SECTION 32 31 16 – GABIONS

PART I - GENERAL

1.01 SCOPE OF WORK

Work described in this section includes materials, equipment, labor costs, including shipping of fences, gates and accessories.

1.02 RELATED WORK (Sections to consult)

****NOTE TO SPECIFIER** Delete any sections below not relevant to this project; add others as required.**

A. Division 03 – Concrete

B. Division 04 – Masonry

C. Division 31 – Earthwork

D. Division 32 – Exterior Improvements

E. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

****NOTE TO SPECIFIER** Delete Section F if motorized gates are not required.**

F. Division 26 - Electrical. For electrical service and connections for motor operators, controls, limit switches, other powered devices and for system disconnect switches.

1.03 REFERENCES

****NOTE TO SPECIFIER** Delete references from the list below that are not required by the text of the edited section.**

ASTM STANDARDS: American Society for Testing and Materials

A121 - 19	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
A123 / A123M - 17	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153 / A153M - 16a	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A500 / A500M - 18	Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Round Shapes.
A505 - 16	Standard Specification for Steel, Sheet and Strip, Alloy, Hot-Rolled and Cold-Rolled, General Requirements
A513/A513M - 19	Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing
A641/A641M - 09a (2014)	Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
A653/A653M - 19	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
A659/A659M - 18	Standard Specification for Commercial Steel (CS), Sheet and Strip, Carbon (0.16 Maximum to 0.25 Maximum Percent), Hot-Rolled
A787/A787M - 15a	Standard Specification for Electric-Resistance-Welded Metallic-Coated Carbon Steel Mechanical Tubing
A853 - 24 (2017)	Standard Specification for Steel Wire, Carbon, for General Use
A1008 / A1008M - 18	Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable
A1064 / A1064M - 18a	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
B6 - 18	Standard Specification for Zinc

B22 - 14	Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
D2247 - 15	Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
D2794 - 93 (2014)	Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
D3359 - 17	Standard Test Methods for Measuring Adhesion by Tape.
F626 - 14 (2019)	Standard Specification for Fence Fittings
F900 - 11 (2017)	Standard Specification for industrial and commercial swing gates.
F934 - 96 (2017)	Standard Specification for Standard Colors for Polymer-Coated Chain Link Fence Materials.
F1043 - 18	Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.
F1184 - 16	Standard Specification for industrial and commercial horizontal slide gates.
F2919 / F2919M - 12 (2018)	Standard Specification for Welded Wire Mesh Fence Fabric (Metallic-Coated or Polymer Coated) with Variable Mesh Patterns or Meshes Greater than 6 in^2 [3871 mm^2] in Panels
F2957 - 13(2019)e1	Standard Specification for Ornamental Aluminum Fence Systems

CSA STANDARDS: Canadian Standards Association

A23.1:19/A23.2:19	Concrete Materials and Methods of Concrete Construction / Test Methods and Standard Practices for Concrete
G164-18	Hot Galvanization of Irregularly Shaped Articles.

CGSB STANDARDS: Canadian General Standards Board

CAN/CGSB-138.1-2019	Fabric for Chain Link Fence
CAN/CGSB-138.2-2019	Steel Framework for Chain Link Fence
CAN/CGSB-138.3-2019	Installation of Chain Link Fence
CAN/CGSB-138.4-2019	Gates for Chain Link Fence

1.04 SUBMITTALS

A. Product Data: Material descriptions, dimension of individual components and profiles, and finishes for the following:
   1. Post, springs, frames, posts

B. Shop Drawings: In accordance to Section 01 33 00 with six (6) copies:
   1. Show locations of gabions and posts
   2. Indicate materials, dimensions, sizes, weights, and finishes of components.
   3. Include plans, elevations, sections, gate swing direction and other required installation and operational clearances, and details of post anchorage, attachment and bracing.
   4. Installation recommendations and instructions by manufacturer describing all details for a typical fence.

1.05 SUBSTITUTION OF PRODUCTS

To enable all tenders to be judged equitably, they shall be based on the specified products in this document and shown on the drawings:

A. The proposal for any substitute products must be attached to their tender separately, identifying the substitution product by its trade name along with any savings it may represent.

B. Following the opening of the tender, only the substitutions proposed by the lowest bidder of the specified products will be considered.

