

PART 1 - GENERAL

1.1 RELATED
REQUIREMENTS

- .1 Section 03 30 00 - Cast-in-Place Concrete.

1.2 REFERENCES

- .1 Definitions:
 - .1 Tremie concrete: concrete placed underwater through tube called tremie pipe.
 - .2 Tremie pipe: pipe has hopper at upper end and may be open ended or may have foot valve, plug or travelling plug to control flow of concrete. Pipe has diameter of 200 mm minimum, constructed from sections with flange couplings fitted with gaskets.
 - .1 Concrete is placed in hopper and sufficient head of concrete is maintained in tremie pipe to provide desired rate of flow.
 - .3 Pumped concrete method: method of placing concrete underwater uses concrete pump with discharge line used in similar manner to tremie pipe.
 - .4 Bottom-dump bucket method: method of placing concrete underwater requires use of bucket designed to discharge from bottom after it has contacted foundation or surface of previously placed concrete.
 - .5 Bagged concrete method: method of placing underwater concrete consists of diver placing bags partially filled with dry concrete mix.
- .2 Reference Standards:
 - .1 American Concrete Institute (ACI)

.1 ACI 304R-[00], Guide for
Measuring, Mixing, Transporting
and Placing Concrete.

- .3 CSA International
.1 CSA A23.1/A23.2-[14], Concrete
Materials and Methods of Concrete
Construction/Test Methods and
Standard Practices for Concrete.

1.3 ADMINISTRATIVE
REQUIREMENTS

- .1 Concrete pre-placement meeting;
conduct pre-placed meeting 2 weeks
minimum before tremie operation.
.1 Ensure meeting includes as
minimum attendees as follows:
.1 General contractor.
.2 Ready-mix concrete
supplier.
.3 Admixture supplier.
.4 Placing/formwork sub-
contractor.
.5 Reinforcing sub-
contractor.
.6 Testing agency
representative.
.7 Departmental
representative.
- .2 Distribute minutes to attendees
including copies of concrete mix
designs, aggregate physical
properties, placing schedule, rate
of delivery, testing program, and,
contingency plan for delay and
breakdown.

1.4 ACTION AND
INFORMATIONAL
SUBMITTALS

- .1 Submit in accordance with Section 01
33 00 - Submittal Procedures.
- .2 Product Data:
.1 Submit manufacturer's
instructions, printed product

literature and data sheets for concrete and include product characteristics, performance criteria, physical size, finish and limitations.

1.5 DELIVERY, STORAGE, AND HANDLING

- .1 Deliver, store and handle materials in accordance with manufacturer's written instructions.
- .2 Delivery and Acceptance
Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.
- .3 Storage and Handling Requirements:
 - .1 Store materials off ground and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
 - .2 Store and protect concrete from nicks, scratches, and blemishes.
 - .3 Replace defective or damaged materials with new.

PART 2 - PRODUCTS

2.1 MATERIALS

- .1 Concrete materials: to Section 03 30 00 - Case-in-Place Concrete.

2.2 CONCRETE MIXES

- .1 Type of cement as required for exposure classification.
- .2 Minimum compressive strength at 28 days: 25 MPa.
- .3 Class of exposure: C-1.
- .4 Maximum water cement ratio by mass: 0.45.

- .5 Nominal size of coarse aggregate: 20mm.
- .6 Cement content for mixtures: 385 kg/m³ minimum.
- .7 Slump at point and time of discharge: 150 to 230mm.
- .8 Air dry density: 2150 to 2500kg/m³.
- .9 Admixtures: as approved in writing by Departmental Representative. Use admixtures to correct deficiencies in mix or to improve placement of concrete.
 - .1 Departmental Representative may withdraw prior approval of admixture if conditions encountered during course of work indicate unsatisfactory results.
 - .2 Do not use calcium chloride or materials containing calcium chloride.
 - .3 Submit admixtures to produce self consolidating concrete to Departmental Representative for review.

PART 3 - EXECUTION

3.1 EXAMINATION

- .1 Verification of Conditions: verify that conditions of substrate previously installed under other Sections or Contracts are acceptable for concrete placement installation in accordance with manufacturer's written instructions.
 - .1 Visually inspect substrate in presence of Departmental Representative.
 - .2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 INSTALLATION

- .1 Do concrete work in accordance with Section 03 30 00 - Cast-in-Place Concrete and Section 03 20 00 - Concrete Reinforcing and to CSA A23.1/A23.2. Testing for concrete to CSA A23.1/A23.2.
- .2 Where concrete placement extends above water surface, protect concrete from direct contact with air at temperature below 5 degrees C for 7 days.
- .3 Place concrete in one continuous operation to full depth required.
 - .1 Supply complete equipment for every phase of operation.
 - .2 Provide sufficient supply of concrete to complete pour without interruption.
- .4 Tremie method:
 - .1 Provide water-tight tremie pipe sized to allow free flow of concrete. Diameter of tremie pipe to be minimum 200 mm and minimum eight times maximum size of coarse aggregate.
 - .2 Provide hopper at top of tremie pipe and means to raise and lower tremie pipe.
 - .3 Provide plug or foot valve at bottom of tremie pipe to permit filling pipe with concrete initially.
 - .4 Provide minimum of one tremie pipe for every 30 m² of plan area and to maximum spacing of 6 m centre to centre. Do not move tremie pipes laterally through concrete.

.5 Start placement with tremie pipe full of concrete. Keep bottom of pipe buried minimum 900 mm in freshly placed concrete.

.6 If seal is lost, allowing water to enter pipe, withdraw pipe immediately. Refill pipe, and continue placing as specified.

.7 If tremie operation is interrupted so that horizontal construction joint has to be made, cut surface laitance by jetting, within 24 to 36 hours and remove loose material by pumping or air lifting before placing next lift.

.5 Pumped concrete method:

.1 Follow procedures as for tremie method in placing concrete using discharge line from concrete pump as tremie pipe.

.2 Pump discharge line diameter: 125 mm minimum.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 - Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse or recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.