

Part 1 General

1.1 REFERENCE STANDARDS

- .1 ASTM International
 - .1 ASTM D4791-10, Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 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 aggregate materials and include product characteristics, performance criteria, physical size, finish and limitations.

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 61 00- Common Product Requirements.
- .2 Transportation and Handling: handle and transport aggregates to avoid segregation, contamination and degradation.
- .3 Storage: store washed materials or materials excavated from underwater 24 hours minimum to allow free water to drain and for materials to attain uniform water content.

Part 2 Products

2.1 MATERIALS

- .1 Aggregate quality: sound, hard, durable material free from soft, thin, elongated or laminated particles, organic material, clay lumps or minerals, free from adherent coatings and injurious amounts of disintegrated pieces or other deleterious substances.
- .2 Flat and elongated particles of coarse aggregate: to ASTM D4791.
 - .1 Greatest dimension to exceed 5 times least dimension.
- .3 Fine aggregates satisfying requirements of applicable section to be one, or blend of following:
 - .1 Natural sand.
 - .2 Manufactured sand.
 - .3 Screenings produced in crushing of quarried rock, boulders, gravel or slag.
- .4 Coarse aggregates satisfying requirements of applicable section to be one of or blend of following:
 - .1 Crushed rock.
 - .2 Gravel and crushed gravel composed of naturally formed particles of stone.

- .3 Lightweight aggregate including slag and expanded shale.

2.2 SOURCE QUALITY CONTROL

- .1 Inform Departmental Representative of proposed source of aggregates and provide access for sampling 4 weeks minimum before starting production.
- .2 If materials from proposed source do not meet, or cannot reasonably be processed to meet, specified requirements, locate alternative source.
- .3 Advise Departmental Representative 4 weeks minimum in advance of proposed change of material source.
- .4 Acceptance of material at source does not preclude future rejection if it fails to conform to requirements specified, lacks uniformity, or if its field performance is found to be unsatisfactory.

Part 3 Execution

3.1 NOT USED

- .1 Not Used.

END OF SECTION

Part 1 General

1.1 REFERENCES

- .1 Canadian Standards Association (CSA)
 - .1 CSA-A23.2-, Methods of Test for Concrete.
 - .2 CAN/CSA-G30.18-, Billet Steel Bars for Concrete Reinforcement.
 - .3 CSA-G40.21-, Structural Quality Steel.
 - .4 CAN/CSA-S16.1-, Limit States Design of Steel Structures.
 - .5 CSA W48-, Filler Metals and Allied Materials for Metal Arc Welding.

1.2 SHOP DRAWINGS

- .1 Submit shop drawings for reinforcing steel in accordance with Section 01 33 00 - Submittal Procedures.

1.3 SOILS REPORT

- .1 A copy of the geotechnical investigation for an adjacent project is available at the Department Representative's office for information purposes only.
- .2 The test boring data and the information given in soils report is given for the assistance of the Contractor, who shall be solely responsible for any interpretation which he may place on this information.
- .3 No warranty is made by the Owner to information contained in this report.
- .4 Should sub-surface conditions be found to vary substantially from those indicated in the Soils Report, notify the Department Representative immediately

1.4 WASTE MANAGEMENT AND DISPOSAL

- .1 Separate and recycle waste materials in accordance with Section 01 74 19 - Construction/Demolition Waste Management And Disposal.

Part 2 Products

2.1 MATERIALS

- .1 Concrete mixes and materials: in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .2 Reinforcing steel: to CAN/CSA-G30.18 and in accordance with Section 03 20 00 - Concrete Reinforcing.
- .3 Steel casing: to ASTM A36/A36M .

Part 3 Execution

3.1 FIELD RECORDS

- .1 Maintain drilling record for each pile, including:
 depth of pile, cut-off elevation, date and time of casting, reinforcing, size and length
- .2 Provide Department Representative with copy of records.

