GOVERNMENT OF NEWFOUNDLAND AND LABRADOR
Department of Transportation and Works
Highway Design Division

SECTION 906

PRESTRESSED CONCRETE MEMBERS

INDEX

906.01 SCOPE

The Contractor shall furnish all labour, materials, equipment, plant and services specified, indicated or required to manufacture, transport, store and install the prestressed concrete and/or prestressed steel components in accordance with the plans and specifications.

906.02 GENERAL

Post-tensioning in general, post-tensioning materials, grouting, preparations for post-tensioning, application and measurement of prestressing force shall conform with CSA Standard CAN/CSA-A23.1-M09. Cast in place concrete or optionally precast at the site is normally covered by CSA Standard CAN/CSA-A23.1-M09. Precast concrete and pre-tensioning operations should conform to CSA Standard CAN3-A23.4-M latest edition.

Welding will not be permitted within 3.0 metres of any tendon without adequate protection of the prestressing steel from welding sparks. Under no circumstances shall prestressing steel be used to ground welding equipment.

906.02.01 Approvals and Casting

The Contractor shall clearly indicate in his bid his intention with regard to casting the prestressed concrete members on site or at an approved plant. Prior to construction, the Contractor shall submit to the Engineer for approval the name of the plant from which it is intended to order the members. Only members supplied from an approved plant will be accepted.

906.02.02 Prestressing Method

The method of prestressing to be used shall be either pre-tensioning or post-tensioning as detailed on the drawings unless otherwise approved.

Prior to casting any concrete to be prestressed, the Contractor shall submit to the Engineer for approval six (6) complete sets of metric drawings and one (1) set of metric design calculations. These details shall outline the method and sequence of stressing and shall include complete specifications and details of the prestressing steel and anchoring devices, e.g. anchorage blockout dimensions and angles, anchoring stresses, elongation calculations, type of enclosures, and all other data pertaining to the prestressing steel in the members, pressure grouting materials and equipment, size and spacing of diaphragm and end block reinforcement, where applicable.

The prestress supplier shall determine through design or experience the prestress anchorage bearing plate/casting as well as the spiral steel directly behind and adjacent to the same.

906.02.03 Inspection And Testing

At all times the Engineer shall have the right to inspect and approve all methods, plant and materials involved. This shall include the right to momentarily stop jacking in order to measure the elongation and jacking pressure from initial to final load on as many cables as deemed appropriate by the Engineer.

906.02.04 Member Top Flanges

Members whose top flanges become the bottom form for the deck slab shall have the flange designed to safely accommodate all temporary construction loads.

906.02.05 False work

Sound, adjustable false work in accordance with Section 907, "Form work And Falsework", shall be required to compensate for any settlement such that the structure, particularly the soffit, is constructed true to line and grade. The prestressed concrete is not self supporting until stressing, anchoring, grouting and proper curing have been carried out. Except as noted on the contract drawings and as outlined in the Specifications, false work may be

removed after these operations have been completed. The prestressing ducts, strands and anchorages must be accurately and rigidly fixed in position before any concrete is placed.

906.03 MATERIALS

906.03.01 Concrete

All concrete work shall conform to the requirements of the Section 904, "Concrete Structures", unless otherwise stated herein.

The minimum ultimate compressive strength of the concrete shall be as shown on the plans and at the time of tensioning shall be verified by the Engineer from the results of the field cured test cylinders.

Care must be taken to ensure that the test cylinders are compacted and cured under conditions similar to the conditions acting on the concrete in place. At least three specimens shall be tested from each batch prior to tensioning the cables and at least three specimens at 28 days.

No concrete shall be deposited in the forms until the placing of reinforcing steel, enclosures, anchorages and prestressing steel has been inspected and approved by the Engineer.

An inspection and testing company may be appointed by the Engineer to inspect and control quality of materials. If so, separate payment will be arranged for by the Department. The Contractor shall provide, without charge, all materials required for test purposes and give all necessary co-operation.