C. All substitutions approval requests shall be accompanied by manufacturing drawings and specifications, and they meet all specifications for design, size gauge of metal parts and fabrication.

D. Each substitution sample must be presented to the owner/consultant within seven days following the opening of tenders. After this time, the bidder will be required to supply the original specified product.

E. The owner/consultant reserves the right to grant or deny approval for proposed substitutions without prejudice to this right and the decision shall be final.

F. Fencing products must be entirely interchangeable, if applicable, with already installed material.

G. The above conditions apply to this section independently of any other clauses on the subject found in this document.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed installations of fences and gates similar in material, design, and extent to those indicated for this project and whose work has resulted in construction with a record of successful in-service performance.

B. Source Limitations for Fences and Gates: Obtain each color, grade, finish, type, and variety of components for fences and gates from one source with resources to provide fences and gates of consistent quality in appearance and physical properties.

1.07 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify local utility making services before beginning work.
2. Unless otherwise indicated in the general provisions of the contract, notify the Architect no less than two (2) days in advance of proposed utility interruptions.
3. Do not proceed with utility interruptions without Architect's written permission.

B. Field Measurements: Verify layout information for fences and gates shown on drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

PART II - THE PRODUCT

2.01 MANUFACTURER

OMEGA II FENCE SYSTEMS ™
A division of Metaltech - Omega Inc.
1735, St-Elzéar west
Laval (Quebec), Canada
H7L 3N6

Tel: 800-836-6342 / 450-686-9600
Fax: 450-681-5318
Email: customerservice@omegatwo.com
Web site: www.omegatwo.com

****NOTE TO SPECIFIER** Delete one of the following two paragraphs: Coordinate with requirements on product options and substitutions.**

A. Substitutions: Not permitted.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirement:

1. All substitution approval requests shall be accompanied by manufacturing drawings and specifications, and they shall meet all specifications for design, size, gauge of metal parts, and fabrication.

****NOTE TO SPECIFIER** Product is galvanized and finished with a polyester-coated finish. Add if needed, delete if not required.**

2.02 COATINGS

1. Coating panel « OMEGA ELITE »:

A. Zinc coating :

1. The mesh sections are coated with a minimum of 150 g/m² (0.5 oz/ft²) of zinc, in accordance with ASTM A641, Class 1.

B. Polyester Coating : The polyester coating shall have a minimum thickness of 100 microns, applied after fabrication using an electrostatic process. The coating shall cover all surfaces of the mesh and the posts. No polyester coating shall be applied to bolts, nuts, or washers. The coating shall successfully pass the following tests:

1. Mechanical adhesion test - ASTM D3359 - Method B.
2. Impact resistance test - ASTM D2794.
3. Salt spray (minimum of 1 000 hours without rust) - ASTM B117.
4. Humidity resistance (100%) - ASTM D2247.
5. Ultraviolet risistance test (500 hours of exposure at 63°C) - ASTM G155 – xenon arc apparatus

C. Polyester coating colors :

****SPECIFIER'S NOTE** Select a color: the standard black color or one of the optional colors listed below. Delete options that are not required. Refer to the Omega II , or [fencing systems website or the RAL color chart].**

1. Standard Coating: Black, RAL 9004 (30% Gloss).
2. Gloss Coating: Signal white, RAL 9003 (85%-90% Gloss).
3. Gloss Coating: Silver grey, RAL 7001 (85%-90% Gloss).
4. Gloss Coating: Basalt grey, RAL 7012 (85%-90% Gloss).
5. Gloss Coating: Fir green, RAL 6009 (85%-90% Gloss)
6. Gloss Coating: Chocolate brown, RAL 8017 (55%-60% Gloss).
7. Gloss Coating: Signal red, RAL 3001 (85%-90% Gloss).
8. Gloss Coating: Taupe brown. (50%-60% Gloss).
9. Textured Coating: Signal yellow, RAL 1003 (85%-90% Gloss).
10. Textured Coating: Sapphire blue, RAL 5003 (50%-60% Gloss).
11. Metallic Coating: Silver (85%-90% Gloss).
12. Metallic Coating: Silver vein (85%-90% Gloss).

