TECHNICAL SPECIFICATIONS

SECTION 032000
CONCRETE REINFORCING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

C. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

D. Section 033000 - Cast-in-Place Concrete.

E. Section 042000 - Unit Masonry: Reinforcement for masonry.

F. ACI 301 - Specifications for Structural Concrete.

G. ACI SP-66 - ACI Detailing Manual.

H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

I. ASTM A704/A704M - Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

K. CRSI (DA4) - Manual of Standard Practice.

1.02 SUBMITTALS

A. See Section 013300 Submittal Procedures, for submittal procedures.

B. Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices.

C. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.03 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301.

PART 2 PRODUCTS

2.01 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Deformed billet-steel bars.
   2. Unfinished.

B. Reinforcing Steel Mat: ASTM A704/A704M, using ASTM A615/A615M, Grade 40 (40,000 psi) steel bars or rods, unfinished.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M
   1. Form: Flat Sheets.
   2. WWR Style: As indicated on drawings.

D. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4) - Manual of Standard Practice.

B. Welding of reinforcement is not permitted.

PART 3 EXECUTION

3.01 PLACEMENT

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

C. Accommodate placement of formed openings.

D. No bars shall be field bent, unless specifically indicated on drawings or aproval from design professional of record.

E. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

F. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces

G. Splicing of Reinforcement: Conform to ACI 318 Chapter 25 for wired lap splices and embedment lengths.

H. Maintain concrete cover around reinforcing as follows:
   1. Beams:1 1/2 inches
   2. Supported Slabs and Joists: 3/4 inch.
   3. Column Ties: 1 1/2 inches.
   4. Walls (exposed to weather or backfill): 2 inches.
   5. Footings and Concrete Formed Against Earth: 3 inches.
   6. Slabs on Fill: centered

I. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

J. Splicing of Reinforcement: Conform to ACI 318 Chapter 25 for wired lap splices and embedment lengths.

K. "Wet Sticking", Hooking-up" or "Walking-in" of any reinforcement will not be permitted.

3.02 FIELD QUALITY CONTROL

A. An independent testing agency, as specified in Section 014000 - Quality Requirements, will inspect installed reinforcement for compliance with contract documents before concrete placement.

END OF SECTION

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete formwork.

B. Concrete for composite floor construction.

C. Floors and slabs on grade.

D. Concrete shear walls, elevator shaft walls, and foundation walls.

E. Concrete reinforcement.

F. Joint devices associated with concrete work.

G. Miscellaneous concrete elements, including equipment pads, equipment pits, light pole bases, flagpole bases, thrust blocks, and manholes.

H. Concrete curing.

I. Concrete repair materials.

1.02 RELATED REQUIREMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

C. ACI 117 - Specification for Tolerances for Concrete Construction and Materials.

D. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.

E. ACI 301 - Specifications for Structural Concrete.

F. ACI 302.1R - Guide to Concrete Floor and Slab Construction.

G. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

H. ACI 305R - Guide to Hot Weather Concreting.

I. ACI 306R - Guide to Cold Weather Concreting.

J. ACI 308R - Guide to External Curing of Concrete.

K. ACI 318 - Building Code Requirements for Structural Concrete.

L. ACI 347R - Guide to Formwork for Concrete.

M. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

N. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.

O. ASTM C33/C33M - Standard Specification for Concrete Aggregates.

P. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

Q. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.

R. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50 mm] Cube Specimens).

S. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete.

T. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

U. ASTM C173/C173M - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.

V. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

W. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete.

X. ASTM C472 - Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters, and Gypsum Concrete.

Y. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.

Z. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.

AA. ASTM C827/C827M - Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures.

BB. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

CC. ASTM C1059/C1059M - Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.

DD. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).

EE. ASTM C1202 - Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration.

FF. ASTM C1240 - Standard Specification for Silica Fume Used in Cementitious Mixtures.

GG. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.

HH. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.

II. ASTM C1708/C1708M - Standard Test Methods for Self-leveling Mortars Containing Hydraulic Cements.

JJ. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

KK. ASTM D1752 - Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.

LL. ASTM D8139 - Standard Specification for Semi-Rigid, Closed-Cell Polypropylene Foam, Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

MM. ASTM E1643 - Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

NN. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

OO. COE CRD-C 572 - Handbook for Concrete and Cement Corps of Engineers Specifications for Polyvinylchloride Waterstop.

PP. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair.

QQ. NSF 61 - Drinking Water System Components - Health Effects.

RR. NSF 372 - Drinking Water System Components - Lead Content.

1.03 SUBMITTALS

A. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

B. Mix Design: Submit proposed concrete mix design.
   1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
   2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

C. Samples: Submit samples of underslab vapor retarder to be used.

D. Test Reports: Submit report for each test or series of tests specified.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

F. Reinforcement Shop Drawings: Comply with requirements of ACI SP-66. Include bar schedules, shapes of bent bars, spacing of bars, and location of splices

G. Reports: Submit certified copies of mill test report of reinforcement materials analysis.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

B. Follow recommendations of ACI 305R when concreting during hot weather.

C. Follow recommendations of ACI 306R when concreting during cold weather.

D. For slabs required to include moisture vapor reducing admixture (MVRA), do not proceed with placement unless manufacturer's representative is present for every day of placement.

1.05 WARRANTY

A. Slabs with Moisture Vapor Reducing Admixture (MVRA): Provide warranty to cover cost of flooring failures due to moisture migration from slabs for life of the concrete.
   1. Include cost of repair or removal of failed flooring, placement of topical moisture remediation system, and replacement of flooring with comparable flooring system.
   2. Provide warranty by admixture manufacturer matching terms of flooring adhesive or primer manufacturer's material defect warranty.

B. Moisture Emission-Reducing Curing and Sealing Compound, Penetrating: Provide non-prorated warranty to cover cost of flooring delamination failures for 20 years.
   1. Include cost of repair or removal of failed flooring, remediation with a moisture vapor impermeable surface coating, and replacement of flooring with comparable flooring system.

PART 2 PRODUCTS

2.01 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
   1. Form Facing for Exposed Finish Concrete: Steel.
   2. Earth Cuts: Do not use earth cuts as forms for vertical surfaces. Natural rock formations that maintain a stable vertical edge may be used as side forms.
   3. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.
   4. Form Ties: Cone snap type that will leave no metal within 1-1/2 inches of concrete surface.

2.02 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
   1. Type: Deformed billet-steel bars.
   2. Finish: Unfinished, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Plain type, ASTM A1064/A1064M.
   1. Form: Flat Sheets.
   2. WWR Style: As noted on drawings.

C. Reinforcement Accessories:
   1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
   2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.03 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
   1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.
   1. Acquire aggregates for entire project from same source.

C. Lightweight Aggregate: ASTM C330/C330M.

D. Fly Ash: ASTM C618, Class C or F.

E. Calcined Pozzolan: ASTM C618, Class N.

F. Silica Fume: ASTM C1240, proportioned in accordance with ACI 211.1.

G. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.04 ADMIXTURES

A. General: Concrete supplier(s) permitted to select and use chemical admixtures indicated in this Section in concrete mix designs to enhance the placement, workability, and other characteristics of the wet concrete properties. Concrete supplier(s) shall review project schedule and coordinate the use of accelerators, retarders, etc. as necessary to facilitate concrete placement in accordance with Hot Weather and/or Cold Weather concreting practice guidelines. Concrete contractor shall also review compatability of all admixtures selected for use in each individual mix design submitted.

B. Do not use chemicals that will result in soluble chloride ions in excess of 0.1 percent by weight of cement.

C. High Range Water Reducing and Retarding Admixture: ASTM C494/C494M Type G.

D. High Range Water Reducing Admixture: ASTM C494/C494M Type F.

E. Water Reducing and Accelerating Admixture: ASTM C494/C494M Type E.

F. Water Reducing and Retarding Admixture: ASTM C494/C494M Type D.

G. Accelerating Admixture: ASTM C494/C494M Type C.

H. Moisture Vapor Reducing Admixture (MVRA): Liquid, inorganic admixture free of volatile organic compounds (VOCs). Closes capillary systems formed during concrete curing to reduce moisture vapor emission and transmission. Reduces concrete shrinkage with no adverse effect on concrete properties or applied flooring.
   1. Provide admixture in slabs to receive adhesively applied flooring or roofing.
   2. Products:
      a. Barrier One, Inc; Barrier One Moisture Vapor Reduction Admixture (MVRA-CPS): www.barrierone.com/#sle.
      b. Hycrete, Inc: www.hycrete.com/#sle.
      c. ISE Logik Industries, Inc; MVRA 900: www.iselogik.com/#sle.
      d. Specialty Products Group; Vapor Lock 20/20: www.spggogreen.com/#sle.

I. Waterproofing Admixture: Admixture formulated to reduce permeability to liquid water, with no adverse effect on concrete properties.
   1. Admixture Composition: Crystalline, functioning by growth of crystals in capillary pores.
   2. Products:
      a. Aquafin, Inc: www.aquafin.net/#sle.
      b. Euclid Chemical Company; Eucon Vandex AM-10: www.euclidchemical.com/#sle.
      c. Kryton International, Inc; Krystol Internal Membrane (KIM): www.kryton.com/#sle.
      d. Penetron, Inc.; Penetron Admix.: www.penetron.com
      e. Sika USA; Sika WT-240P: www.usa.sika.com
      f. Xypex Chemical Corporation; XYPEX Admix C-500: www.xypex.com/#sle.

2.05 ACCESSORY MATERIALS

A. Underslab Vapor Retarder:
   1. Accessory Products: Vapor retarder manufacturer's recommended tape, adhesive, mastic, prefabricated boots, etc., for sealing seams and penetrations.
   2. Products:
      a. Fortifiber Building Systems Group ; Moistop Ultra 10: www.fortifiber.com/#sle.
      b. ISI Building Products; Viper VaporCheck II 10-mil (Class A): www.isibp.com/#sle.
      c. Stego Industries, LLC10-mil: www.stegoindustries.com/#sle.
      d. W. R. Meadows, Inc; PERMINATOR Class A - 10 mils (0.25 mm): www.wrmeadows.com/#sle.

B. Non-Shrink Cementitious Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents.
   1. Grout: Comply with ASTM C1107/C1107M.
   2. Height Change, Plastic State; when tested in accordance with ASTM C827/C827M:
      a. Maximum: Plus 4 percent.
      b. Minimum: Plus 1 percent.
   3. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 7,000 pounds per square inch.

C. Architectural Concrete Floor Topping and Resurfacer:
   1. Minimum Compressive Strength at 28 Days, ASTM C109/C109M: 6,000 pounds per square inch.
   2. Compressive Strength: Minimum 5000 pounds per square inch, tested per ASTM C472.

D. Self-Leveling Cementitious Concrete Floor Topping:
   1. Minimum Compressive Strength at 28 Days, ASTM C1708/C1708M: 7,000 pounds per square inch.
   2. Products:
      a. LATICRETE International, Inc; LATICRETE SUPERCAP SC650-MC: www.laticrete.com/#sle.