906.03.02 Prestressing Steel

All prestressing steel shall be protected against damage, rust and other corrosion and shall be free of all dirt, oil, grease and other deleterious substances when finally grouted in the deck. Splicing of prestressing steel bars only shall be permitted to manufacturers' specifications. Splicing of strands or wire is not permitted.

All prestressing steel from each manufactured reel of wire, strand or mill heat of bar to be shipped to the site, shall be assigned an individual lot number and shall be tagged in such a manner that each such lot can be accurately identified at the job site. All unidentified prestressing steel received at the site will be rejected.

The Contractor shall furnish one sample, 1500 mm long from each manufactured reel of wire, strand or mill heat of bar prestressing steel for testing purposes. The Engineer will select the samples of prestressing steel from the job site and all materials for testing shall be furnished by the Contractor at his own expense.

The Contractor shall have no claim for additional compensation in the event his work is delayed awaiting approval of the materials.

The approval of any material by the Engineer shall not preclude subsequent rejection if the material is damaged in transit or later damaged or found to be defective. Storage of the material on site shall be in accordance with Prestressing steel shall be high tensile strength 7-wire strand or bar as shown on the contract drawings, fabricated, sampled and tested in accordance with the requirements of ASTM A 416/A 416M-02 and ASTM A 421/A 421M-02 and to the satisfaction of the Engineer. Longer term storage of prestress steel and components, i.e. storage over the winter, shall be in accordance with ASTM A 416/A 416M-02 and ASTM A 421/A 421M-02 and the environment shall not be wet, humid or subject to the accumulation of moisture.

Two copies of the mill certificate and two copies of the stress-strain curves representative of the actual lots to be used shall be submitted to the Engineer with samples.

Prestressing steel shall be high tensile strength 7-wire strand or bar as shown on the contract drawings, fabricated, sampled and tested in accordance with the requirements of 416/A 416M-02 and A 421/A 421M-02.

Tendons shall consist of parallel wires or strands composed of the required number of high tensile, cold-drawn, low-relaxation (stabilized) strands. Positive end anchorage shall be provided on each end of the tendon after threading through the terminal hardware. The tendon shall be enclosed in mortar-tight flexible metal conduit.

The pre-assembled connection between the conduit and the end bearing assemblies shall be adequate to ensure a mortar tight enclosure from terminal to terminal. The anchor shall provide for grout passage into the tendon. The supplier of the tendons shall furnish grout fittings for attachment to the terminal hardware.

High tensile strength steel shall be from steel made by the open hearth, electric furnace or basic oxygen process to produce the desired high tensile strength. Strand shall have a nominal diameter of 15.24 mm, minimum ultimate tensile strength of 260.6 kN and a nominal end area of 140.0 mm^2 per strand, or as otherwise indicated on the contract drawings.

Steel grade shall be 1860 MPa unless otherwise specified on the contract drawings.
Oil tempered steel shall not be employed for use in prestressed concrete construction.

The complete stress-strain curve for the steel shall be obtained for each heat or lot of steel used in the entire project and shall be used as data for stressing of the steel of that particular heat or lot. Care shall be taken that the steel so defined is correctly identified.

The Contractor shall furnish one entire tendon complete with anchorages, one complete coupling device and all hardware for testing and evaluation purposes, if so indicated in the Contract Documents. If the tendon and/or associated hardware has not been previously used in Newfoundland, the Engineer may request a sample for evaluation and testing purposes. Any components which in the opinion of the Engineer, fall below the quality of the sample provided shall not be used in the works.