13. Metallic Coating: Copper vein (85%-90% Gloss).
14. Corten Steel Look: Rust (± 6 months).
15. Corten Steel Look: Dark Rust (± 2 years).
16. Custom Coating: [____] [Match RAL ___] [Gloss ___].
17. Custom Coating: Color Match [Provide metal color sample].

2. Panel coating « OMEGA SQUARE MESH »:

A. Zinc coating :

1. The mesh sections are coated with a minimum of 150 g/m² (0.5 oz/ft²) of zinc, in accordance with ASTM A641, Class 1.

B. Polyester Coating : The polyester coating shall have a minimum thickness of 100 microns, applied after fabrication using an electrostatic process. The coating shall cover all surfaces of the mesh and the posts. No polyester coating shall be applied to bolts, nuts, or washers. The coating shall successfully pass the following tests:

1. Mechanical adhesion test - ASTM D3359 - Method B.
2. Impact resistance test - ASTM D2794.
3. Salt spray (minimum of 1 000 hours without rust) - ASTM B117.
4. Humidity resistance (100%) - ASTM D2247.
5. Ultraviolet risistance test (500 hours of exposure at 63°C) - ASTM G155 – xenon arc apparatus

C. Polyester coating colors :

****SPECIFIER'S NOTE** Select a color: the standard black color or one of the optional colors listed below. Delete options that are not required. Refer to the Omega II , or [fencing systems website or the RAL color chart].**

1. Standard Coating: Black, RAL 9004 (30% Gloss).
2. Gloss Coating: Signal white, RAL 9003 (85%-90% Gloss).
3. Gloss Coating: Silver grey, RAL 7001 (85%-90% Gloss).
4. Gloss Coating: Basalt grey, RAL 7012 (85%-90% Gloss).
5. Gloss Coating: Fir green, RAL 6009 (85%-90% Gloss)
6. Gloss Coating: Chocolate brown, RAL 8017 (55%-60% Gloss).
7. Gloss Coating: Signal red, RAL 3001 (85%-90% Gloss).
8. Gloss Coating: Taupe brown. (50%-60% Gloss).
9. Textured Coating: Signal yellow, RAL 1003 (85%-90% Gloss).
10. Textured Coating: Sapphire blue, RAL 5003 (50%-60% Gloss).
11. Metallic Coating: Silver (85%-90% Gloss).
12. Metallic Coating: Silver vein (85%-90% Gloss).
13. Metallic Coating: Copper vein (85%-90% Gloss).
14. Corten Steel Look: Rust (± 6 months).
15. Corten Steel Look: Dark Rust (± 2 years).
16. Custom Coating: [____] [Match RAL ___] [Gloss ___].
17. Custom Coating: Color Match [Provide metal color sample].

3. Panel coating « OMEGA EVOLUTION »:

A. Zinc Coating :

1. Wire meshes are coated with a minimum of 1.5 oz/ft2 (460 g/m2) zinc in conformity with ASTM A123 Grade 65.

2.03 MATERIALS

2.03.1 GABIONS AND ACCESSORIES

Please note that the dimensions provided in this section may vary from one installation to another. For more information on the factors that may affect the dimensions, refer to the gabion assembly section or contact customer service

A. Applications

- Retaining wall (Erosion control)
- Landscaping
- Riparian developpement
- Sound barrier wall
- Fencing
- Building cladding

B. Square post :

They are cold-rolled and made of AISI 1008 steel, in compliance with ASTM A500 and ASTM A787 standards. Unlike chain-link fencing, it is not necessary to use larger corner or terminal posts, as the panels are rigid and self-supporting

The fence posts shall be a minimum of 914 mm (36 in.) longer than the actual fence height when embedded in the ground.

