

SPECIFICATIONS FOR
INSTALLATION OF PRECAST PRESTRESSED CONCRETE DECK PANELS

1.0 DESCRIPTION

The Work shall consist of:

- .1 Transportation, unloading, erection and grouting of precast prestressed concrete deck panels; and
- .2 Supply and installation of miscellaneous materials including all materials detailed on the Drawings and all other incidental materials required to install the precast prestressed concrete deck panels.

The Contractor shall notify the Department of any Subcontractors that have been contracted in respect of this Specification. The Contractor shall remain responsible for the work of such Subcontractors. All requirements of this Specification, such as right of access, shall apply to such Subcontractor.

2.0 REFERENCES AND RELATED SPECIFICATIONS

All reference standards and related specifications shall be current issue or the latest revision at the date of tender advertisement.

2.1 Related Specifications

- Specifications for Fabrication of Precast Prestressed Concrete Deck Panels

3.0 SUBMITTALS

The Contractor shall submit the following to the Engineer, in accordance with this Specification:

- (a) A Transportation Plan identifying the loading and transportation procedures, including the proposed route, schedule and traffic control procedures. The Transportation Plan shall be sealed, signed and dated by a Professional Engineer registered or licensed to practice in the Province of Manitoba:
- (b) An Erection Plan comprised of a schedule and detailed, step by step procedure clearly illustrating all equipment, methods and sequences by which the Contractor proposes to unload and erect the precast prestressed concrete deck panels. The Erection Plan shall include detailed design notes and Shop Drawings that are sealed, signed and dated by a Professional Engineer, registered in the Province of Manitoba, necessary to describe the following and assume full responsibility that the design is being followed:
 - i) Access to Work, including earth berms, work bridges, and/or rock platforms;
 - ii) Type and capacity of equipment;
 - iii) Sequence of operation, including position of cranes, trucks loaded with panels, and traffic accommodation for all stages of unloading and erection;
 - iv) Detailed crane position on the ground, particularly adjacent to substructure elements, such as piers and abutment backwalls, with details of load distribution on wheels/tracks and outriggers. If approved by the Engineer, details of crane position on the structure showing wheel loads and axle spacing of equipment (stationary and moving);
 - v) Loads and their position from crane wheels/tracks and outriggers during all positions of lifting when crane is on or adjacent to the structure;

- vi) Details of temporary falsework and release procedures (if applicable), including proposed methods to be used to ensure structure stability prior to grouting and/or placing concrete;
 - vii) Details of temporary girder bracing if required to ensure girder stability during deck removal and panel installation operations;
 - viii) Details of lifting units, showing vertical forces at and rated capacities of lifting devices;
 - ix) Method and procedures for installation of foam bearing strips and adhesive (if applicable);
 - x) Provisions for control and adjustment of errors for height and positioning of the foam bearing strips;
- (c) A Safety Plan complying with the Manitoba Workplace Safety and Health Act and Regulations shall be prepared integral with the Transportation and Erection Plans.
- (d) A Grouting Plan detailing the procedure for grouting the haunches, shear blockouts and transverse joints and include;
- i. Details of all materials, equipment, and procedures for mixing, placing, and completely containing the grout;
 - ii. Type and model of grout pump (if applicable). The grout pump shall be fully automated high speed shear mixer type and capable of recording grout flow rate;
 - iii. Plan for ensuring haunches are completely filled with grout and free of voids;
 - iv. Experience of grouting personnel with related work and list of related projects;
 - v. Procedures for handling and controlling any grout leakage;
 - vi. Results/print-out of grout volume pumped shall be made available to the Engineer upon request.

4.0 MATERIALS

4.1 Precast Prestressed Concrete Panels

Precast Prestressed Concrete Panels will be supplied to the Contractor f.o.b. Contractor's truck at the precast Fabricator's yard or at a location within the City of Winnipeg limits identified in the Special Provisions. The precast Fabricator will load the panels onto the Contractor's hauling equipment. Pick up of panels shall be during the Fabricator's normal weekday working hours unless other mutually satisfactory arrangements are made between the Contractor and the Fabricator. The Contractor will be responsible for any premium charged for any panels picked up outside of the Fabricator's normal working hours or for costs associated with non-typical loading requirements as determined by the Engineer.

The Contractor shall be responsible for the security and integrity of the panels during transportation to site, and during unloading, storage and installation on site. Panels damaged during any of these operations shall be replaced or repaired to the satisfaction of the Engineer before final approval is granted. The decision to repair or replace the damaged panels will be entirely at the discretion of the Department.