906.03.03 Ducts

Ducts for prestressing steel shall be made of approved bright metal rigid or semi-rigid corrugated steel tubing with mechanical joint connections of the diameter as shown on the drawings. Rigid ducts shall have a minimum wall thickness of 0.60 mm and be capable of being bent to a minimum inside radius of 9 metres without distress. Semi-rigid ducts shall have a minimum wall thickness of 0.25 mm and be capable of being bent to a minimum inside radius of 3.5 metres without distress. The wobble friction coefficient (k) shall not exceed 0.0023 per metre and 0.0033 per metre for rigid and semi-rigid ducts respectively. The curvature friction coefficient (μ) shall not exceed 0.20 for both duct types. Rigid ducts shall be used for longitudinal tendons and semi-rigid ducts used for transverse tendons unless otherwise specified in the contract documents.

Ducts shall be watertight and of sufficient strength to withstand all forces imposed upon them during placing of concrete without denting, sagging or leaking. All ducts and anchorage assemblies shall be provided with any necessary air vents and pipes for the injection of grout after prestressing. Grouting ducts and vents shall be located at all high points and at both ends of all longitudinal tendons. For transverse tendons, grouting ducts and vents shall be located at both ends of all tendons and at all high points when the vertical distance between the lowest and highest point in the duct exceeds 400 mm.

906.03.04 Anchorage Assemblies

The anchorages shall be of an approved type as indicated on the contract drawings for the size of tendons shown on the drawings complete with all required spiral reinforcement.

Anchoring hardware shall meet the minimum requirements set forth in CAN/CSA-A23.1-M09. Moreover, the anchorage components, i.e. the bearing plate, wedges, anchor head and/or casting to develop at least 100% of the ultimate tendon capacity but the prestressing steel as anchored is permitted to fail at 95% of the ultimate tendon capacity.

All reinforcement, duct work, cones and/or anchorages shall be fastened firmly so that no movement can occur when concrete is placed. Anchorages shall be held tight to the end forms so that no laitance can leak down the face of the cone or bearing plates. Enclosures shall be protected against the entrance of foreign matter prior to grouting particularly in cold weather.

The anchorages shall be placed in the position shown on the contract drawings. The axis of the anchorage must coincide with the axis of the cable passing through it. Details of end anchorages, i.e. block out dimensions and angles shall be determined by the prestress supplier in coordination with the Engineer.

906.03.05 Round Void Forms

When required the type of round void form used shall be in accordance with the following table:

OUTSIDE DIAMETER OF VOID	TYPE OF ROUND VOID FORM
OVER 930 MM	1.2 MM CORRUGATED METAL PIPE
630 MM - 930 MM	1.0 MM CORRUGATED METAL PIPE
UNDER 630 MM	1.0 MM CORRUGATED METAL PIPE OR SONOVOID TUBES, TYPE D, 100% DUROBOARD OR APPROVED EQUAL

Metal void forms shall have outside diameter (top of corrugations to top of corrugation) equal to the diameter of the voids shown on the drawings.

Void tubes made of fibrous material shall be protected against damage during storage and handling and shall be protected from moisture and water at all times. Adequate ventilation shall be provided to prevent damage due to humidity. The void tubes shall not be stored on the site for more than seven days before installation.

The void tubes shall be designed to withstand the forces imposed on them during concreting and until the concrete has set up, without deformation such as bulging, sagging or collapse.

Damaged tubes shall not be used.

All void tubes must be accurately placed and rigidly fixed in position before any concrete is placed. The Contractor shall pay particular attention to the buoyancy of the voids and adequate measures shall be taken to counteract the same. No concrete shall be placed until the installation of the tubes has been inspected and approved by the Engineer.

906.04 DIMENSIONAL TOLERANCES

The following dimensional tolerances will be allowed:

LENGTH	= ± 10 MM
CROSS SECTION	= ± 3 MM FROM EACH DIM. (NOT CUMULATIVE)
ALIGNMENT	= ± 3 MM MAX. IN ANY 3 M LENGTH
CAMBER DIFERENTIAL BETWEEEN ADJACENT PRESTRESSED MEMBERS	= 20 MM MAX.