C. Models

1. Gabion Box

The overall dimensions of the bench model are identical, regardless of the selected Omega panel (Elite or Evolution).

a) Overall dimensions « OMEGA ELITE » ou « OMEGA EVOLUTION »:

Dimensions	Value (inches)
Width	49 1/8 " [1246mm] ; 72 5/8 " [1846mm]
Depth	25 1/2 " [648mm]
hight	17 1/4 " [437mm]

b) Overall dimensions « SQUARE MESH »:

Dimensions	Value (inches)
Width	49 3/8 " [1256mm] ; 73 3/8 " [1865mm]
Depth	25 3/8 " [646mm]
hight	17 " [433mm]

2. Gabion Bench

The overall dimensions of the bench model are identical, regardless of the selected Omega panel (Elite, Square Mesh, or Evolution). The bench models are the same as the box models, with the addition of a frame around the panels. Refer to the Frame section

a) Overall dimensions « OMEGA ELITE »; « SQUARE MESH »; « OMEGA EVOLUTION »

Dimensions	Value (inches)
Width	50 1/2 " [1283mm] ; 74 1/2 " [1892mm]
Depth	26 1/2 " [673mm]

hight	19 " [483mm]

3. Gabion Fence

Composed of Elite, Evolution, or square mesh panels. Because this type of gabion has a greater height, a post must be installed at each end (internal or external) to ensure stability. Refer to the Posts section.

a) Overall dimensions « OMEGA ELITE » ou « OMEGA EVOLUTION »:

Dimensions	Value (inches)
Width	100 1/4"[2548mm]
Depth	9 3/4"[248mm]
hight	48 3/4" [1238mm] ; 72 3/8" [248mm] ; 96" [2437mm]

b) Overall dimensions « SQUARE MESH »:

Dimensions	Value (inches)
Width	91 3/8"[2322mm]
Depth	9 3/8"[239mm]
hight	49 3/8"[1255mm] ; 73 3/8" [1865mm] ; 97 3/8"[2475mm]

D. Panels

****SPECIFIER'S NOTE** The product shall be galvanized and the receive a polyester coating. Delete if not required.**

1. Welded panels « OMEGA ELITE »:

1. 98-5/8 in (2505 mm) wide, welded by one vertical wire of 6 gauge (0.192 in or 4.9 mm) placed between two horizontal wires of 4 gauge (0.225 in or 5.72 mm) to form rectangles 1-15/16 x 7-7/8 in (50.0 x 200.0 mm).
2. Cold rolled annealed wire made of AISI Grade 1018 steel with tensile strength of at least 75 000 psi (515 Mpa) in accordance with ASTM A853.
3. One end of the vertical wires of the panel shall extend 1 in (25.4 mm) from the last or the first horizontal wire to create a spiked top or bottom depending on installed position. The other end is cut flush.
4. Panel camber may not exceed 0.094 in (2.5 mm).

2. Welded panels « OMEGA SQUARRE MESH »:

1. With an overall width of 2,290.9 mm (90-3/16 in.), manufactured from 6 GA (4.88 mm) vertical steel wires positioned between two horizontal wires of the same gauge to form 2 in. square openings
2. The tensile strength of the cold-formed steel wire made from annealed AISI Grade 1018 steel is 515 MPa (75,000 psi), in accordance with ASTM A853 standards.

3. Welded panels « OMEGA EVOLUTION »:

1. With an overall width of 2,505 mm (98-5/8 in.), manufactured from galvanized vertical steel wires of 6 gauge (4.9 mm or 0.192 in.), positioned between two horizontal wires of 4 gauge (5.7 mm or 0.225 in.) to form rectangular openings measuring 1-15/16 in. × 7-7/8 in. (50.0 × 200.0 mm).
2. The tensile strength of the cold-formed steel wire made from annealed AISI Grade 1018 steel is 515 MPa (75,000 psi), in accordance with ASTM A853 standards.

3. The vertical rods on one side of the panel extend 25.4 mm (1 in.) beyond the last horizontal rod, forming spikes that can be positioned at the top or bottom depending on the application. At the opposite end, the spikes are cut flush.
4. The panel camber shall not exceed 2.5 mm (0.094 in.).

E. Square post :

1. They are cold-rolled and made of AISI 1008 steel, in compliance with ASTM A500 and ASTM A787 standards. Unlike chain-link fencing, larger corner or terminal posts are not required, as the panels are rigid and self-supporting.
2. The fence posts shall be a minimum of 914 mm (36 in.) longer than the actual fence height when embedded in the ground.