2.06 BONDING AND JOINTING PRODUCTS

A. Latex Bonding Agent: Non-redispersable acrylic latex, complying with ASTM C1059/C1059M, Type II.
   1. Products:
      a. Euclid Chemical Company; AKKRO-7T: www.euclidchemical.com/#sle.
      b. Kaufman Products Inc; SureBond: www.kaufmanproducts.net/#sle.
      c. Kaufman Products Inc; SureWeld: www.kaufmanproducts.net/#sle.
      d. SpecChem, LLC; Strong Bond Acrylic Bonder: www.specchemllc.com/#sle.
      e. W. R. Meadows, Inc; ACRY-LOK-: www.wrmeadows.com/#sle.

B. Epoxy Bonding System:
   1. Complying with ASTM C881/C881M and of Type required for specific application.

2. Products:
    a. Adhesives Technology Corporation; Crackbond SLV-302, Crackbond LR-321, Crackbond LR-321 LPL, Ultrabond 2100 LPL, Ultrabond 2100, Ultrabond 1, Ultrabond 2, or Ultrabond HS200: www.atcepoxy.com/#sle.
    b. Euclid Chemical Company; DURAL FAST SET LV: www.euclidchemical.com/#sle.
    c. Euclid Chemical Company; DURALFLEX GEL: www.euclidchemical.com/#sle.
    d. Euclid Chemical Company; DURALFLEX LV: www.euclidchemical.com/#sle.
    e. Euclid Chemical Company; DURAL 452 GEL, DURAL 452 LV, or DURAL 452 MV: www.euclidchemical.com/#sle.
    f. SpecChem, LLC; SpecPoxy 1000, SpecPoxy 2000, SpecPoxy 3000, or SpecPoxy 3000FS: www.specchemllc.com/#sle.
    g. W. R. Meadows, Inc; Rezi-Weld Gel Paste, Rezi-Weld Gel Paste State, Rezi-Weld 1000: www.wrmeadows.com/#sle.

C. Waterstops: PVC, complying with COE CRD-C 572.

D. Waterstops: Bentonite and butyl rubber, complying with NSF 61 and NSF 372.
    1. Products:

E. Reglets: Formed steel sheet, galvanized, with temporary filler to prevent concrete intrusion during placement.

F. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
    1. Material: ASTM D1751, cellulose fiber.
    2. Material: ASTM D1752, sponge rubber (Type I).
    3. Material: ASTM D8139, semi-rigid, closed-cell polypropylene foam.
    4. Material: Closed-cell, non-absorbent, compressible polymer foam in sheet form.
    5. Products:
        a. Nomaco, Inc; Nomaflex Expansion Joint Filler with Void Cap Option: www.nomaco.com/#sle.
        b. Nomaco, Inc; Fastflex Slab Isolation Joint Filler with Tear-Off Strip: www.nomaco.com/#sle.
        c. W. R. Meadows, Inc; Fiber Expansion Joint Filler with Snap-Cap: www.wrmeadows.com/#sle.

G. Slab Contraction Joint Device: Preformed linear strip intended for pressing into wet concrete to provide straight route for shrinkage cracking.

H. Slab Construction Joint Devices: Combination keyed joint form and screed, galvanized steel, with rectangular or round knockout holes for conduit or rebar to pass through joint form at 6 inches on center; ribbed steel stakes for setting.

I. Dowel Sleeves: Plastic sleeve for smooth, round, steel load-transfer dowels.

J. Plate Dowel System: Steel plate dowel and plastic dowel sleeve; with integral fasteners for attachment to formwork.

2.07 CURING MATERIALS

A. Resin Curing Compound: Solvent-based liquid, membrane-forming.
    1. Comply with ASTM C309, Types 1 and 1D, Classes A and B.
    2. VOC Content: Less than 350 g/L.
    3. Products:
        a. Euclid Chemical Company: KUREZ DR-100: www.euclidchemical.com/#sle.
        b. Euclid Chemical Company: KUREZ DR-VOX: www.euclidchemical.com/#sle.
        c. Euclid Chemical Company: Tammscure WB: www.euclidchemical.com/#sle..

B. Curing and Sealing Compound, Moisture Emission-Reducing, Penetrating: Clear, water-based, non-film-forming curing agent; capable of providing adequate bond for flooring adhesives,

initially and over the long term; with sufficient moisture vapor impermeability to prevent deterioration of flooring adhesives due to moisture emission, moisture vapor emission, and alkalinity.

1. Use this product to cure and seal all slabs to receive adhesively applied flooring or roofing.
2. Compressive Strength of Treated Concrete: Equal to or greater than strength after 28-day water cure when tested according to ASTM C39/C39M.
3. Chloride Ion Resistance of Treated Concrete: Equal to or greater than strength after 28-day water cure when tested according to ASTM C1202.
4. Comply with ASTM C309 and ASTM C1315 Type I Class A.
5. Products:
    a. Green Umbrella Architectural Concrete Systems, Inc. 20 Jetview Dr. Rochester, NY 14624, basis of design manufacturer. Technical and Architectural Support:(844) 200-7336, info@greenumbrellasystems.com.

C. Moisture-Retaining Sheet: ASTM C171.
1. Polyethylene film, white opaque, minimum nominal thickness of 4 mil, 0.004 inch.

2.08 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109.

2.09 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Admixtures: Add acceptable admixtures as recommended in ACI 211.1 and at rates recommended or required by manufacturer.

C. Normal Weight Concrete: Footings and Buried Foundations. (Exposure Category F0)
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Cement Content: Minimum 540 pounds per cubic yard.
4. Water-Cement Ratio: Maximum 50 percent by weight.
5. Maximum Slump: 3 1/2 inches (+/- one inch)
6. Maximum Aggregate Size: 1-1/2 inches.

D. Normal Weight Concrete: Exposed Foundations and Retaining Walls (Exposure Category F3)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 5,000 pounds per square inch.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Cement Content: Minimum 660 pounds per cubic yard.
   4. Water-Cement Ratio: Maximum 40 percent by weight.
   5. Total Air Content: 5.5 percent (+/- one percent), determined in accordance with ASTM C173/C173M.
   6. Maximum Slump: 3 1/2 inches (+/- one inch.)
   7. Maximum Aggregate Size: 1-1/2 inches.

E. Normal Weight Concrete: Slab-on-Grade (interior). (Exposure Category F0)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Cement Content: Minimum 590 pounds per cubic yard.
   4. Water-Cement Ratio: Maximum 45 percent by weight.
   5. Total Air Content: 4 percent (+/- one percent), determined in accordance with ASTM C173/C173M.
   6. Maximum Slump: 3 1/2 inches (+/- one inch.)
   7. Maximum Aggregate Size: 3/4 inch.

F. Normal Weight Concrete: Exterior Slabs. (Exposure Category F3)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 5,000 pounds per square inch.
   2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
   3. Cement Content: Minimum 660 pounds per cubic yard.
   4. Water-Cement Ratio: Maximum 40 percent by weight.
   5. Total Air Content: 5.5 percent (+/- one percent) determined in accordance with ASTM C173/C173M.
   6. Maximum Slump: 3 1/2 inches (+/- one inch.)
   7. Maximum Aggregate Size: 3/4 inch.

G. Structural Normal Weight Concrete: Roof slabs on deck. (Exposure Category F0)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch..
   2. Cement Content: Minimum 590 pounds per cubic yard.
   3. Water-Cement Ratio: Maximum 45 percent by weight.
   4. Maximum Slump: 4 inches (+/- one inch.)
   5. Maximum Aggregate Size: 3/4 inch.
   6. Provide Moisture Vapor Reducing Admixture (MVRA) admixture in slabs to receive adhesively applied roofing.

H. Structural Light Weight Concrete: Interior slabs on deck. (Exposure Category F0)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch..
   2. Water-Cement Ratio: Maximum 45 percent by weight.
   3. Maximum Slump: 4 inches (+/- one inch.)
   4. Maximum Aggregate Size: 5/8 inch.
   5. Provide Moisture Vapor Reducing Admixture (MVRA) admixture in slabs to receive adhesively applied flooring.

I. Structural Light Weight Concrete (Pump Mix): Interior slabs on deck. (Exposure Category F0)
   1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 3,500 pounds per square inch..

2. Water-Cement Ratio: Maximum 45 percent by weight.
3. Total Air Content: 6 percent (+/- one percent), determined in accordance with ASTM C173/C173M.
4. Maximum Slump: 7 inches (+/- one inch) with High Range Water Reducer.
5. Maximum Aggregate Size: 1/2 inch.
6. Provide Moisture Vapor Reducing Admixture (MVRA) admixture in slabs to receive adhesively applied flooring.

J. Structural Normal Weight Concrete: Toppings and Fill for Stair Pans. (Exposure Category F0)
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4,000 pounds per square inch.
2. Cement Content: Minimum 590 pounds per cubic yard.
3. Water-Cement Ratio: Maximum 45 percent by weight.
4. Total Air Content: 5 percent (+/- one percent), determined in accordance with ASTM C173/C173M.
5. Maximum Slump: 4 inches (+/- one inch.)
6. Maximum Aggregate Size: 3/8 inch.

K. Structural Normal Weight Concrete: Vehicular Parking Slabs and Aprons. (Exposure Category F3)
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 5,000 pounds per square inch.
2. Fly Ash Content: Maximum 15 percent of cementitious materials by weight.
3. Cement Content: Minimum 750 pounds per cubic yard.
4. Water-Cement Ratio: Maximum 40 percent by weight.
5. Total Air Content: 6 percent (+/- one percent) determined in accordance with ASTM C173/C173M.
6. Maximum Slump: 3 1/2 inches (+/- one inch.)
7. Maximum Aggregate Size: 3/4 inch.
8. Provide a silane sealer on vehicle parking slabs.

L. Structural Normal Weight Concrete: Site Slip-form Curbs. (Exposure Category F3)
1. Compressive Strength, when tested in accordance with ASTM C39/C39M at 28 days: 4500 pounds per square inch.
2. Cement Content: Minimum 675 pounds per cubic yard.
3. Water-Cement Ratio: Maximum 45 percent by weight.
4. Total Air Content: 5 percent (+/- one percent), determined in accordance with ASTM C173/C173M.
5. Maximum Slump: 1 inch (+/- one-half inch.)
6. Maximum Aggregate Size: 5/8 inch.

M. Controlled Low Strength Material (CLSM)
1. Permanent Material.
   a. Material shall meet the requirements of ACI 229R with a minimum compressive strength of 400 lb./sq. in
2. Removable Material.
   a. Material shall meet the requirements of ACI 229R with a minimum compressive strength of 50 to 100 lb./sq. in.