In addition, camber in the prestressed members immediately after stressing or de-tensioning shall not vary more than 50% of the calculated value. Camber due to member dead load only, at the time of placing the deck slab, shall not be more than 20 mm greater than the initial camber.

Deck slab surface under full dead load shall be to the grades indicated on the drawings. The deck slab thickness shall be constant between the top flanges of adjacent members. In order to meet these criteria the Contractor shall haunch the deck slab over the member or protrude the member a maximum of 20 mm into the deck slab or both, as indicated on the drawings.

For prestressed slab superstructures the deck slab surface and soffit shall be to the grades indicated on the drawings immediately after stressing, unless otherwise indicated in the contract documents.

906.05 PLACING CONCRETE, STRESSING AND GROUTING TENDONS

The minimum concrete strength at stressing shall be 30 MPa unless otherwise specified on the contract drawings.

906.05.01 Placing

Concrete must not be deposited in the forms until the Engineer has inspected the placing of the reinforcement, ducts, anchorages, prestressing steel and has given his approval thereof.

Bar reinforcing steel and prestressing steel shall be placed accurately at the locations shown on the drawings or approved by the Engineer. The distance from the forms shall be maintained by plastic bar chairs, spacers, hangers or hold down devices. Within a 5.0 metre longitudinal distance from support locations i.e. piers and abutments, a tolerance of ± 6mm will be permitted in the placing of prestressing ducts. At all other locations a tolerance of ± 12mm will be permitted.

Post-tensioning ducts must be held securely at intervals of 500 mm or less against vertical or horizontal displacement from true alignment during the placing of concrete.

Holes shall be provided for anchor dowels and for diaphragm dowels which pass through the member, openings for connection rods, recesses for grout and holes for railing bolts in the members shall be provided in accordance with the details shown on the drawings.

Where diaphragm dowels do not pass through the member, the dowels shall be anchored in the member by embedment in the concrete or by means of approved threaded inserts.

Where openings for diaphragm dowels are provided, these dowels shall be grouted in place after the installation of the member in the structure.

Where continuous prestressed concrete slab type construction is required, the deck shall be cast in one continuous concrete placing operation commencing at the lower end of the structure.

The concrete must be vibrated internally or externally or both as required to consolidate the concrete. The vibrating shall be done with care and in such a manner that reinforcing steel, ducts and prestressing steel will not be displaced. Vibrators shall operate at a minimum
frequency of 160 Hz for the internal type and 60 Hz for the external type.

The Contractor shall pay particular attention to concrete placement details, external vibration shall be used when casting CPCI girders.

All curing methods shall be subject to the Engineer's approval. Curing shall be in accordance with Section 904.05, "Curing", of the Specifications Book.

906.05.02 Prestressing Technician

The Contractor shall provide at his own expense a technician familiar with the type of prestressing involved, approved by the Engineer, to supervise all prestressing work. This technician shall be present at the completion of the steel installation and just prior to concreting operations, at stressing and grouting operations.

The prestressing supplier shall formally certify in writing that the stressing technician being employed on the works has sufficient knowledge and experience to undertake and successfully complete the prestressing, grouting and associated work.

906.05.03 Stressing

All prestressing steel shall be stressed by means of hydraulic jacks which shall be equipped with accurately calibrated hydraulic pressure gauges, damped from vibration, with a dial not less than 150 mm in diameter, to permit the stress to be computed at any time. A certified calibration curve shall accompany each jack, showing the relationship between gauge readings and stress in the ram for both ascending and descending movements of the ram. In general monostrand jacks shall not be used for stressing multi-strand tendons unless specifically approved by the Designer. A monostrand jack shall be present on site during stressing operations. No stressing will be permitted without the presence of a monostrand jack on site.

A load cell attached to the jack will be accepted, as an alternative to the above, as a means of obtaining the force in the tendon provided the accuracy of the load cell is attested to by an authority acceptable to the Engineer.

