placing Concrete

Care shall be taken to ensure that anchor bolts are vertically aligned and that anchor bolts and conduits are properly positioned prior to placement of concrete.

The threaded portion of the anchor bolts projecting above the concrete surface shall be taped with a light gauge PVC electrical tape before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

6.7 Concrete Pile Foundation Template Removal

After the concrete has been placed the Contractor shall determine the length of time required for the safe removal of the concrete foundation template to complete a first class concrete finish on the surface of the concrete pile foundation. The template shall be placed back on the concrete pile foundation after the first class finish has been completed. After the concrete has cured the Contractor shall determine when the template can be safely removed from the concrete foundation. Removal of the template shall be done in a manner to avoid damage to, or spalling of, the concrete.


Any damage (i.e. cracking or chipping of the concrete) to the concrete foundation surface during removal of the foundation template shall be inspected by the Engineer on site. The Engineer on site shall determine the extent of the damage, and decide whether the concrete foundation shall be repaired or replaced. Any repair or replacement of the concrete foundation shall be at the Contractor's own expense.

6.8 Grout Pads

When directed by the Engineer, the Contractor shall install grout pads between the base plate and concrete pile foundation.

Standards equipped with breakaway safety bases do not require grout pads.

Grout pads shall be installed after the traffic signal and/or pedestrian corridor standards are erected.

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The concrete pile foundation shall be sound and all surfaces to be in contact with the grout shall be entirely free of oil, grease, laitance, curing compounds, and other deleterious substances.

The bottom surface of the base plates, which are to be in direct contact with the grout, shall be thoroughly cleaned immediately before grouting.

The surface of concrete pile foundation shall be washed clean and then saturated with water for 24 hours prior to installation of non-shrink grout. The concrete shall be covered with saturated burlap and running a soaker hose or flooding the surface shall be carried out for satisfactory results, as directed by the Engineer.

Grout shall be mixed according to the procedures recommended by the manufacturer. Carefully read all mixing information on the package and the latest literature. If in doubt about mixing procedures, contact the product manufacturer.

The consistency of the grout will vary with the amount of water added. Add the minimum water recommended by the manufacturer before adding the grout. Forming is not required to place the grout.

The placement of grout shall be rapid and continuous so as to avoid cold joints under the base plate.

Grout must not be placed in layers. All grouting should take place from one side to the other to avoid trapping air. The grout shall be packed underneath the base plate, eliminating all voids, and ensuring full contact between the base plate and the grout pad. The top of the grout pad shall be sloped away from the base plate to prevent standing water.

The fresh grout shall be cured using an approved curing compound.

7.0 CONSTRUCTION METHODS FOR REBUILT FOUNDATIONS

7.1 General

Notwithstanding and in addition to Specification No. 1018M "Specifications for Placing Cast-in-Place Concrete Piles", and Specification No. 1030(I) "Specifications for Reinforced Cast-in-Place Concrete", the following shall apply.



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Concrete foundations to be extended or repaired shall be identified on the contract drawings and shall be marked by the Engineer before work commences.

The following rebuild work related to existing concrete foundations at designated traffic signal structure sites are covered under this Specification.

The construction methods described in this section shall be applicable to

- 1) construction of concrete pile extensions, and;
- 2) repair of concrete foundations.

The Contractor shall include the cost of removing and restoring the existing concrete/asphalt sidewalk paving or sodding or soil surface, as required, in the total cost of the respective repairs as no separate payment will be made for this Work.

The Contractor is advised that the removal, temporary storage, reinstallation of the existing traffic signal structures, and related electrical work will be done by the Department's Traffic Signal crew unless otherwise specified.

7.2 Concrete Removal

The grout pad and deteriorated concrete shall be removed from the top of concrete pile foundation down to sound concrete. The amount of concrete removed shall be determined by the Engineer for concrete foundations requiring repairs, and for concrete pile foundations requiring extensions.