F. Frames

1. Rectangular-shaped frames are composed of two subassemblies fastened together with screws and bolts: the bottom frame on which the gabion rests, and the top frame that covers the gabion.
2. They are made of 44W steel angle sections in accordance with ASTM A500 Grade C and are galvanized in accordance with ASTM A653 G90, with a minimum coating of 275 g/m² (0.9 oz/ft²).
3. The frame dimensions are defined based on the gabion dimensions. Approximately 1.5 in. must be added in length and depth, and 3 in. in height compared to the panel dimensions.
4. They are intended to provide increased stability and protection for the gabion against its surrounding environment. In addition, they enhance the overall aesthetic appearance of the product.

G. Spring

1. The springs are used to connect the panels and ensure the rigidity of the gabion. The springs are supplied in 96-inch lengths and must be cut to the appropriate length according to your installation.
2. They are made of stainless steel in accordance with ASTM A313 Type 302.

H. Post

1.Used exclusively on gabion fence models.
2.Pre-galvanized 2 × 2 in. square steel tube, 11 ga, compliant with ASTM A500 Grade C.
3.They are cold-rolled and made of 1008 steel in accordance with ASTM A500 and ASTM A787 standards. They feature hooks that allow them to be connected to the gabion panels. An aluminum cap is installed on top of the post.

I. Hooks

1. The hooks allow the panels to be connected to each other and to the posts, ensuring the structural integrity of the gabion. Their position is specified in the installation manual.
2. They are made of 304 stainless steel in accordance with ASTM A276.

1. Installation

****NOTE TO THE SPECIFIER** Select the type of installation and the length of the posts. Delete options that are not required.**

a. In-ground, with post lengths meeting local frost line requirements.
b. Surface-mounted on base plates.
c. Customized

****NOTE TO THE SPECIFIER** Select the dimensions based on the height of the panels used. Delete options that are not required.**

2. Dimensions

a. For gabion fencing with nominal heights of 2, 6, and 8 feet:

Dimensions Post	Gauge	Maximum post capacity
50,8 mm x 50,8 mm (2 po x 2 po)	11 (3,0 mm)	1 713 N (385 lb)

J. Stones

The stones selected for infill must be dense and hard in order to be sufficiently durable against environmental effects. It is recommended to use stone with a density of at least 2,400 kg/m³.
The stones must also be of uniform size so that they can be easily stacked and remain as stable as possible.

Example of stones :

- Limestone: Durable and available in many regions, ideal for outdoor
- Granite: Very durable and often used for projects requiring high strength.
- Basalt: Strong and uniform, commonly used for structural applications.
- Gravel or pebbles: Sometimes used for lighter or decorative finishes.
- Quantity: (Approx. 1,450 kg/m³)

PARTIE III - EXECUTION

3.01 SITE ANALYSIS

A. Examine the site and conditions, with the installer present, to ensure compliance with requirements related to [property lines,] excavation, site cleaning, masonry work, and any other conditions that may affect the installation.

B. Level the ground where the gabions will be installed to obtain a uniform surface. Do not begin installation until grading is complete, unless otherwise directed by the Architect.

C. Proceed with installation only after all conditions deemed unsatisfactory have been corrected.

3.02 PRÉPARATIONS

1.03 GENERAL INSTALLATION

****NOTE TO THE SPECIFIER** Delete the following section if the desired installation does not include a gate.**

Gate Installation with Gabion Fencing

Gabion fences can be installed with all Omega gate assemblies available in the catalog.

1. For a detailed understanding of the possible configurations and installation methods, please refer to the gabion installation guides.
2. For any information related to the selected gates (hardware, fittings, or posts), please consult the technical specifications of the relevant model.
3. However, it is not possible to supply gabion gates filled with stones for safety and durability reasons.

Foundation Construction

The purpose of the foundation is to ensure that the gabions rest on stable ground, thereby preventing any movement or settlement. It also helps keep the gabion level to ensure uniform distribution of the stones. Finally, it helps prevent the risk of sliding or erosion, especially for structures such as retaining walls. Therefore, the foundation must be sufficiently deep and wide to guarantee the stability of the structure, considering soil characteristics and the size of the gabion.

1. Excavation: Excavate a foundation trench for the gabions. It must be located below the frost line. A depth of 30 cm is often sufficient, but this may vary depending on the size of the gabions and structural requirements. The bottom of the trench should be as flat and level as possible.
2. It is recommended to add a geotextile fabric at the bottom of the trench to prevent the soil from mixing with the backfill and to inhibit weed growth. It is essential to have clean soil in order to obtain a stable base.
3. Ensure that the soil is not loose; if it is, compact it.