2.10 MIXING

A. Transit Mixers: Comply with ASTM C94/C94M.

B. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

C. Do not use shrinkage-reducing admixture (SRA) in same concrete batch with MVRA or PIA.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.02 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Verify that forms are clean and free of rust before applying release agent. Coat contact surfaces of forms with form-release agent before placing reinforcement.

C. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.

F. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class C, 1/2 inch for rough-formed finished surfaces.

G. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

H. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

I. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

J. Chamfer exterior corners and edges of permanently exposed concrete.

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

L. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

M. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

N. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R.

O. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.
   1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
   2. Use latex bonding agent only for non-load-bearing applications.

P. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Comply with ASTM E1643. Lap joints minimum 6 inches. Run vapor retarder up the face of foundation walls at slab perimeter and adhere with manufacturer's recommended adhesive. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow

manufacturer's written instructions. Repair damaged vapor retarder before covering.

3.03 INSTALLING REINFORCEMENT, ANCHOR RODS, AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
   2. Allow six hours between completion of reinforcement installation and placement of concrete for special inspection.

B. Bend steel reinforcement in accordance with ACI 318.
   1. Do not heat steel reinforcement for bending. Bend or straighten bars cold.
   2. Do not bend partially embedded steel reinforcement, except as approved.

C. Clean reinforcement of dirt, grease, scale, loose rust, oil, paint and other foreign matter prior to installation.

D. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

E. Splicing of Reinforcement: Conform to ACI 318 Chapter 25 for wired lap splices and embedment lengths.

F. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

G. Install welded wire reinforcement in maximum possible lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Splice laps with tie wire.

H. "Wet Sticking", "Hooking-up" or "Walking-in" of any reinforcement will not be permitted.

I. Maintain required concrete cover dimensions indicated. Coordinate placement of conduit and inserts with reinforcement. Protect installed reinforcement from damage or displacement prior to and during concrete placement.

J. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

K. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303. Misplaced or damaged anchor rods shall be subject to re-engineering fees.
   2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
   3. Install dovetail anchors in concrete structures as indicated.

3.04 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.

2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.05 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R. Verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed and corrections made.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
   a. Supplement mechanical consolidation by hand, spading, rodding, or tamping.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Place concrete for floor slabs in accordance with ACI 302.1R. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

F. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

G. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

H. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.06 JOINTING

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
   7. Provide waterstops as indicated, and at all construction joints below grade adjacent to usable spaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness or a minimum of 1-inch as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
   3. Spacing of joints shall not exceed 30 times (24 times for exposed concrete floor surface) the thickness of the slab nor 15 feet on center. All panels should be square or nearly so. Joints shall typically isolate columns and run between columns, with intermediate joints located at equal spaces between column lines.
   4. Joints produced using conventional processes shall be made within 4 or 12 hours after the slab in that area has been finished- within 4 hours in hot weather and within 12 hours in cold weather.
   5. Joints produced using early-entry dry-cut saws shall be made within 1 or 4 hours after the slab in that area has been finished- within 1 hour in hot weather and within 4 hours in cold weather.
   6. Hand tooled joints shall be done immediately following edging, or at the same time.
   7. For floors to be covered with quarry tile, ceramic tile, or terrazzo, the joints shall be aligned with joints in the rigid floor coverings.

D. Contraction Joints in Walls: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Provide adequate shear reinforcement as indicated or directed. Construct contraction joints as follows:
   1. Joints shall be constructed to provide for the installation of watertight joint and sealant, and filled with sealant.
   2. Provide waterstops as indicated, and at all joints below grade adjacent to usable spaces.
   3. Spacing of joints shall be located 4 feet from corners and intersections, and then at 25 feet on center thereafter.

E. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

F. Anchor joint fillers and devices to prevent movement during concrete placement.

G. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

H. Saw Cut Contraction Joints: Saw cut joints before concrete begins to cool, within 4 to 12 hours after placing; use 3/16 inch thick blade and cut at least 1 inch deep but not less than one quarter (1/4) the depth of the slab.

3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:
1. Exposed Concrete Floors: 1/8 inch in 10 feet.
2. Under Seamless Resilient Flooring: 1/16 inch in 10 feet.
3. Under Carpeting: 1/8 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.08 CONCRETE FINISHING

A. Repair surface defects, including tie holes, immediately after removing formwork.

B. Exposed Form Finish: Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
1. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.

C. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
1. Surfaces to Receive Thin Floor Coverings: "Steel trowel" as described in ACI 302.1R; thin floor coverings include carpeting, resilient flooring, seamless flooring, resinous matrix terrazzo, thin set quarry tile, and thin set ceramic tile.
2. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

D. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:100 nominal.

E. Sidewalk slabs shall be broom finished after floating concrete. Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

3.09 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
1. Normal concrete: Not less than seven days.
2. High early strength concrete: Not less than four days.

C. Formed Surfaces: Cure by moist curing with forms in place for full curing period.

D. Surfaces Not in Contact with Forms:

1. Slabs and Floors To Receive Adhesive-Applied Flooring: Curing compounds and other surface coatings are usually considered unacceptable by flooring and adhesive manufacturers. If such materials must be used, either obtain the approval of the flooring and adhesive manufacturers prior to use or remove the surface coating after curing to flooring manufacturer's satisfaction.
2. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water-fog spray or saturated burlap.
    a. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
    b. Spraying: Spray water over floor slab areas and maintain wet.
    c. Saturated Burlap: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place.
3. Final Curing: Begin after initial curing but before surface is dry.
    a. Moisture-Retaining Sheet: Lap strips not less than 3 inches and seal with waterproof tape or adhesive; secure at edges.
    b. Curing Compound: Apply in two coats at right angles, using application rate recommended by manufacturer.

3.10 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.

B. Provide free access to concrete operations at project site and cooperate with appointed firm.

C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of concrete operations.

D. Compressive Strength Tests: ASTM C39/C39M, for each test, mold and cure three concrete test cylinders. Obtain test samples for every 50 cubic yards or less of each class of concrete placed.

E. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

F. Perform one slump test for each set of test cylinders taken, following procedures of ASTM C143/C143M.

G. Slab Testing: Cooperate with manufacturer of specified moisture vapor reducing admixture (MVRA) to allow access for sampling and testing concrete for compliance with warranty requirements.

3.11 DEFECTIVE CONCRETE

A. Test Results: The testing agency shall report test results in writing to Architect and Contractor within 24 hours of test.

B. Defective Concrete: Concrete not complying with required lines, details, dimensions, tolerances or specified requirements.

C. Repair or replacement of defective concrete will be determined by the Architect. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

3.12 PROTECTION

A. Do not permit wheeled traffic over unprotected concrete floor surface for first seven days after pour and not until concrete has attained a minimum compressive strength of 3500 psi.

END OF SECTION

SECTION 116833
ATHLETIC FIELD EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Tennis court equipment.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Convene a meeting one week before starting this work to discuss coordination between various installers.

1.03 SUBMITTALS

A. Product Data: Provide athletic field equipment manufacturer's product data indicating materials of construction, compliance with specified standards, installation procedures, and necessary safety limitations.

B. Shop Drawings: Submit detailed scale drawings showing athletic field equipment and perimeter layout.

C. Samples: Submit color chart for each item that color must be selected showing full range of colors and finishes.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store equipment on project site in accordance with manufacturer's recommendations.

B. Store materials in a dry, covered area, and elevated above grade.

PART 2 PRODUCTS

2.01 ATHLETIC FIELD EQUIPMENT - GENERAL

A. High School Sports: Provide equipment that complies with NFHS and USTA requirements.

B. Mount supporting posts and ground sleeves in concrete footings.

2.02 TENNIS COURT EQUIPMENT

A. Outdoor Tennis Uprights: Single piece uprights, 11-gage steel. 60 inch long of galvanized steel and 3 inch round with integrated welded net lacing rods and bottom pin to set at 42 inch height with remaining 18 inch of upright mounted in concrete footing.
   1. Provide cast aluminum cap with cable guide pins to close top of uprights.
   2. Provide winch post on one side with internal cable length adjustment using removable handle, and internal net attachment in fixed post on other side.
   3. Ground Sleeve: Polyvinyl chloride (PVC) pipe with 3 inch square inside dimension and 24 inch long with debris trap at bottom.
   4. Color and Finish: Black powder coat.

B. Tennis Net: Polyethylene cord with 0.12 inch thick hollow braid, 36 ounce single layer vinyl headband, 18 ounce coated vinyl side and bottom tapes with brass grommets; vinyl coated galvanized cable at top and 1/2 inch diameter fiberglass dowels at each end. System must be compatible with net posts.
   1. Center Strap: Heavy-duty polyester webbing with black oxide coated brass slide buckles, nickel-plated double end snap with reinforced ends.
   2. Center Ground Anchor: Galvanized steel tubing, 1-1/2 inch diameter and 9 inch long with stainless steel pin to attach to center strap, and mounted in concrete footing.

2.03 MATERIALS

A. Steel Pipe and Tube: Complying with ASTM A135/A135M, ASTM A500/A500M, or ASTM A513/A513M; hot-dip galvanized and free of excess weld and spatter.
   1. Tensile Strength: 45,000 psi, minimum.

2. Yield Point: 33,000 psi, minimum.
3. Galvanizing: Hot-dip metal components in zinc after fabrication, in accordance with ASTM A123/A123M; remove tailings and sharp protrusions and burnish edges.

B. Cast Aluminum: ASTM B26/B26M, ASTM B108/B108M, or ASTM B179.

C. Powder Coating for Steel: Electrostatically applied and oven cured polyester powder over electrostatic zinc coating.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that athletic field equipment area has been graded to subgrade elevations required and that excess soil, rocks, and debris has been removed as necessary for installation of footings.

B. Verify that athletic field equipment footings have been installed in proper locations and at proper elevations.

C. Verify location of underground utilities and facilities in athletic field equipment area; damage to underground utilities and facilities will be repaired at Contractor's expense.

3.02 PREPARATION

A. Stake location of athletic field equipment elements, including necessary athletic field perimeters, surfacing, access and egress points, hard surfaces, walls, fences, _____, and/or structures.

B. Stake layout of athletic field equipment perimeter in accordance with approved shop drawings before starting any work.
1. Verify that athletic field perimeters do not overlap hard surfaces, whether currently installed or not.
2. Verify that athletic fields are free of obstructions.
3. If conflicts or obstructions are found, notify Architect.
4. Do not proceed with this work until revised drawings have been provided, showing corrected layout, and that any obstructions have been removed or corrections to layout have been made.

3.03 INSTALLATION

A. Install athletic field equipment in accordance with manufacturer's instructions, and rules and regulations of specified athletic association indicated for this work.

B. Install athletic field equipment without sharp points, edges, or protrusions; entanglement hazards or pinch, crush, or shear points.

3.04 CLEANING

A. Clean athletic field equipment of construction materials, dirt, stains, filings, and blemishes due to shipment or installation; clean in accordance with manufacturer's instructions, using cleaning agents as recommended by manufacturer.