The areas requiring removal shall be marked in the field by the Engineer after the Contractor has excavated around the concrete pile foundation.

The perimeter of all concrete identified for removal shall be saw-cut to a minimum depth of 20 mm prior to removal of concrete.

7.3 Field-Applied Touch-up Galvanizing

After the concrete has been removed to a depth determined by the Engineer, the Contractor shall field-apply touch-up galvanizing for all exposed anchor bolts and steel reinforcement.

Surfaces to receive touch-up galvanizing shall be cleaned using a wire brush, a light grinding action, or mild blasting to remove loose scale, rust, paint, grease, dirt, or other contaminants.



For pure zinc paint on systems, the approved product Zinga shall be applied by either a brush or roller. The Zinga shall be applied in three coats, with each coat having a minimum dry film thickness of 2.36 mils. Each coat shall be left to dry for a minimum of one (1) hour before the application of the next coat.

No additional payment shall be made for this Work as it is considered incidental to the Work of this Specification.

7.4 Installation of Dowels, Anchor Bolt Extensions and Conduits

Dowels, which are to be anchored into existing concrete, shall be installed in pre-drilled holes, as shown on the Drawings and grouted in place to the correct grade and alignment. In the event that existing reinforcing steel bars are hit during the drilling operations that hole shall be abandoned and a new hole shall be drilled nearby to the correct depth. All abandoned holes shall be filled with non-shrink non-metallic grout.

All holes shall be thoroughly cleaned prior to installation of dowel bars.

Care shall be taken not to disturb the holes until the grout has set properly. Any dowels, which are found to be loose, shall be removed and reinstalled properly to the satisfaction of the Engineer. After the Engineer has approved the installation of the dowels, the reinforcing steel shall be placed to clearances as shown on the Drawings and shall be positively tied.

Anchor Bolt Extensions shall be installed as shown on the Drawings. The anchor bolt extensions shall be aligned with a template matching the bolt holes in the existing base plate. The setting template shall be held in place by the top and bottom nuts of the anchor bolts.


The size of electrical conduit extensions shall match the existing electrical conduits. The electrical conduit extensions shall be installed by licensed electricians.

7.5 Placing Concrete

The threaded portion of the anchor bolts projecting above the concrete surface shall be taped with a light gauge PVC electrical tape before the concrete is poured, to minimize the fouling of threads splattered by concrete residue.

7.6 Patching of Formed Surfaces

Immediately after forms have been removed, but before any repairing or surface finishing is started, the concrete surface shall be inspected by the Engineer. Any

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repair of surface finishing started before this inspection may be rejected and required to be removed.

All formed concrete surfaces shall have bolts, ties, struts, and all other timber or metal parts not specifically required for construction purposes cut back fifty (50) mm from the surface before patching.

Minor surface defects caused by honeycomb, air pockets greater than 5 mm in diameter, and voids left by strutting, and tie holes shall be repaired by removing the defective concrete to sound concrete, dampening the area to be patched and then applying patching mortar. A slurry grout consisting of water and cement shall be well-brushed onto the area to be patched. When the slurry grout begins to lose the water sheen, the patching mortar shall be applied. It shall be struck-off slightly higher than the surface and left for one hour before final finishing to permit initial shrinkage of the patching mortar and it shall be touched up until it is satisfactory to the Engineer. The patch shall be cured as specified in this Specification, and the final colour shall match the surrounding concrete.

7.7 Reinstallation of Traffic Signal Structures

The traffic signal structures will be reinstalled by the Department's forces unless otherwise specified.

8.0 CONCRETE TESTING


In addition to Specification 1030 (I) "Specifications for Reinforced Cast-in-Place Concrete", the following shall apply.

All concrete delivered to the project sites for new concrete pile foundations shall be tested. No concrete shall be discharged from the concrete truck until there is a third-party concrete technologist on-site to perform concrete testing.