4.2 Girder Haunch Forming

The Contractor shall supply and install the foam bearing strips as specified on the Drawings unless otherwise specified in the Special Provisions.

The Contractor shall supply and install the epoxy adhesive for the strips as specified on the Drawings and in accordance with the manufacturer's recommendations unless otherwise specified in the Special Provisions.

4.3 Grout

Grout for the haunches, shear blockouts and transverse joints shall be a high early, non-shrink, flowable pre-bagged product as identified on MIT's, Water Management & Structures approved product list unless otherwise specified on the Drawings or in the Special Provisions.

The grout shall be stored, prepared, mixed, placed and cured in accordance with the manufacturers recommendations or instructions.

5.0 CONSTRUCTION METHODS

5.1 General

Transportation, unloading and erection of the precast prestressed concrete panels shall be under the direction of a Professional Engineer, registered and licensed to practice in the Province of Manitoba. The Professional Engineer shall be experienced in precast prestressed concrete transportation and erection and be present for the initial stages of panel loading, unloading and erection.

The precast prestressed concrete panels shall be picked up only by the lifting devices installed by the Fabricator.

5.2 Handling and Transportation of Panels

The Fabricator shall load and the Contractor shall transport all of the panels in accordance with the following:

- i) The Contractor shall submit his proposed route for transporting the panels including traffic control procedures as part of the proposed Transportation Plan. In all traffic control situations, the flagman must be trained and properly attired in flagman's vest and approved headgear with approved flagman's stop/slow paddle or fluorescent red flag. The proper advance signing must also be in place. For an example of traffic control procedures at an intersection see Drawing S-TMP-6 of MIT's Work Zone Traffic Control Manual.
- ii) When transporting panels using equipment other than a flatbed trailer, the Contractor shall be responsible for ensuring the following:
 - i) Pilot vehicles meet the requirements of Part 9, Highway Traffic Act, Regulation 575/88;
 - ii) Travel speed not to exceed 80 kph;
 - iii) Travel only in daylight between sunrise and sunset; and
 - iv) Travel will not be allowed on weekends or statutory holidays unless authorized by the Engineer.
- iii) When transporting panels, the Contractor shall be responsible for ensuring that all of the required permits have been acquired and the conditions of all permits are met.

- iv) Extreme care shall be exercised during the handling and transportation of the panels in order to avoid damage to the panel. The Contractor shall be responsible for protecting the panels at restraint points on the vehicle. All damaged corners or surfaces of the panels will be regarded as honeycomb and shall be repaired as directed by the Engineer.
- v) The Contractor shall be responsible for handling, transporting, storing and erecting the panels in a manner that does not induce tensile stresses sufficient to cause cracking. Panels with cracks larger than 0.3 mm may require replacement at the Contractor's expense as determined by the Engineer.
- vi) No loose timber blocking will be permitted for use in temporary works for any aspect of panel handling and transportation.
- vii) It is the Contractor's responsibility to ascertain the actual weight of the panels. The concrete in the precast prestressed panels may be denser than regular concrete and the panels contain a high percentage of reinforcing steel and stressing strands which also tend to increase the weight of the panels.

5.3 Temporary Works

Temporary works including work bridges and platforms, barges, and erection bracing required for handling, transportation and erection of precast prestressed concrete panels shall be installed and constructed in accordance with the Contractor's approved design and Shop Drawings.

5.4 Haunch Forming

The Contractor shall clean all contact surfaces prior to applying the epoxy adhesive and foam bearing strips at the locations and in accordance with the details as indicated on the Drawings.

The Contractor shall ensure that the foam bearing strips are placed correctly and adequately sealed to prevent the leakage of grout during grouting operations. In the event that any leakage occurs, it shall be the responsibility of the Contractor to carry out all required remedial measures at his own cost in accordance with his Grouting Plan as approved by the Department.

5.5 Erection of Panels

Before erecting the panels, the Contractor shall verify the dimensions of the bearing areas and shear blockouts to the dimensions and layout of the girders. All discrepancies discovered by the Contractor shall be brought immediately to the attention of the Engineer.

The Contractor shall use the levelling bolts on the panels to closely match adjacent panel elevations and achieve the profile as shown on the Drawings. The Contractor shall adjust the levelling bolts to their anticipated final locations prior to erecting the panels in place. The elevations of adjacent erected panels shall be within 3 mm.