B. Clean athletic field area of excess construction materials, debris, and waste.

C. Remove excess and waste material and dispose of off-site in accordance with requirements of authorities having jurisdiction.

END OF SECTION

SECTION 310519
GEOSYNTHETICS FOR EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Geotextile for filtration.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Product Data: Manufacturer's data on each product to be used, including physical properties, seaming materials, and installation instructions.

1.03 DELIVERY, STORAGE, AND HANDLING

A. See Section 016000 - Product Requirements for additional requirements.

B. Handle geosynthetics with care and prevent dragging, dropping, or imbalanced lifting.

PART 2 PRODUCTS

2.01 GEOSYNTHETIC

A. Provide geosynthetic in largest size sheets as possible to minimize field joining.

B. Uniform thickness according to ASTM D5199.

C. Resistant to mildew, chemicals in soil, stable under freeze-thaw cycles, will not shrink or expand under wet conditions, and will not unravel or become clogged during use.

D. Ultraviolet Stability: 65 percent, minimum, when tested in accordance with ASTM D4355/D4355M.

2.02 GEOTEXTILE

A. General: As indicated on the drawings
   1. AASHTO M 288.

B. Geotextile for Filtration: Capable of allowing liquid passage while restricting solids.
   1. Type: Needlepunched non-woven polypropylene fib
   2. Seams:
      a. Overlap: 3 inches (7.6 cm).
      b. Stitch: Flat; continuous; tied off at ends.
   3. Grab Strength: 120 pounds minimum, when tested in accordance with ASTM D4632/D4632M.
   4. CBR Puncture: 310 pounds, minimum,
   5. Permittivity: 0.5 per second, minimum, ASTM D4491/D4491M.
   6. Apparent Opening Size: _____ (_____ mm), maximum, when tested in accordance with ASTM D4751.
   7. Sewn Seam Strength: , minimum, when tested in accordance with ASTM D4632/D4632M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify the receiving surface is smooth, without ruts or protrusions, and grades are according to design drawings.

B. Verify the geosynthetic is free of defects or flaws that may degrade physical performance.

3.02 INSTALLATION

A. General:

1. Prevent surface drainage from eroding under geosynthetic. Repair undermined areas prior to backfill.
2. Position geosynthetic smooth and wrinkle free on prepared surface; unroll or unfold carefully, avoiding stretching.
3. Perform seaming in adequate lighting. Seam each geosynthetic member immediately after final placement. Clean sheets of dust, dirt, and other foreign matter prior to seaming.

B. Filtration:
1. Install geotextile according to manufacturer's recommendations.
2. Lay sheets in the direction of construction.
3. Repairs: Remove damaged portion of geotextile and seam an additional layer to cover the affected area in all directions. Replace geotextile where surface runoff contamination has occurred.

C. Protection:
1. Install geotextile according to manufacturer's recommendations.
2. Lay sheets in the direction of incline.
3. Repairs: Remove damaged portion of geotextile and seam an additional layer to cover the affected area in all directions.

3.03 BACKFILL

A. Obtain approval for geosynthetic sheet installation from Architect before placing fill.

B. Backfill in a manner to prevent damage to geosynthetic. Repair geosynthetic damaged during backfill operations.

C. Cover geosynthetic in the installed direction in accordance with Section 312323.
1. Cover geosynthetic within time limits specified by manufacturer.
2. Drive only on earth cover and use only rubber-tired or rubber-tracked vehicles.

3.04 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for additional requirements.

B. Provide manufacturer's field representative at all times during geosynthetic installation.

C. Inspect completed liner for pinholes, punctures, and tears; inspect seams and joints for unbonded areas. Repair any defects or damages found.

3.05 PROTECTION

A. Do not exceed geosynthetic manufacturer's recommended exposure to UV radiation.

B. Prevent surface water runoff from contaminating geosynthetic.

C. Do not use pins or staples where risk of damaging underlying geosynthetic layer is present.

D. Erect barricades to prevent traffic over geosynthetic before it is filled.

END OF SECTION

SECTION 311000
SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

PART 2 PRODUCTS -- NOT USED

PART 3 EXECUTION

3.01 SITE CLEARING

A. Comply with other requirements specified in Section 017000.

B. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

3.02 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

3.03 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not begin clearing until vegetation to be relocated has been removed.

C. Do not remove or damage vegetation beyond the limits indicated on drawings.

D. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.
   2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
   3. Around other vegetation to remain within vegetation removal limits.

E. In areas where vegetation must be removed but no construction will occur other than pervious paving, remove vegetation with minimum disturbance of the subsoil.

F. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Sell if marketable; if not, treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   3. Sod: Re-use on site if possible; otherwise sell if marketable, and if not, treat as specified for other vegetation removed.

G. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

H. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner or the Owners Represenative.

3.04 DEBRIS

A. Remove debris, junk, and trash from site.
B. Leave site in clean condition, ready for subsequent work.
C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 312200
GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Removal and storage of topsoil.

B. Rough grading the site for building pads, parking lots, and site improvements shown on the drawings..

C. Finish grading.

1.02 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

B. Provide finished surface elevations where grades vary from design requirments.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: See Section 312323.

B. Other Fill Materials: See Section 312323.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the Work are as indicated.

B. Verify the absence of standing or ponding water.

C. The existing ground elevations as shown on the Drawings are believed to be reasonably correct. The Contractor shall satisfy himself, by actual examination of the sites of the work, as to the existing elevations and the amount of work required under this section. No claim shall be made by the Contractor for additional compensation by the reason of the fact that conditions are other than as shown.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Stake and flag locations of known utilities.

C. Locate, identify, and protect from damage above- and below-grade utilities to remain.

D. Notify utility company to remove and relocate utilities as necessary.

E. Provide temporary means and methods to remove all standing or ponding water from areas prior to grading.

F. Protect site features to remain, including but not limited to bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs, from damage by grading equipment and vehicular traffic.

G. Protect trees to remain by providing substantial fencing around entire tree at the outer tips of its branches; no grading is to be performed inside this line.

H. Protect plants, lawns, rock outcroppings, and other features to remain as a portion of final landscaping.

3.03 ROUGH GRADING

A. Remove topsoil from areas to be further excavated, re-landscaped, or re-graded, without mixing with foreign materials.

B. Do not remove topsoil when wet.

C. Remove subsoil from areas to be further excavated, re-landscaped, or re-graded.

D. Do not remove wet subsoil , unless it is subsequently processed to obtain optimum moisture content.

E. When excavating through roots, perform work by hand and cut roots with sharp axe.

F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.

G. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack surface water control.

3.04 SOIL REMOVAL

A. Stockpile topsoil to be re-used on site; remove remainder from site.

B. Stockpile subsoil to be re-used on site; remove remainder from site.

C. Stockpiles: Use areas designated on site; pile depth not to exceed 10 feet; protect from erosion.

3.05 FINISH GRADING

A. Before Finish Grading:
   1. Verify building and trench backfilling have been inspected.
   2. Verify subgrade has been contoured and compacted.

B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove soil contaminated with petroleum products.

C. Where topsoil is to be placed, scarify surface to depth of 3 inches.

D. In areas where vehicles or equipment have compacted soil, scarify surface to depth of 6 inches.

E. Place topsoil in areas where seeding, sodding, and planting are indicated.

F. Unless otherwise indicated on the drawings place topsoil to the following compacted thicknesses:
   1. Areas to be Seeded with Grass: 6 inches.
   2. Areas to be Sodded: 4 inches.
   3. Shrub Beds: 18 inches.
   4. Flower Beds: 12 inches.
   5. Planter Boxes: To within 3 inches of box rim.

G. Place topsoil during dry weather.

H. Remove roots, weeds, rocks, and foreign material while spreading.

I. Near plants spread topsoil manually to prevent damage.

J. Fine grade topsoil to eliminate uneven areas and low spots. Maintain profiles and contour of subgrade.

K. Lightly compact placed topsoil.

L. Maintain stability of topsoil during inclement weather. Replace topsoil in areas where surface water has eroded thickness below specifications.

3.06 TOLERANCES

A. Top Surface of Subgrade: Plus or minus 0.10 foot (1-3/16 inches) from required elevation.

B. Top Surface of Finish Grade: Plus or minus 0.04 foot (1/2 inch).

3.07 REPAIR AND RESTORATION

A. Existing Facilities, Utilities, and Site Features to Remain: If damaged due to this work, repair or replace to original condition.

B. Other Existing Vegetation to Remain: If damaged due to this work, replace with vegetation of equivalent species and size.

3.08 FIELD QUALITY CONTROL

A. See Section 312323 for compaction density testing.

3.09 CLEANING

A. Remove unused stockpiled topsoil, subsoil, and excess cut material . Grade stockpile area to prevent standing water.

B. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 312316
EXCAVATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavating for building volume below grade, footings, pile caps, slabs-on-grade, paving, site structures, and utilities within the building.

B. Trenching for utilities outside the building to utility main connections.

C. Temporary excavation support and protection systems.

1.02 QUALITY ASSURANCE

A. Temporary Support and Excavation Protection Plan (if necessary)
   1. Indicate sheeting, shoring, and bracing materials and installation required to protect excavations and adjacent structures and property.
   2. Bracing and shoring design to meet requirements of OSHA's Excavation Standard, 29 CFR 1926, Subpart P.

B. Designer Qualifications: For design of temporary shoring and bracing, employ a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench mark and intended elevations for the work are as indicated.

B. Determine the prevailing groundwater level prior to excavation. If the proposed excavation extends less than 1 foot into the prevailing groundwater, control groundwater intrusion with perimeter drains routed to sump pumps, or as directed. If the proposed excavation extends more than 1 foot into the prevailing groundwater, control groundwater intrusion with a comprehensive dewatering procedures, or as directed.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum locations.

B. Locate, identify, and protect utilities that remain and protect from damage.

C. Protect bench marks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

D. Protect plants, lawns, rock outcroppings, and other features to remain.

E. Grade top perimeter of excavation to prevent surface water from draining into excavation. Provide temporary means and methods, as required, to maintain surface water diversion until no longer needed, or as directed by Architect.

3.03 TEMPORARY EXCAVATION SUPPORT AND PROTECTION

A. Excavation Safety: Comply with OSHA's Excavation Standard, 29 CFR 1926, Subpart P.

3.04 EXCAVATING

A. Excavate to accommodate new structures and construction operations.
   1. Excavate to the specified elevations.
   2. Excavate to the length and width required to safely install, adjust, and remove any forms, bracing, or supports necessary for the installation of the work.
   3. Cut utility trenches wide enough to allow inspection of installed utilities.

B. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include

rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

C. Do not interfere with 45 degree bearing splay of foundations.

D. Provide temporary means and methods, as required, to remove all water from excavations. See Section 312319. Remove and replace soils deemed suitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.05 SUBGRADE PREPARATION

A. See Section 312323 for subgrade preparation at general excavations.

3.06 FILLING AND BACKFILLING

A. Do not fill or backfill until all debris, water, unsatisfactory soil materials, obstructions, and deleterious materials have been removed from excavation.