3.2 INSTALLATION

- .1 Bore holes to diameters and depths as indicated
- .2 Protective steel casing:
 - .1 Where required, use steel protective casing. Ensure penetration of casing to required depths either by self mass or driving.
- .3 Dispose of excavated materials.
- .4 Testing agency to inspect pile excavation prior to placing of concrete. Remove loose material, foreign matter and water.
- .5 Install steel reinforcement in accordance with Section 03 20 00 - Concrete Reinforcing and as indicated.
- .6 Fill pile excavations with concrete to elevations as indicated. Place concrete in one continuous pour in accordance with Section 03 30 00 - Cast-in-Place Concrete.
- .7 Where required by ground conditions, the holes shall be sleeved with steel casing, minimum 5 mm. thick, to ensure a clean open hole. Where the soil is insufficiently stable to maintain a vertical shaft without sloughing in, the steel sleeve shall remain in position until the hole has been dewatered, reinforcing steel has been set in position and concrete is about to be placed in the hole. The casing shall be withdrawn at such a time and in such a manner as to prevent ground water or soil from entering the hole.
- .8 The Contractor shall include in his bid for all steel sleeving required for the installation of the piles.
- .9 All holes, whether sleeved or not, shall be dewatered before any concrete is placed therein.
- .10 All piles shall be installed in one continuous pour to finished pile cut-off elevation. Where the pile projects above ground level the pile projection shall be formed using removable steel casing or Sonotube forms not smaller in diameter than that of the pile.
- .11 Remove boulders as required and continue pile to specified depth. If boulders cannot be removed with reasonable effort, notify Department Representative immediately. Changes to pile design or locations must be approved by the Department Representative in writing.
- .12 Where steel protective casing is left in place, fill void space between casing and shaft excavation with concrete.

3.3 PLACING REINFORCING STEEL

- .1 Reinforcing steel shall be placed immediately prior to concrete placing and the steel shall be securely held to maintain position during concrete placing and until the concrete has hardened. Place reinforcing in such a manner as to prevent loose earth or debris from falling into the hole.
- .2 No splices in reinforcing steel shall be permitted unless specifically shown on the drawings or approved by the Department Representative. Where such splices are permitted, they shall be a minimum of 36 bar diameters and splices in adjacent bars shall be staggered.
- .3 Minimum cover to all pile reinforcing including ties shall be 75 millimeter or as called for on drawings.
- .4 Ties or spiral reinforcing shall be securely wired to main reinforcing at each bar intersection. No tack welding of reinforcing cages will be permitted. Provide additional reinforcing bars as required to securely brace the reinforcing steel cage.
- .5 Care shall be taken to clean all form oil or other deleterious substances from the reinforcing steel.

3.4 PLACING CONCRETE

- .1 Concrete shall be handled to the place of final deposit in such a manner as to prevent segregation of the concrete.
- .2 Concrete shall be placed continuously as soon as possible after the hole has been drilled, cleaned out and reinforcing steel has been secured in position. Every care shall be taken to ensure that the hole is completely filled with concrete.
- .3 Concrete in the piles shall be compacted by the use of high frequency vibrators. The vibrator shall be lowered down the drilled holes, applied directly to the concrete and gradually withdrawn as the concrete placing progresses. Personnel experienced in vibrating concrete shall be used on this work and care shall be taken not to over-vibrate.
- .4 Protect concrete from rain, frost or snow during and after placing until the concrete has hardened.
- .5 Immediately after the concrete pouring is completed, clean all projecting reinforcing steel.

3.5 TOLERANCES IN PILE SIZE, LOCATION AND ALIGNMENT

- .1 The maximum permissible error in location at cut-off shall be 40 millimeters in any direction. All piles shall be placed not more than two percent of their lengths out of plumb. The elevation of the top of all piles shall be within 25 millimeters of the elevation called for on the structural drawings. All reinforcing steel clearances shall be within a tolerance of + 12 millimeters of the dimension called for on the drawings.
- .3 The minimum diameter of all piles shall be as called for on the drawings.

- .4 Where piles have been placed outside the above tolerances, such piles may be rejected by the Department Representative. The Contractor shall place additional piles and pile caps as directed by the Department Representative to replace rejected piles and such additional piles and pile caps shall be installed at not additional cost to the contract.
- .5 The pile lengths called for on the drawings are the minimum lengths required below the pile cut-off elevations shown on the drawings.

3.6 COLD WEATHER REQUIREMENTS

- .1 When the air temperatures are below 5°C., care shall be taken to keep forms and reinforcing steel free from ice.
- .2 Provision shall be made to protect the concrete from rain or snow while placing and after placing, until the concrete has hardened.
- .3 Where piles are drilled through frozen ground, enlarge the pile diameter by 100 mm for that portion of the pile.

3.7 PILE SHAFT ENCLOSURES

- .1 All pile holes are to be protected with an enclosure, acceptable to the Department Representative.

3.8 SITE CLEAN-UP

- .1 Leave the site neat, tidy, free of plant and/or equipment and in safe condition. Remove excavation material from site or deposit on site as directed by the Department Representative.

3.9 DEFECTIVE PILES

- .1 Correct as directed all piles not meeting requirements of this specification at no additional cost to the contract.

END OF SECTION