After the Engineer has approved the erected positions of the panels the contractor shall cut the levelling bolts 50 mm below the top of the deck panel. All lifting hooks shall be cut off 50 mm below the top surface of the panel and all lifting hook pockets shall be filled with grout.

5.6 Grout

All grout material shall be packaged in waterproof containers with the production date and shelf life of the material shown. The grout shall be mixed, placed and cured in strict accordance with the Manufacturer's recommendations.

The method of forming and pouring the grout shall be submitted to the Engineer for review and approval prior to the work being undertaken. Placement of grout shall be performed by workers competent in this field.

When the daily minimum air temperature or the temperature of the girders or panels in the immediate area of the grouting falls below 5°C, or when there is a probability of it falling below 5°C within 24 hours of grouting, the following provisions for cold weather grouting shall be implemented:

- (a) Before grouting, adequate preheat shall be provided to raise the temperature of the adjacent areas of the girders and panels to at least 10°C.
- (b) Temperature of the grout during placing shall be between 10°C and 20°C.
- (c) The grout shall be enclosed and kept between 15°C to 25°C for at least five (5) days. The system of heating shall be designed to prevent excessive drying out of the grout.
- (d) Cold weather protection measures shall be maintained at least 12 hours after moisture curing of concrete has been terminated during periods of freezing weather.

The Contractor shall grind the top of all grouted surfaces to be flush with the adjacent concrete following curing.

6.0 QUALITY MANAGEMENT

Panel transportation and erection shall not commence until the Department's review and acceptance of the Transportation Plan and Erection Plan has been completed. The Contractor's project manager, site superintendent, and Erection designer may be required to attend a pre-job meeting with the Engineer at a location determined by the Department prior to commencement of any field work.

Before erection begins, the Contractor shall complete a layout by means of chalk lines and markings applied to all girders showing the locations of all shear blockouts and transverse joints of panels in accordance with the layout plan.

The Contractor is fully responsible for the results obtained by use of the Transportation Plan and the Erection Plan. The Department's acceptance shall not be considered as relieving the Contractor of the responsibility for the safety of its methods or equipment, nor from carrying out the work in full accordance with the Drawings and the Special Provisions.

Quality Control

.1 General

The Contractor shall be responsible for all quality control testing identified in this Specification. All testing shall be completed by qualified personnel who are certified at the time of testing as ACI CSA-based Concrete Field Testing Technicians, Grade 1.

Testing shall be conducted by an independent, CSA certified laboratory in accordance with CAN/CSA A23.2-1B, Viscosity, Bleeding, Expansion, and Compressive Strength of Flowable Grout.

.2 Compressive Strength Sampling and Testing

Grout for compressive strength testing shall be sampled from the Contractor's mixer immediately following completion of mixing during the grouting of the deck panels.

Preparation of the grout samples for testing shall be performed on a flat, level surface protected from adverse weather. Grout cubes for testing shall be prepared with 50 mm cube specimens from the grout sample.

The minimum number of test cubes that the Contractor shall cast from each 10 m³ of grout to be placed are as follows:

- i) Two cubes to be tested for the 3 day compressive strength;
- ii) One cube to be tested for the 7 day compressive strength;
- iii) One cube to be tested for the 14 day compressive strength;
- iv) Two cubes to be tested for the 28 day compressive strength;

Compressive strength test results shall be forwarded to the Engineer within 3 days following testing.

The grout test samples shall be cured in a similar method used during construction as approved by the Engineer.

After all precast concrete panels have been installed, the Contractor and the Engineer shall conduct a final inspection to locate any damage or deficiencies. All visible damage or deficiencies shall be repaired by the Contractor to the satisfaction of the Engineer and acceptable to the Department before final approval is granted.

7.0 METHOD OF MEASUREMENT

The delivery of precast prestressed concrete panels will be measured on a unit basis and the number to be paid for will be the total number of panels delivered and accepted by the Engineer.

The installation of precast prestressed concrete panels will be measured on a unit basis and the number to be paid for will be the total number of panels installed and accepted by the Engineer.

8.0 BASIS OF PAYMENT

Delivery of precast prestressed concrete panels will be paid for at the contract unit price per panel for "Delivery of Precast Prestressed Concrete Deck Panels", measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the work including in this Specification.

Installation of precast prestressed concrete panels will be paid for at the contract unit price per panel for "Installation of Precast Prestressed Concrete Deck Panels", measured as specified herein, which price will be payment in full for performing all operations herein described and all other items incidental to the work including in this Specification.