3.07 CLEANING

A. Remove excavated material that is unsuitable for re-use from site.

3.08 PROTECTION

A. Divert surface flow from rains or water discharges from the excavation.

B. Prevent displacement of banks and keep loose soil from falling into excavation; maintain soil stability.

C. Protect open excavations from rainfall, runoff, freezing groundwater, or excessive drying so as to maintain foundation subgrade in satisfactory, undisturbed condition.

D. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

E. Keep excavations free of standing water and completely free of water during concrete placement.

END OF SECTION

SECTION 312323
FILL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Filling, backfilling, and compacting for slabs-on-grade, paving, and sidewalks.

B. Backfilling and compacting for utilities outside the building .

C. Filling holes, pits, and excavations generated as a result of removal (demolition) operations.

1.02 DEFINITIONS

A. Finish Grade Elevations: Indicated on drawings.

B. Subgrade Elevations: Indicated on drawings.

1.03 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Fill Composition Test Reports: Results of laboratory tests on proposed and actual materials used.
   1. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
      a. Classification according to ASTM D 2487.
      b. Laboratory compaction curve according to ASTM D 698
      c. Gradation table.

D. Compaction Density Test Reports.

E. Testing Agency Qualification Statement.

PART 2 PRODUCTS

2.01 FILL MATERIALS

A. General Fill - Fill Type Satisfactory Soils: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
   1. Free of lumps larger than 3 inches, rocks larger than 2 inches, and debris.
   2. Complying with ASTM D2487 Group Symbol GW, GP, GM, SW, SP, and SM .

B. Structural Fill - Fill Type Select Granular: Complying with State of New York Department of Transportation (Item 203.07 and Section 733-11) standard.

C. Granular Fill - Fill Type Bedding Stone: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand, washed stone; free of shale, clay, friable material and debris meeting NYSDOT 733-11 (203.07) with the following gradation:
   1. Graded in accordance with ASTM C136/C136M, within the following limits:
      a. 1 inch sieve: 100 percent passing.
      b. 1/4" sieve: 35 to 60 percent passing.
      c. No. 40: 10 to 25 percent passing.
      d. No. 200: 5 to 10 percent passing.

D. Granular Fill - Fill Type Drainage Course: NYS DOT Specification.
   1. Material shall meet the requirements of Item 605.0901, Type 1, or a 50-50 mixture of Type I and Type II (605.1001) as defined in the New York State Department of Transportation "Standard Specification".

E. Sand: Natural river or bank sand; free of silt, clay, loam, friable or soluble materials, and organic matter.
   1. Grade in accordance with ASTM D2487 Group Symbol SW.

F. Topsoil: Topsoil excavated on-site or imported in accordance wih Section 329219.
   1. Select.
   2. Graded.
   3. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds and foreign matter.
   4. Acidity range (pH) of 5.5 to 7.5.
   5. Containing a minimum of 4 percent and a maximum of 25 percent inorganic matter.
   6. Complying with ASTM D2487 Group Symbol OH.

2.02 SOURCE QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for testing and analysis of soil material.

B. Where fill materials are specified by reference to a specific standard, test and analyze samples for compliance before delivery to site.

C. If tests indicate materials do not meet specified requirements, change material and retest.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the Work are as indicated.

B. Identify required lines, levels, contours, and datum locations.

C. Verify areas to be filled are not compromised with surface or ground water.

3.02 PREPARATION

A. Scarify and proof roll subgrade surface to a depth of 6 inches to identify soft spots.

B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with general fill.

C. Compact subgrade to density equal to or greater than requirements for subsequent fill material.

D. Until ready to fill, maintain excavations and prevent loose soil from falling into excavation.

E. If Owner’s Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.

F. Authorized additional excavation and replacement material will be paid for per Contract provisions for unit prices / alloawances or changes in the Work as applicable.

G. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Owner’s Representative, without additional compensation.

3.03 FILLING

A. Fill to contours and elevations indicated using unfrozen materials.

B. Fill up to subgrade elevations unless otherwise indicated.

C. Employ a placement method that does not disturb or damage other work.

D. Systematically fill to allow maximum time for natural settlement. Do not fill over porous, wet, frozen or spongy subgrade surfaces.

E. Maintain optimum moisture content of fill materials to attain required compaction density.

F. Granular Fill: Place and compact materials in equal continuous layers not exceeding 6 inches compacted depth.

G. Soil Fill: Place and compact material in equal continuous layers not exceeding 8 inches compacted depth.

H. Slope grade away from building minimum 2 inches in 10 feet, unless noted otherwise. Make gradual grade changes. Blend slope into level areas.

I. Correct areas that are over-excavated.

1. Load-bearing foundation surfaces: Use structural fill, flush to required elevation, compacted to 100 percent of maximum dry density.
2. Other areas: Use general fill, flush to required elevation, compacted to minimum 97 percent of maximum dry density.

J. Compaction Density Unless Otherwise Specified or Indicated:

K. Reshape and re-compact fills subjected to vehicular traffic.

L. Maintain temporary means and methods, as required, to remove all water while fill is being placed as required, or until directed by the Architect. Remove and replace soils deemed unsuitable by classification and which are excessively moist due to lack of dewatering or surface water control.

3.04 FILL AT SPECIFIC LOCATIONS

A. Use general fill unless otherwise specified or indicated.

B. Structural Fill below slabs, pavements and at locations indicated on the drawings.:
1. Use structural fill NYS DOT 304.12.
2. Maximum depth per lift: 8 inches, compacted.
3. Compact to minimum 95 percent of maximum dry density.

C. Over Buried Utility Piping in Trenches:
1. Bedding: Use granular fill (Bedding Stone).
2. Cover with general fill use strutural fill below roadways and pavements.
3. Fill up to subgrade elevation.
4. Compact in maximum 8 inch lifts to 95 percent of maximum dry density 90 percnet in non traffic or lawn areas.

D. At Lawn Areas:
1. Use general fill.
2. Compact to 90 percent of maximum dry density.
3. See Section 312200 for topsoil placement.

E. At Planting Areas Other Than Lawns :
1. Use general fill.
2. Compact to 90 percent of maximum dry density.
3. See Section 312200 for topsoil placement.

F. At French Drains:
1. Use Drainage Fill .

G. Under Pavers Set on Sand Leveling Bed:
1. Use granular fill.
2. Fill up to bottom of sand leveling bed.
3. Compact to 95 percent of maximum dry density.
4. See unit pavers section for leveling bed placement.

3.05 TOLERANCES

A. Top Surface of General Filling: Plus or minus 1 inch from required elevations.

B. Top Surface of Filling Under Paved Areas: Plus or minus 1 inch from required elevations.

3.06 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for field inspection and testing.

B. Soil Fill Materials:
1. Perform compaction density testing on compacted fill in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

2. Evaluate results in relation to compaction curve determined by testing uncompacted material in accordance with ASTM D698 ("standard Proctor"), ASTM D1557 ("modified Proctor"), or AASHTO T 180.
3. If tests indicate work does not meet specified requirements, remove work, replace and retest.
4. Frequency of Tests:
5. Proof roll compacted fill at surfaces that will be under slabs-on-grade, pavers, and paving or gravel roads.
    a. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
    b. Completely proof-roll subgrade in one direction. Limit vehicle speed to 3 mph.
    c. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Owner's Representative. Place No. 3/No. 4 size stone to stabilize subgrades as directed by Engineer or onsite geotechnical engineer and approved by Owner's Representative. Replace excavated soil with compacted backfill or fill as directed

3.07 CLEANING

A. See Section 017419 - Construction Waste Management and Disposal, for additional requirements.

B. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

C. Leave borrow areas in a clean and neat condition. Grade to prevent standing surface water.

END OF SECTION

SECTION 312500
EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. New York State Standards and Specifications for Erosion and Sediment Control.

1.02 WORK OF THIS SECTION

A. Work covered in this section includes the control of erosion, siltation, and sedimentation pursuant to Section 402 of the Clean Water Act. All costs associated with the temporary or permanent erosion control measures shall be included in the Contractor's bid.

B. All Contractors and their subcontractors must agree to implement all applicable provisions of the Erosion Control Plans prior to commencement of any construction activity. The SWPPP is appended to this Specification or bound separatly as part of the contract documents.

1.03 QUALITY ASSURANCE

A. Contractor shall comply with the Erosion Control Plans prepared for the site. All workers responsible for site work activities shall be familiar with these Plans.

B. Contractor shall designate one individual responsible for implementing and maintaining site-wide erosion and sediment control measures who shall be thoroughly familiar with the types of materials being installed and the best methods for their installation. This individual shall conduct daily inspections of erosion and sediment control measures.

C. Clear only what is required for immediate construction activities. Disturbed areas of the site that will not be re-disturbed for 21 days or more must be stabilized by the 14th day following the last disturbance.

D. Upstream storm water runoff should be diverted away from disturbed areas. Contractor shall provide and maintain temporary erosion and sediment control measures, such as berms, dikes, slope drains, silt stops, and sedimentation basins, until permanent drainage facilities and erosion control features have been completed and are operative.

E. The limits of cleared areas shall be physically delineated to protect areas designated as undisturbed.

F. Take every reasonable precaution and do whatever is necessary to avoid erosion and to prevent silting of rivers, streams, impoundments, and drainage ditches, swales or any off-site water body.

G. Continue erosion control measures until the permanent measures have been sufficiently established and are capable of control ling erosion on their own.

H. The control of dust, erosion and sediment originating from construction operations is considered a critical responsibili ty of the Contractor. The Owner's Representative will be the final judge of the adequacy of the Contractor's dust, erosion and sedimentation control. The Owner's Representative may suspend work until adequate dust, erosion and sedimenta tion control is attained. The Contractor shall bear the costs of repair work and restoration of damaged items.

PART 1 PRODUCTS

2.01 MULCHING

A. Hay and straw mulches shall be air-dried mowings (<15% moisture content) of acceptable herbaceous growth reasonably free from swamp grass, weeds, twigs, debris, and other deleterious material, and free from rot, mold, primary noxious weed seeds, and rough or woody materials. Mulches containing mature seed of species which would volunteer and be

detrimental to the permanent seeding, or would result in overseeding, or would produce growth which is aesthetically unpleasing, are not permitted. Materials may be baled, however, loose or broken bales are not acceptable.

B. Temporary Type Mulch Nets: Lightweight, extruded photodegradable netting, with approximate openings of 1½“ x ¾”, with manufacturer recommended staples or anchoring method.

C. Wood fiber mulch with tackifier (Terra Tack). Apply wood fibers at the rate of 500 lbs./acre and tackifier at the rate of 40-45 gallons/acre.