AMEC, Eng-Tech and National Testing Laboratories Limited perform on-site concrete tests, and laboratory tests.

All concrete test results shall be e-mailed to the Traffic Signals Manager (Lou Gagnon) E-mail: Lucien.Gagnon@gov.mb.ca.

A minimum 26 MPa (75%) compressive strength is required for the safe installation of the traffic signal pole on the new concrete pile foundation.

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The Contractor shall be responsible for all the required concrete tests, and all costs incurred for the concrete tests.

No additional payment shall be made for concrete testing as it is considered incidental to the work of this specification.

9.0 BACKFILLING AROUND CONCRETE FOUNDATIONS

In addition to Specification 1002 M “Specifications for Supplying and Placing Granular Backfill”, the following provisions will apply.

Placed concrete shall be allowed to cure for a minimum of 24 hours prior to backfilling and compaction of an approved granular material around the concrete pile foundation.

For traffic signal pole foundations, backfill shall be placed up to 50 mm from the concrete pile foundation surface. For controller foundations, backfill shall be placed up to 100 mm from the concrete pile foundation surface.

No additional payment shall be made for the supply or placement of backfill material as it shall be considered incidental to the Work of this Specification.


10.0 QUALITY CONTROL

All workmanship and all materials furnished and supplied under this Specification are subject to close and systematic inspection and testing by the Engineer, including all operations from the selection and production of materials, through to final acceptance of the Work. The Contractor shall be wholly responsible for the control of all operations incidental thereto notwithstanding any inspection or approval that may have been previously given. The Engineer reserves the right to reject any materials or Works that are not in accordance with the requirements of this Specification.

The Contractor shall be responsible for making a thorough inspection of materials to be supplied under this Contract. All material shall be free of surface imperfections and other defects.

11.0 GUARANTEE

The Contractor shall guarantee all material against quality or workmanship for a period of at least one year after final approval by the purchaser.

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12.0 METHOD OF MEASUREMENT

12.1 Construction of New Concrete Foundations

The construction of cast-in-place concrete foundations will be measured on a unit basis for each type of foundation. The number of foundations to be paid for shall be the total number of foundations of each type constructed in accordance with this Specification and accepted by the Engineer.

12.2 Construction of Concrete Pile Extensions

The construction of concrete pile extensions will be measured on a unit basis. The units to be paid for shall be the total number of pile extensions constructed in accordance with this Specification and accepted by the Engineer.

12.3 Repair of Concrete Foundations

The repair of concrete foundations will be measured on a unit basis. The units to be paid for shall be the total number of foundations repaired in accordance with this Specification and accepted by the Engineer.

13.0 BASIS OF PAYMENT


13.1 Construction of New Concrete Foundations

The construction of cast-in-place concrete foundations will be paid for at the Contract Unit Price per unit for the "Items of Work" listed herebelow, measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations described herein and all other items incidental to the Work included in this Specification.

Items of Work:

Construction of New Concrete Foundations

- a) Traffic Signal Concrete Pile - Foundation Type F1
 - b) Traffic Signal Concrete Pile - Foundation Type F2
 - c) Traffic Signal Concrete Pile - Foundation Type F3
 - d) Traffic Signal Concrete Pile - Foundation Type F5
 - e) Controller Concrete Foundation
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13.2 Construction of Concrete Pile Extensions

The construction of concrete pile extensions will be paid for at the Contract Unit Price per unit for "Construction of Concrete Pile Extensions," measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations described herein and all other items incidental to the Work included in this Specification.

13.3 Repair of Concrete Foundations

The repair of concrete foundations will be paid for at the Contract Unit Price per unit for "Repair of Concrete Foundations," measured as specified herein, which price shall be payment in full for supplying all materials and performing all operations described herein and all other items incidental to the Work included in this Specification.

"Original Signed By"

Approved: _____
 Glenn Cuthbertson, P. Eng.
 Director, Traffic Engineering Branch