The stressing operation shall be conducted in a manner recommended by the manufacturer of prestressing material and only in the presence of the Engineer or designated representative.

The supervisor in charge of the tensioning shall be provided with the required extension of the tendons and the jack pressure. The extension shall be carried out at an even rate, jack pressure and extension shall coincide with the required extension and pressure at the time of anchoring, due allowance being made for anchorage slippage at both ends of the tendons. The permissible variation in specified prestress shall not be more than 95% to 100% of the theoretical jacking force or pressure for both longitudinal and transverse tendons. Moreover, the permissible variation in specified elongation shall not be more than ± 5% of the theoretical elongation for longitudinal tendons. For transverse tendons the permissible variation in specified elongation shall not be more than ± 5% of the theoretical elongation or ± 10 mm whichever is greater.

The stress in the tendons shall be measured by means of the extension of the tendons and shall be continuously checked by means of the pressure gauge on the jack. The accuracy of the jack pressure gauge shall be checked periodically. The zero error in the jack pressure shall be determined by plotting a few straight pressure readings against jack extension and extending the straight line back to determine the zero intercept.

The stressing shall be carried out as shown on the contract drawings. The tensioning shall not be commenced until the tests on the concrete cylinders, manufactured and cured under the same conditions as the prestressed member, indicate that the concrete of the member has attained the required compressive strength as shown on the contract drawings.

After the concrete is placed, no tensioning will be permitted until it is demonstrated, to the satisfaction of the Engineer, that the prestressing steel is free and unbounded in the enclosure.

Any tendon in which the accuracy of the extension is doubted shall be de-stressed and restressed in the presence of the Engineer.

Records of elongation, calibrated jack force readings and slip shall be kept by the Engineer. Until such approval is obtained in writing, no tendons shall be grouted.

The prestressed steel shall be anchored at a stress that will result in the ultimate retention of working forces or stresses of not less than those shown on the plans, but in no case shall the steel be tensioned above 80% of the ultimate strength. Losses in stress due to creep, plastic flow, elastic flow and shrinkage of concrete plus creep of steel and sequence stressing, shall be computed in accordance with CSA-S6-06 latest edition.

Prestressed strands which have been stressed and meet project criteria shall be cut off with a saw; a torch is not acceptable. The Contractor shall leave 25-50 mm of strand protruding beyond the visible end of the wedge.

906.05.04 Bonding And Grouting

The Contractor shall sandblast all concrete surfaces in anchorage boxout areas and fill the boxout with concrete of a quality similar to that used in the member. For anchorages without the tendon end cap, anchorage recesses or boxouts are to be sandblasted and filled with concrete before grouting operations commence.

All post-tensioned prestressing steel shall be bonded to the concrete by pressure grouting the ducts or openings. All stressing shall be completed before grouting begins. All areas around post-tensioned cables, strands, tendons or rods shall be completely filled with high early strength non-shrink grout.

The grouting procedure shall be approved by the Engineer.

Generally this work shall be done as soon as the prestressing steel has been stressed and approved and in no case shall any tensioned prestressing steel be left ungrouted for more than seven (7) days after prestressing.

In the case of post-tensioned slabs which contain both longitudinal and transverse prestressing steel, the maximum time permitted between the beginning of the stressing sequence and the grouting of the last cable shall not exceed two weeks.

Stressing and grouting sequences of longitudinal and transverse tendons shall be as outlined in the contract documents. The maximum time permitted between the beginning of stressing and grouting of the last cable shall not exceed two weeks.

All ducts or openings shall be clean and free of all foreign materials that would impair bonding of the grout. Each duct or opening shall be throughly blown out with compressed air immediately prior to grouting. Where it is found necessary, in the opinion of the Engineer, the duct or opening shall be flushed out with water, prior to use of compressed air. The concrete shall have a temperature of at least 5^{o}C at the time of grouting and shall be maintained at this temperature or higher for a period of at least 48 hours. If necessary this may include preheating the structure and maintaining protection for a period of three days after the grout is placed. The temperature of the grout at the time of injection shall be not less than 16^{o}C nor more than 27^{o}C.