D. Hardwood Stakes: Stakes shall be new hardwood, 1½” x 1½ “, minimum 3 feet long.

2.02 MATTING/BLANKETS

A. Jute Matting: Undyed and unbleached jute yarn woven into a uniform open, plain weave mesh, furnished in rolled strip, with 78 warp ends per yard width of cloth, 41 weft ends per linear yard, weighing approximately 0.9 pounds per square yard of fabric.

B. Erosion Control Blanket: Blanket shall be machine-produced 100% biodegradable consisting of a 70% agricultural straw / 30% coconut fiber blend having a functional longevity of 18 months. Blanket shall covered top and bottom sides with 100% biodegradable woven natural organic fiber netting, with an approximate mesh of 0.5 x 1 inch. Blanket mesh and netting shall be sewn together on 1.5-inch centers.

C. Staples: As specified by the manufacturer of the blanket/matting, constituting a complete system.

2.03 SEED AND SOD FOR EROSION CONTROL

A. For temporary seeding in spring, summer or early fall, seed the area with ryegrass, (annual or perennial) or approved equal at 30 lbs per acre. For temporary seeding in late fall or early winter, seed the area with Certified winter rye (cereal rye) or approved equal at 100 lbs per acre. Mulch area with hay or straw at 2 tons per acre. Mulch anchoring may be required where wind or areas of concentrated water are a concern.

B. For permanent seeding on slopes, provide a seed according to the following or as shown on the Contract Drawings

1. Erosion control areas are to be seeded at a rate of: 50 pounds per acre with a mix consisting of 70% Ernst Best Strip Mine Mix (ERNMX-101) and 30% Ernst Shaded Roadside Mix (ERNMX-140), as supplied by Ernst Conservation Seeds, or as approved by Owner.

2.04 SILT FENCES

A. Prefabricated silt fencing with UV-stabilized geotextile fabric, with hardwood or steel posts, mesh reinforced backing and appropriate fasteners. Fabric shall be 48” minimum width.

2.05 STABILIZED CONSTRUCTION ENTRANCE

A. Material shall be clean, sound, crushed stone of uniform quality.

B. Geotextile filter cloth (Mirafi 600X, or equal) designed for heavy-duty haul road use.

2.06 TEMPORARY STRUCTURAL MEASURES

A. Temporary structural measures for erosion control include, but are not limited to, earth dikes, temporary swales, perimeter swales, rip rap outlet protection, sediment traps, and sediment basins.

B. Each measure shall be designed in accordance with New York State Guidelines for Urban Erosion and Sediment Control, as well as New York State Standards and Specifications for Erosion and Sediment Control. Materials and construction measures shall be consistent with these measures.

PART 1 EXECUTION

3.01 HAY AND STRAW MULCHING

A. Install hay or straw mulch immediately after each area has been properly prepared. Place at a rate of 2 tons per acre (approximately 100 to 120 bales per acre). Mulching shall be applied to a uniform thickness of 2 to 3 inches (loose, uncompacted) by hand or broadcast. No clumping, matting, bale fragments, or excessive thickness shall be permitted. The intent is to allow 20% to 40% of the ground surface to be seen in a uniform coverage.

B. Place mulch on seeded areas within 24 hours after seeding.

C. Where winds may blow the mulch, or when ground slopes exceed 10%, or when otherwise required to maintain the mulch firmly in place. Apply temporary netting, chemical bonding, or other anchoring devices, or use mechanical crimping, punching or rolling, to anchor the mulch. Unless otherwise directed, remove netting or other acceptable anchoring system prior to the acceptance of the work.

3.02 MATTING/BLANKETS - GENERAL

A. Prepare surfaces of ditches and slopes to conform to the grades, contours and cross sections as shown on the Drawings and finish to a smooth and even condition with all debris, roots, stone, and lumps raked out and removed. Loosen the soil surface to permit bedding of the matting. Unless otherwise noted, seed prior to the placement of the matting.

B. Unroll matting parallel to the direction of flow of water and loosely drape, without folds or stretching, so that continuous ground contact is maintained.

C. The ditches and swales, and on slopes, each upslope and each downslope end of each piece of matting shall be placed in a 6" trench, stapled at 12" on center, backfilled, and tamped. Similarly, bury edges of matting along the edges of catch basins and other structures. Owner’s Representative may require that any other edge, exposed to more than normal flow of water, be buried in a similar fashion.

D. Tightly secure matting to the soil by staples driven approxi mately vertically into the ground, flush with the surface of the matting. In driving the staples, take care not to form depressions or bulges in the surface of the matting.

E. Decrease the specified spacing of staples when varying factors, such as the season of the year or the amount of water encountered or anticipated, requires additional anchoring.

3.03 SEED FOR EROSION CONTROL

A. Sow seed when soils are moderately dry and when wind does not exceed five miles per hour or as directed by the Owner’s Representative.

B. Areas that will be regraded or otherwise disturbed later during construction may be seeded as directed by the Owner’s Representative to obtain temporary control.

3.04 SILT FENCES

A. Provide silt fences, as required, for the temporary control of erosion and to stop silt and sediment from reaching surface waters, adjacent properties, or entering catch basins, or damaging the work.

B. Erect silt fences and bury bottom edge in accordance with the manufacturer's recommended installation instructions. Provide a sufficient length of fence to accommodate runoff without causing any flooding and to adequately store any silt, sediment, and debris reaching it. Place silt fences along contours so that low areas are minimized.

C. Maintain and leave silt fences in place until permanent erosion control measures have been established.

3.05 STABILIZED CONSTRUCTION ENTRANCES

A. Stabilized pads of aggregate underlain with filter cloth shall be constructed as shown on the Contract Drawings.

B. Geotextile fabric shall be placed over the entire area to be covered with aggregate prior to placing of the stone.

3.06 TEMPORARY STRUCTURAL MEASURES

A. Temporary structural measures shall be maintained throughout the duration of the contract or until the drainage area has been properly stabilized as approved by the Owner's Representative.

B. Temporary sediment traps must provide at least 3,600 cubic feet of storage for every acre of drainage area.

C. Sediment shall be removed and trap restored to its original dimensions when sediment has accumulated to 1/2 the design depth of the trap.

D. Removed sediment shall be properly disposed of.

E. Inspect all erosion control measures following each rainfall event exceeding ½ inch in a 24-hour period. Correct all damage immediately.

3.07 MAINTENANCE

A. If any staples become loosened or raised, or if any matting becomes loose, torn, or undermined, or if any temporary erosion and sediment control measures are disturbed, repair them immediately.

B. If the seed is washed out before germination, repair any damage, refertilize, and reseed.

C. Maintain mulched and matted areas, silt stops, and other temporary control measures until the permanent control measures are established and no further erosion is likely.

D. All sediment spilled, dropped, or washed onto the driveway or public right-of-way shall be removed immediately.

E. Maintain ditches and swales at all times so that they effec tively drain. Refill, reshape, and re-compact where ruts or erosion occurs.

F. Maintain areas temporarily seeded including repair of all damages, re-seeding, and refertilizing.

G. Take special precautions in the use of construction equipment to minimize erosion. Do not leave wheel tracks where erosion might begin. Prevent direct discharge from dewatering pumps and surface runoff from the construction sites to storm sewers, culverts, streams or ditches. Intercept and conduct surface runoff and discharge from dewatering pumps to silt ation ponds before discharging to natural drainage channels.

END OF SECTION

SECTION 321123
AGGREGATE BASE COURSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Materials Sources: Submit name of imported materials source.

C. Aggregate Composition Test Reports: Results of laboratory tests on proposed and actual materials used.

1.03 DELIVERY, STORAGE, AND HANDLING

A. When necessary, store materials on site in advance of need.

B. When aggregate materials need to be stored on site, locate where directed by Owner.

PART 2 PRODUCTS

2.01 MATERIALS

A. Coarse Aggregate as indicated on the drawings or Type 304.12: Coarse aggregate, complying with State of NY DOT standard. Recycled Concrete Product (RCP) or Recycled Asphalt Product (RAP) is not permitted under any athletic field or court installations.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that survey bench marks and intended elevations for the work are as indicated.

B. Verify substrate has been inspected, gradients and elevations are correct, and is dry.

3.02 PREPARATION

A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.

B. Do not place aggregate on soft, muddy, or frozen surfaces.

3.03 INSTALLATION

A. Spread aggregate over prepared substrate to a total compacted thickness as indicated on the Contract Drawings.

B. Place aggregate in maximum 4 inch layers and roller compact to specified density.

C. Level and contour surfaces to elevations and gradients indicated.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

3.04 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge.

B. Scheduled Compacted Thickness: Within 1/4 inch.

C. Variation From Design Elevation: Within 1/2 inch.

3.05 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements for general requirements for field inspection and testing.

B. Compaction density testing will be performed on compacted aggregate base course in accordance with ASTM D1556, ASTM D2167, or ASTM D6938.

C. Results will be evaluated in relation to compaction curve determined by testing uncompacted material in accordance with AASHTO T 180, ASTM D698 ("standard Proctor"), or ASTM D1557 ("modified Proctor").

D. If tests indicate work does not meet specified requirements, remove work, replace and retest.

3.06 CLEANING

A. Remove unused stockpiled materials, leave area in a clean and neat condition. Grade stockpile area to prevent standing surface water.

END OF SECTION

SECTION 321216
ASPHALT PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aggregate base course.

B. Hot-mix asphalt paving.

C. Hot-mix asphalt overlay

D. Double course bituminous concrete paving.

E. Surface sealer.

1.02 QUALITY ASSURANCE

A. Perform Work in accordance with NYS DOT Standards.

B. Mixing Plant: Complying with NYS DOT Standards.

C. Obtain materials from same source throughout.

1.03 FIELD CONDITIONS

A. Do not place asphalt when ambient air or base surface temperature is less than 40 degrees F, or surface is wet or frozen.

B. Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

C. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.

D. Asphalt Surface Course: Minimum surface temperature of 45 deg F at time of placement

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: ASTM D946.

B. Aggregate for Base Course: In accordance with State of New York Highways standards.

C. Aggregate for Binder Course: In accordance with State of New York Highways standards.

D. Aggregate for Wearing Course: In accordance with State of New York Highways standards.

E. Tack Coat: Meeting the requirements of NYSDOT cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application and appliaction rate.

F. Primer: In accordance with State of NY Highways standards.

2.02 ASPHALT PAVING MIXES AND MIX DESIGN

A. Hot-Mix Asphalt: Dense-graded, hot-laid, hot-mix asphalt plant mixes in compliance with the with NYSDOT specification mix requirements. If not otherwise called out on the drawings (plans), provide the following:

B. Provide mixes with a history of satisfactory performance in geographical area where the project is located.
   1. Top Course: NYSDOT 9.5 F2 HMA 80 Series. Recycled Asphalt Product is not permitted.
   2. Binder Course: NYSDOT 19 F9 HMA 80 Series
   3. Base Course: NYSDOT 37.5 F9 HMA 80 Series.
   4. Emulsified-Asphalt Slurry: ASTM D 3910, Type 2.