****NOTE TO THE SPECIFIER** Delete the following section if posts are not used.**

Post installation

1. Positioning: Set the posts in concrete footings. Protect the portions above ground level from concrete splashing. Pour concrete around the posts and reinforcement. The use of mechanical devices to secure the posts is prohibited. Verify that the posts are plumb, properly aligned, and spaced at the correct distances, then hold them in place until the concrete has fully set.
2. Dimensions and profile: As shown on the drawings.
3. Ensure uniform center-to-center spacing of the posts.
4. Exposed concrete footings: Extend the concrete 2 in. (50.8 mm) above finished grade. Shape and smooth to allow water runoff.
5. Concealed concrete footings: Terminate footings 2 in. (50.8 mm) below finished grade [or as indicated on the drawings] to allow surface coverage.
6. Anchor sleeves: Use steel sleeves anchored in the concrete for post installation. Once the posts are inserted into the sleeves, fill the space between them with [non-metallic, non-shrink grout] [setting cement,] mixed and placed in accordance with the anchor manufacturer's instructions. Slope the surface to divert water away from the posts.
7. Core-drilled installation: Drill holes at least 5 in. (125 mm) deep and 3/4 in. (19.1 mm) larger than the outside diameter of the post. Clean debris from the holes, insert the posts, and fill the space between the two with [non-metallic, non-shrink grout] [setting cement,] mixed and placed in accordance with the anchor manufacturer's instructions. Slope the surface to divert water away from the posts.
8. Post flange installation: Secure the mounting plates of each post to the slab or structure, as indicated, using anchor screws.

Gabion assembly

WARNING: The dimensions provided may vary slightly from one installation to another. Several factors can affect the final dimensions, such as the selected rocks, ground flatness, etc.

A. Panel assembly:
Align the panels together to form a closed structure in accordance with the drawing. Use the metal springs to secure the panels. Ensure the structure is properly closed and firmly assembled.

B. Gabion filling:
During filling, it is essential to distribute the stones evenly to minimize voids and ensure uniform weight distribution within the gabion. Use one of the types of stone mentioned above

3.05 CAST-IN-PLACE CONCRETE

A. Cast-in-place concrete shall comply with ACI 30.

B. Materials: Cement shall comply with ASTM C150; aggregates shall comply with ASTM C33; and potable water shall be used for ready-mixed concrete in accordance with ASTM C94. Proportions for concrete mixed on-site shall comply with ASTM C94.

C. Concrete Mix: Concrete shall be of normal weight with a compressive strength of not less than 20.7 MPa (3,000 psi) at 28 days. Slump shall not exceed 76.2 mm (3 in.). It shall contain coarse aggregate with a minimum size of 5 mm (1/5 in.) and a maximum size of 19.1 mm (3/4 in.). Air entrainment between 5% and 7% is recommended in accordance with Section 03 00 00.

D. Materials: Prepackaged dry concrete mix complying with ASTM C387, mixed with water in accordance with the manufacturer's written instructions.

3.06 GROUT AND ANCHORING CEMENT

A. Grout: A factory-packaged, pre-mixed, non-metallic, non-shrink, non-corrosive grout that is non-staining and non-gassing shall be used in accordance with ASTM C1107. Follow the manufacturer's instructions, for exterior use only.

B. Anchoring Cement: Erosion-resistant anchoring cement shall be a factory-packaged, non-shrink cement that is non-staining and hydraulically controlled for expansion. It shall be mixed with water on the project site to create a pourable anchoring solution.

The material shall be capable of resisting erosion without the application of protective treatments such as sealers or water-resistant coatings. Refer to the manufacturer's recommendations for exterior applications.

3.13 CLEANING

Clean and restore surfaces where the ground was disturbed during the work. Remove surplus materials and replace damaged turf in accordance with the Engineer's and Consultant's directions.

3.14 MAINTENANCE

A. Inspection :
   1. General condition of the panel wires.
   2. General condition of the frames (if applicable).
   3. Wear of the stones.