All grouts used for grouting of post-tensioning cables shall be pre-packaged products and intended for that purpose. The grout shall be mixed and placed as per the manufacturer's instructions and under the supervision of the Engineer

Grout shall have a maximum water: cement ratio of not more than 0.36, not contain any trace amounts of chlorides, contain at least 6% of silica fume by weight, contain an approved superplasticizer and an approved expansive agent. Masterflow 816 Cable and Anchor grout manufactured by BASF and In-Pakt PT Grout manufactured by KING are two grouts which meet the above criteria.

The compressive strength of the grout shall be at least 40 MPa in four (4) days. Strength tests shall be performed on 50 mm cubes, stored and tested in accordance with ASTM Specification C109.

When allowed to stand for 15 minutes, the grout shall not bleed or segregate. At the time of initial set, the grout shall exhibit an expansion of 8% (± 2%) of its original volume

The Contractor shall be responsible for quality control of grout production and placing. Quality assurance of the grout from a testing viewpoint shall be provided by the Department.

Grouting equipment shall be capable of grouting to a pressure of at least 1.5 MPa with a 19 mm minimum inside diameter grout hose, maximum pressure 1.7 MPa.

Alternatively, the grouting equipment shall be specifically designed for the job and approved by the Engineer.

Grout shall be mixed in an approved mechanical mixer, that provides for straining and re-agitating the grout before it is used. Time between mixing and pumping the grout shall not exceed 40 minutes.

Retempering the grout will be prohibited.

The grout shall completely fill the duct or opening and shall be allowed to flow continuously and freely for 5 seconds at the outlet end of the duct or opening. In case the continuity of grouting is interrupted, the duct or opening shall be immediately cleaned out. A dependable high pressure air and water supply shall be on hand during grouting.

After grout has set, all exposed vents and hoses, in finished concrete surfaces are to be removed 50mm from the finished surface. The resulting void or cavity must have all debris removed and be throughly cleaned. The void or cavity should be filled with SET 45, manufactured by Master Builders or an approved equal. The Contractor shall follow the Manufacturer’s recommendations and specifications in the mixing and placing of SET 45.

906.06 HANDLING AND INSTALLATION OF PRESTRESSED MEMBERS

At least seven (7) days before starting work, the Engineer shall be fully informed as to the method of handling, installation and the amount and kind of equipment proposed for use. The Contractor shall comply with the provisions of the Highway Traffic Act and make all necessary arrangements with the authorities for permission to transport.

The Contractor shall exercise extreme care in handling, storing, moving and erecting precast prestressed concrete members to avoid twisting, racking or other distortion that would result in cracking or damage to the members. The Contractor shall handle, transport and erect precast prestressed members in an upright position

and keep the points of support during lifting, storing, transportation and erection within 600 mm of the points of support in the final structure. The Contractor shall not permit the reactions of the lifting devices to be inclined to the vertical at an angle greater than thirty degrees. Holes provided for lifting shall be filled with mortar when members have been placed.

The Contractor must decide upon the method by which he plans to lift the prestressed girders and submit design calculations signed and stamped by a Professional Engineer licensed to practice in the Province of Newfoundland.

The Contractor is responsible for the stability of the prestressed girders during placing and until the diaphragms are in place regardless of the loading conditions.

Prestressed concrete girders shall not be moved or transported until the grout has attained 30 MPa. False work shall not be removed from continuous prestressed concrete structures until the grout has attained 30 MPa. Loads in addition to member self-weight shall not be placed on the prestressed concrete members until the grout has attained 30 MPa. Grout samples shall be taken, field cured and tested to establish the appropriate time to move or transport girders, remove false work or apply loads to prestressed concrete structures. Grout samples shall also be obtained and tested for acceptance purposes.