C. Base Course: 3.0 to 6 percent of asphalt cement by weight in mixture in accordance with AI MS-2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that compacted subgrade, granular base, and asphalt base/binder is dry and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

C. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
   1. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to 3 mph.
   2. Revise the minimum weight or type of vehicle in first subparagraph below if required.
   3. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than 15 tons.

D. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer , and replace with compacted backfill or fill as directed.

3.02 BASE COURSE

A. Place and compact base course.

3.03 PREPARATION - PRIMER

A. Apply primer in accordance with manufacturer's instructions.

B. If indicated on drawings , apply primer on aggregate base or subbase at uniform rate of 1/3 gal/sq yd.

C. Use clean sand to blot excess primer.

3.04 PREPARATION - TACK COAT

A. Apply tack coat in accordance with manufacturer's instructions.

B. Apply tack coat on all asphalt or concrete surfaces over subgrade surface at uniform rate of 0.05 to 0.10 gal /sq yd..

C. Apply tack coat on the contact surfaces between all HMA pavement lifts in accordance with the NYS DOT Standards prior to placing HMA mixture regardless of time period between lifts. The only exception to this is the surface of permeable base courses. Paving over a tack coat should not commence until the emulsion has broken (goes from brown to black) or is tacky when touched.

D. Apply tack coat to contact surfaces of curbs, gutters and and objects that are adjacent to pavement courses.

3.05 PLACING ASPHALT PAVEMENT - DOUBLE COURSE

A. Place asphalt binder course within 24 hours of applying primer or tack coat.

B. Place wearing course within 48 hours of placing and compacting binder course.

C. Compact pavement by rolling to specified density. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

D. Perform rolling with consecutive passes to achieve even and smooth finish, without roller marks. All longitudinal seams must be flush and in accordance with NYSDOT seam methodology.

3.06 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch measured with 10 foot straight edge. Court installation shall comply with ASBA court requirements.

B. Variation from True Elevation: Within 1/2 inch.

C. Variations exceeding ¼ inch will be appropriately corrected or the pavement be removed and replaced at no additional cost to the Owner. Including variations between asphalt and sidewalks, or any other fixed surface intended for foot of vehicle access.

3.07 FIELD QUALITY CONTROL

A. See Section 014000 - Quality Requirements, for general requirements for quality control.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549/D 3549M.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979/D 979M.

F. Replace and compact hot-mix asphalt where core tests were taken, if any.

G. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.

END OF SECTION

SECTION 321313
CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, integral curbs, parking areas, and roads.

PART 2 PRODUCTS

2.01 PAVING ASSEMBLIES

A. Comply with applicable requirements of ACI SPEC-301.

2.02 FORM MATERIALS

A. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
   1. Use flexible or uniformly curved forms for curves with a radius of 100 feet or less.[**Do not use notched and bent forms.**]

B. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

2.03 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi) yield strength; deformed billet steel bars; unfinished.

B. Steel Welded Wire Reinforcement: Plain type, ASTM A1064/A1064M; in flat sheets; unfinished.

C. Dowels: ASTM A615/A615M, Grade 40 - 40,000 psi yield strength; deformed billet steel bars; unfinished finish.

2.04 CONCRETE MATERIALS

A. Concrete Materials: Provide in accordance with State of New York State Department of Transporation standards.

B. Fiber Reinforcement: Synthetic fibers shown to have long-term resistance to deterioration when in contact with alkalis and moisture; 1/2"to 3/4 " inch length.

2.05 ACCESSORIES

A. Curing Compound: ASTM C309, Type 1, Class A.

B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.
   1. Material: ASTM D1751, cellulose fiber.

C. Joint Sealants: Use Sikaflex Self Leveling Sealant or approved equivalent.

2.06 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations.

B. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301.
   1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

C. Admixtures: Add acceptable admixtures as recommended in ACI PRC-211.1 and at rates recommended by manufacturer.

D. Fiber Reinforcement: Add to mix at rate of 1.5 pounds per cubic yard, or as recommended by manufacturer for specific project conditions.

E. Concrete Properties:
   1. Compressive strength, when tested in accordance with ASTM C39/C39M at 28 days; as indicated on the drawings or 5000 psi.
      a. Fly Ash Content: 15 to 20 percent of cementitious materials by weight.
      b. Calcined Pozzolan Content: Maximum 10 percent of cementitious materials by weight.
      c. Silica Fume Content: Maximum 5 percent of cementitious materials by weight.
      d. Cement Content: Minimum 650 pounds per cubic yard.
      e. Water-Cement Ratio: Maximum 40 percent by weight.
      f. Total Air Content: 6 percent (+/- one percent) determined in accordance with ASTM C173/C173M.
      g. Maximum Slump: 3 1/2 inches (+/- one inch.)

2.07 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support paving and imposed loads.

B. Verify gradients and elevations of base are correct.

3.02 SUBBASE

A. See Section 321123 for construction of base course for work of this Section.

3.03 PREPARATION

A. Moisten base to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole frames with oil to prevent bond with concrete pavement.

3.04 FORMING

A. Place and secure forms to correct location, dimension, profile, and gradient.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.05 REINFORCEMENT

A. Place reinforcement as indicated.

B. Interrupt reinforcement at contraction joints.

C. Place dowels to achieve pavement and curb alignment as detailed.

3.06 COLD AND HOT WEATHER CONCRETING

A. Follow recommendations of ACI PRC-305 when concreting during hot weather.

B. Follow recommendations of ACI PRC-306 when concreting during cold weather.

C. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

3.07 PLACING CONCRETE

A. Coordinate installation of snow melting components.

B. Place concrete in accordance with ACI PRC-304.

C. Ensure reinforcement, inserts, embedded parts, formed joints are not disturbed during concrete placement.

D. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

E. Apply surface retarder to all exposed surfaces in accordance with manufacturer's instructions.

3.08 JOINTS

A. Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.; Align curb, gutter, and sidewalk joints. Joint type and spacing as indicated on the drawings. Maximum spacing shall be 30 times the thickness of the slab.

B. Place 3/8 inch wide expansion joints at fiked objects and to separate paving from vertical surfaces and other components and in pattern indicated.
   1. Form joints with joint filler extending from bottom of pavement to within 1/2 inch of finished surface.
   2. Secure to resist movement by wet concrete.

C. Saw cut contraction joints 3/16 inch wide at an optimum time after finishing. Cut 1/3 into depth of slab.

3.09 FINISHING

A. Area Paving: Light broom, texture perpendicular to pavement direction.

B. Sidewalk Paving: Light broom, texture perpendicular to direction of travel with troweled and radiused edge 1/4 inch radius.

C. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.10 TOLERANCES

A. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

B. Maximum Variation From True Position: 1/4 inch.

3.11 FIELD QUALITY CONTROL

A. An independent testing agency will perform field quality control tests, as specified in Section 014000 - Quality Requirements.
   1. Provide free access to concrete operations at project site and cooperate with appointed firm.

B. Compressive Strength Tests: ASTM C39/C39M; for each test, mold and cure three concrete test cylinders. Obtain test samples for every 100 cu yd or less of each class of concrete placed.
   1. Take one additional test cylinder during cold weather concreting, cured on job site under same conditions as concrete it represents.

3.12 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, and mechanical injury.

B. Do not permit pedestrian traffic over pavement for 7 days minimum after finishing.

END OF SECTION

SECTION 323113
CHAIN LINK FENCE AND GATES

SUMMARY

1.01 SECTION INCLUDES:

A. Chain-link fences.

B. Swing gates.

C. Horizontal-slide gates.

1.02 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:

C. Fence and gate posts, rails, and fittings.

D. Chain-link fabric, reinforcements, and attachments.

E. Gates and hardware.

F. Shop Drawings: For each type of fence and gate assembly.

G. Include plans, elevations, sections, details, and attachments to other work.

H. Include accessories, hardware, gate operation, and operational clearances.

I. Samples for Initial Selection: For each type of factory-applied finish.

1.04 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.05 WARRANTY

A. Installer agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.

B. Failures include, but are not limited to, the following:

C. Failure to comply with performance requirements.

D. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

E. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 CHAIN-LINK FENCE FABRIC

A. General: Match Existing Fence or Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist according to "CLFMI Product Manual" and requirements indicated below:

B. Fabric Height: As indicated on Drawings.

C. Fabric Gage: As indicated on Contract Drawings. 9-gage if not indicated.

D. Mesh Size: 2 inches. 1.75 inches for tennis court applications as required.

E. Fabric Heights 8-foot or greater. Zinc-Coated Fabric: ASTM A 392, Type II, with zinc coating applied before weaving.

F. Fabric Heights 6-foot or less. Polymer-Coated Fabric: ASTM F 668, Class 2A, fusion-bonded and adhered to 9 gage steel wire, applied before weaving. Color shall be Black.

G. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.

H. Selvage: Knuckled at both selvages.

2.02 FENCE FRAMEWORK

A. Posts and Rails: ASTM F 1043 for framework, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 based on the following:

B. Fence Height: As indicated on Drawings.

C. Industrial-Strength Material: Group IC, Standard Weight, Schedule 40, round steel pipe, electric-resistance-welded pipe, 50,000 PSI minimum yield strength.

D. Line Post: As indicated on Contract Drawings.

E. End, Corner, and Pull Posts: As indicated on Contract Drawings.

F. Horizontal Framework Members: Intermediate top and bottom rails according to ASTM F 1043.

G. Top / Bottom Rail: 1.66 inches in diameter.

H. Brace Rails: ASTM F 1043.

I. Metallic Coating for Steel Framework 6->

J. Type A: Not less than minimum 2.0-oz./sq. ft. average zinc coating according to ASTM A 123/A 123M or 4.0-oz./sq. ft. zinc coating according to ASTM A 653/A 653M.

K. Polymer coating matching fabric over metallic coating for framework less than less than 6-foot. Color shall be Black.

2.03 SWING GATES

A. General: ASTM F 900 for gate posts and single and double swing gate types, as indicated on the Contract Drawings.

B. Gate Leaf Width: As indicated and shall be clear opening width.

C. Pipe and Tubing:

D. Zinc-Coated Steel: ASTM F 1043 and ASTM F 1083; manufacturer's standard protective coating and finish.

E. Gate Posts: Round tubular steel.

F. Gate Frames and Bracing: Round tubular steel.

G. Frame Corner Construction: Welded.
   1. Hardware:
      a. Hinge: Commercial grade - 360-degree inward and outward swing.
      b. Latch: Permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate. Coordinate hasp size with Owner locks.

2.04 FITTINGS

A. Provide fittings according to ASTM F 626.

B. Post Caps: Provide for each post.
   1. Provide line post caps with loop to receive tension wire or top rail.

C. Rail and Brace Ends: For each gate, corner, pull, and end post.

D. Rail Fittings: Provide the following:
   1. Top Rail Sleeves: Pressed-steel or round-steel tubing not less than 6 inches long.

2. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom rails to posts.

E. Tension and Brace Bands: Pressed steel.

F. Tension Bars: Steel, length not less than 2 inches shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.

G. Truss Rod Assemblies: Steel, hot-dip galvanized after threading rod and turnbuckle or other means of adjustment.

H. Tie Wires, Clips, and Fasteners: According to ASTM F 626.

I. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, according to the following:

J. Hot-Dip Galvanized Steel: 0.148-inch-diameter wire.

K. Aluminum: ASTM B 211; Alloy 1350-H19; 0.148-inch-diameter, mill-finished wire.

2.05 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout, recommended in writing by manufacturer, for exterior applications.

B. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating, and that is recommended in writing by manufacturer for exterior applications.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
1. Do not begin installation before final grading is completed unless otherwise permitted by Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of 500 feet or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

3.03 CHAIN-LINK FENCE INSTALLATION

A. Install chain-link fencing according to ASTM F 567 and more stringent requirements specified.
1. Install fencing on established boundary lines inside property line.

B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.

C. Post Setting: Set posts in concrete at indicated spacing into firm, undisturbed soil.
1. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
2. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
3. Exposed Concrete: Extend 2 inches above grade; shape and smooth to shed water.
4. Concealed Concrete: Place top of concrete below grade as indicated on Drawings to allow covering with surface material.

5. Posts Set into Sleeves in Concrete: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.
6. Posts Set into Holes in Concrete: Form or core drill holes not less than 5 inches deep and 3/4 inch larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed according to anchoring material manufacturer's written instructions. Finish anchorage joint to slope away from post to drain water.

D. Terminal Posts: Install terminal end, corner, and gate posts according to ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of as indicated on Drawings. For runs exceeding 500 feet, space pull posts an equal distance between corner or end posts.

E. Line Posts: Space line posts uniformly at as indicated on the contract documents, with a maximum post spacing of 10 feet for fence heights of six feet or less.

F. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
   1. Locate horizontal braces at mid-height of fabric 72 inches or higher, on fences with top rail, and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.

G. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fence posts. Run rail continuously through line post caps, bending to r]adius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.

H. Intermediate and Bottom Rails: Secure to posts with fittings.

I. Chain-Link Fabric: Apply fabric to outside of enclosing frame work or facing athletic field / court areas. Leave 1-inch bottom clearance between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails]], and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.

J. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts, with tension bands spaced not more than 15 inches o.c.

K. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of] 180 degrees, and attach other end to chain-link fabric according to ASTM F 626.]Bend ends of wire to minimize hazard to individuals and clothing.

L. Maximum Spacing: Tie fabric to line posts at 12 inches o.c. and to braces at 24 inches o.c.

M. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side.

3.04 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

3.05 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without

forcing or binding and are compatible with Owner locks.

END OF SECTION 323113

END OF SECTION

SECTION 323114
TENNIS COURT SURFACING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

A. Tennis Court surface preparation

B. Tennis Court surfacing approved by USTA and ASBA standards.

C. Layout and paint court lines

1.02 SUBMITTALS

A. Court resurfacing material data sheets / certifications..

B. Court layout, striping plan and color selections. Colors to verified bythe Owner's Representative.

C. Written acceptance from court surfacing supplier that asphalt surface is acceptable for coating.

1.03 SITE VISITATION

A. A visitation to the proposed site is recommended prior to bid. No allowances will be made after the award of contract for any problems encountered which would have been discovered during the pre-bid visitation.

PART 2 PRODUCTS

2.01 COURT SURFACING

A. Provide surfacing with an International Tennis Federation accreditation, with a two-year warranty. All components shall be from a single manufacturer.

B. Binder and Patch – 100% Acrylic emulsion specifically designed for mixing with silica sand and portland cement to patch cracks, level low spots and smooth paving joints and other surface irregularities.

C. Acrylic Resurfacer - 100% Acrylic primer / base coat designed to bond to new asphalt before the color coats are installed. 60-80 mesh silica sand. Resurfacer shall be asbestos-, mercury- and lead free.

D. Acrylic Filler - 100% emulsion, fully pigmented.

2.02 CRACK FILLER (AS NECESSARY)

A. Two component thixotropic polyurethane filler.

2.03 ACRYLIC COLORCOAT FINISH

A. 100% acrylic emulsion, pigments applied over the acrylic resurfacer with a texture coat containing 100% silica sand (70-100 mesh) and finish coat (no sand).

2.04 ACRYLIC COURT LINE PAINT

A. 100% acrylic emulsion white line for tennis lines, yellow for pickleball. Verify final color selection with Owner.

PART 3 EXECUTION

3.01 INSTALLATION

A. Surface Preparation: Remove all loose materials such as dirt, oil, grease, leaves and other debris. Pressure wash entire court area with high pressure, heated wash system immedaitely prior to court surfacing.

B. New asphalt court pavement shall cure for a minimum of 30 days prior to surfacing application.

C. Flood court with fresh water and correct all "bird baths" greater than 1/16 inch or other imperfections in asphalt prior to any surfacing application. Obtain Owner's Representative

approval of asphalt surfacing prior to any surfacing application.

D. Do not apply tennis court surfacing system within 24 hours of a rain event or when air temperature is not within manufacturer's recommendation.

E. Thoroughly clean any cracks with air. Fill all cracks to refusal with acrylic crack fill material and binder compatible with surfacing system.

3.02 ACRYLIC RESURFACING

A. The application shall be in accordance with manufacturer recommendations. A minimum of two coats are needed. No squeegee or tool marks shall be permitted.

3.03 ACRYLIC COLOR COATING SURFACE

A. The application shall be in accordance with manufacturer recommendations. Two coats are necessary, pulled at 90 degrees, with final coat parallel to nets.

3.04 ACRYLIC COURT LINE PAINT

A. Allow surface to cure a minimum of 24 hours prior to painting lines. Line markings shall be in accordance with the USTA specifications. Mask all lines. Apply two coats per manufacturer recommendations. Line "bleed" or overspray will not be permitted.

3.05 CLEANING

A. Clean all surfaces according to manufacturer's recommendations. Remove all overspray areas.

B. Remove all packaging and construction debris from site.

END OF SECTION

SECTION 329219
SEEDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Placing topsoil.

B. Hydroseeding,mulching and fertilizer.

C. Maintenance.

1.02 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable. Deliver seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

PART 2 PRODUCTS

2.01 SEED MIXTURE

A. Seed Mixture:
   1. Kentucky Blue Grass: 15 percent.
   2. Creeping Red Fescue Grass: 15 percent.
   3. Perennial Rye: 70 percent.

2.02 SOIL MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4 and maximum 7.0.

2.03 ACCESSORIES

A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.

B. Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen,; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, as indicated by analysis. Fertilizer shall be selected and applied in accordance with all local and New York State laws. Fertilizer shall be phosphorus free unless soil tests indicate phosporus levels are insufficient. Fertilizer shall not be applied between December 1 and April 1.

C. Water: Clean, fresh and free of substances or matter that could inhibit vigorous growth of grass.

D. Erosion Fabric: Jute matting, open weave to be installed on all slopes greater than 1V:4H.

E. Stakes: Softwood lumber, chisel pointed.

F. String: Inorganic fiber.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared soil base is ready to receive the work of this Section.

3.02 PREPARATION

A. Place topsoil in accordance with Section 312200.

3.03 FERTILIZING

A. Apply fertilizer in accordance with manufacturer's instructions nad all local laws.

B. Apply after smooth raking of topsoil and prior to roller compaction.

C. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.04 SEEDING

A. Apply seed at a rate of 7 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.

B. Do not seed areas in excess of that which can be mulched on same day.

C. Do not sow immediately following rain, when ground is too dry, or during windy periods.

D. Immediately following seeding and compacting, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

E. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

F. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.05 HYDROSEEDING

A. Apply seeded slurry with a hydraulic seeder at a rate of 1500-lb/acre dry weight evenly in two intersecting directions.

B. Do not hydroseed area in excess of that which can be mulched on same day.

C. Immediately following seeding, apply mulch to a thickness of 1/8 inches. Maintain clear of shrubs and trees.

D. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

E. Following germination, immediately re-seed areas without germinated seeds that are larger than 4 by 4 inches.

3.06 MAINTENANCE

A. Provide maintenance at no extra cost to Owner.

B. See Section 017000 - Execution Requirements, for additional requirements relating to maintenance service.

C. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

D. Neatly trim edges and hand clip where necessary.

E. Immediately remove clippings after mowing and trimming.

F. Water to prevent grass and soil from drying out. Owner to provide water and costs.

G. Roll surface to remove minor depressions or irregularities.

H. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.

I. Immediately reseed areas that show bare spots.

J. Protect seeded areas with warning signs during maintenance period.

K. Grass establishment will only be accepted after a healthy, weed-free stand of grass with no bare spots greater than 2 square feet is achieved.

END OF SECTION

SECTION 334100
SUBDRAINAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Building Perimeter, Retaining Wall, and Under-Slab Drainage Systems.

B. Pavement underdrain systems.

1.02 SUBMITTALS

A. See Section 013000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe drainage products, pipe accessories, and fittings.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Comply with applicable code for materials and installation of the work of this section.

2.02 PIPE MATERIALS

A. Polyvinyl Chloride Pipe: ASTM D2729; plain end, 6 inch inside diameter; with required fittings.

B. Corrugated Plastic Pipe: Flexible type; 4 inch diameter, unless other shown on the drawings with required fittings.

C. Use perforated pipe at subdrainage system; unperforated through sleeved walls.

2.03 AGGREGATE AND BEDDING

A. Filter Aggregate and Bedding Material: Granular fill as specified in Section 312323.

B. Filter Sand and Bedding Material: Sand as specified in Section 312323.

2.04 ACCESSORIES

A. Pipe Couplings: Solid plastic.

B. Filter Fabric: Water pervious type, black polyolefin.As indicted on te drawings.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that trench cut is ready to receive work and excavations, dimensions, and elevations are as indicated on layout drawings.

3.02 PREPARATION

A. Hand trim excavations to required elevations. Correct over-excavation with General Fill.

B. Remove large stones or other hard matter that could damage drainage piping or impede consistent backfilling or compaction.

3.03 INSTALLATION

A. Install and join pipe and pipe fittings in accordance with pipe manufacturer's instructions.

B. Place drainage pipe on clean cut subsoil.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Loosely butt pipe ends. Place joint cover strip 12 inches wide, around pipe diameter centered over joint.

E. Install filter aggregate at sides, over joint covers and top of pipe. Provide top cover compacted thickness of 12 inches.

F. Place filter fabric over levelled top surface of aggregate cover prior to subsequent backfilling operations.

G. Place aggregate in maximum 4 inch lifts, consolidating each lift.

3.04 FIELD QUALITY CONTROL

A. Section 014000 - Quality Requirements: Field inspection and testing.

3.05 PROTECTION

A. Protect pipe and aggregate cover from damage or displacement until backfilling operation begins.

END OF SECTION