906.09 MEASUREMENT FOR PAYMENT

906.09.01 Prestressed Concrete Members

The quantity of prestressed members supplied and erected for which payment shall be made shall be the total number of members required as shown on the plans.

906.09.01.01 Supply of Prestressing Steel and Accessories

Prestressing tendons including anchorages will be measured as a lump sum for the total number required by the contract. Payment for the Supply of Prestressing Steel and Accessories will not be made where the prestress steel and/or components are held in longer term storage, i.e. over the winter.

906.09.02 Prestressed Concrete In Post- Tensioned Slab Superstructures

906.09.02.01 Concrete

Measurement for payment will be by cubic metres of concrete placed based on neat lines shown on the plans. No deductions will be made from the volume of concrete for reinforcing or prestressing steel, anchorages or inserts. Deductions for any design voids will be made. The quantity shall include the volume of concrete in curbs, sidewalks, medians, parapets, including those on the wingwalls or as otherwise shown on the plans.

906.09.02.02 Supply of Prestressing Steel and Accessories

The quantity of prestressing tendons including anchorages for which payment shall be made shall be the total number of tendons required as shown on the plans. This will be considered as a lump sum and includes both transverse and longitudinal tendons as indicated on the contract drawings.

906.09.02.03 Concrete Surface Finish

Measurement for payment for surface finish shall be in accordance with Section 904, "Concrete Structures".

906.10 BASIS OF PAYMENT

906.10.01 Prestressed Concrete Members and Post-Tensioned Slabs

Payment at the contract price shall be full compensation for all materials, labour, equipment, plant and services necessary to complete the

prestressed concrete work in accordance with the plans and as described herein.

In particular, no separate payment will be made for:

a) Supply of cement, aggregates and other materials, plant or equipment for producing the concrete.
b) Supply and placement of grout.
c) Form work and false work.
d) Supply and installation of void tubes including all drain tubes, air vents, bracing, non-corrosive chair supports, splices and end closures.
e) Sandblasting the construction joints.
f) Supply and apply approved bonding adhesive.
g) Supply and installation for reinforcing steel except that in post-tensioned slabs.
h) Transporting and storing prestressed concrete members.
i) Any post construction jacking of the superstructure.

Payment for post-tensioned slab concrete will be under Section 904, "Concrete In Superstructures".

Payment for prestressed concrete members, such as AASHTO or CPCI Girders and double tees, will be under "Prestressed Girders" (a) supplied, (b) installed as appropriate.

906.10.02 Supply of Prestressing Steel and Accessories

Payment at the contract unit price for "Supply Of Prestressing Steel And Accessories" shall be full compensation for all materials, labour, services, plant and equipment necessary for the supply, delivery, installation and stressing of the tendons including all anchorages, bursting and
spalling or end block steel and grouting as required in accordance with the contract drawings and this specification.

For post-tensioned slab structures, the materials, fabrication and placing, cost of bursting and spalling or end block steel shall be paid for under Section 905, "Concrete Reinforcement".

906.10.03 Concrete Surface Finish

Payment for concrete surface finish shall be in accordance with Section 904, "Concrete Structures".

906.10.04 Rejection

Excessive honeycombing, distortion, warping, cracking, improper grouting or other evidence of inferior workmanship or failure to meet the requirements of these specifications shall be cause for rejection of any member.

Minor surface cavities or irregularities which are satisfactorily repaired shall not constitute cause for rejection. Repairs shall not be made until the Engineer has inspected the extent of the irregularities and has determined whether or not the concrete will be rejected.

Final acceptance of members will not be made until they have been installed in the structure. Members that have been tentatively accepted at the manufacturing plant but are damaged in transit shall be replaced by the Contractor at his own expense.

Erection by a non approved method may be cause for rejection.