

# Project Manual

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## UNLV Track Resurfacing Sheila Tarr Track



UNLV

Construction Documents

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## SECTION 02 41 00 - SITE DEMOLITION

### PART 1 GENERAL

#### 1.01 SUMMARY

- A. Section Includes: Site demolition. Protection of existing and removal of indicated items, including, but not limited to:
  - 1. Removal of temporary partitions, fencing, and protections.
  - 2. Identification of utilities.
  - 3. Capping and removal of designated utilities.
  - 4. Pay for the legal and environmentally safe offsite disposal or recycling of construction debris.
  - 5. Removal of asphalt and concrete paving.
  - 6. Removal of concrete curb work.
  - 7. Removal of natural and man-made landscape materials.
- B. Related Sections:
  - 1. Individual Specification Sections
- C. Hazardous Materials: The Owner has an established hazardous materials abatement program. Should hazardous materials be encountered during the course of demolition, immediately notify the Owner and comply with Owner's direction

#### 1.02 QUALITY ASSURANCE

- A. Regulatory Requirements, Codes, and Standard:
  - 1. Conform to applicable federal, state, and local codes for demolition work, safety of structure, dust control, and debris removal.
  - 2. Obtain required permits from authorities.
  - 3. ANSI A10.6 – Safety Requirements for Demolition.
  - 4. Requirements of affected utility companies.
- B. Structural Integrity: Maintain structural integrity to existing facilities and Buildings Designated to Remain (BDTR) at all times.

#### 1.03 SUBMITTAL

- A. Schedule: Submit sequence of demolition operations to Owner for review prior to start of work to prevent interruption of Owner's onsite business operations.
  - 1. Coordinate shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
  - 2. Coordinate with Owner's continuing occupation of BDTR.
- B. Shop Drawings: Indicate location and construction of temporary work.
- C. Project Record Documentation: Accurately record and submit actual locations of capped utilities, subsurface obstructions, and related details.

#### 1.04 PROJECT CONDITIONS

- A. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
- B. Protections: Provide temporary barriers to protect Owner's personnel, the residents, and public from injury from work.
  - 1. Take required protective measures to provide free and safe passage to BDTR.
  - 2. Provide shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
  - 3. Remove protections at completion of work.
- C. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- D. Explosives: Explosives are not permitted at the site.
- E. Flame Cutting: Do not use cutting torches for removal until flammable materials are removed. At concealed spaces, verify conditions prior to flame cutting operations. Maintain portable fire suppression devices during flame cutting operations.
- H. Utility Services: Maintain utilities to buildings designated to remain and protect against damage during demolition operations. Do not interrupt utilities serving buildings to remain, except when such utilities have been relocated and when authorized in writing by authorities having jurisdiction. All utilities to be relocated or removed by others should be notified at least 72 hours before demolition begins.
  - 1. Cable television lines to be relocated, trimmed and/or removed by Cox Communications personnel.
  - 2. Electric conduits, vaults, meters and associated appurtenances to be removed or relocated by Nevada Power personnel.
  - 3. Natural gas conduits, meters, valves and associated appurtenances to be removed or relocated by Southwest Gas personnel.
  - 4. Telephone lines to be relocated, trimmed and/or removed by CenturyLink Communications personnel.
- F. Environmental Controls: Use water sprinkling, temporary enclosures, or other acceptable methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
  - 1. Do not use water when it may create hazardous or objectionable conditions.

#### PART 2 PRODUCTS

Not used.

#### PART 3 EXECUTION

##### 3.01 PREPARATION

- A. Provide shoring, bracing, or support to prevent movement, settlement, or collapse.
- B. Locate, identify, stub off, and disconnect utility services indicated to remain.

##### 3.02 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference..

- B. Provide services for effective air and water pollution controls required by local authorities having jurisdiction.
- C. Exercise extreme care to salvage those items indicated to be reused. Stockpile and protect in an appropriate locations.

### 3.03 DEMOLITION

- A. Perform demolition activities in a systematic manner.
- B. Demolish concrete and asphalt in small sections. Cut concrete at junctures with construction to remain using power driven masonry saw or hand tools; do not use power driven impact tools.
- C. Demolish and remove foundation walls including footings. Demolish and remove below grade wood or metal construction. Break up and remove below grade concrete slabs.
- D. If unanticipated mechanical, electrical, or structural elements conflicting with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Owner in written, accurate detail. Pending receipt of directive from Owner's Representative, rearrange demolition schedule as necessary to continue overall job progress without undue delay.

### 3.04 REMOVAL OF STRUCTURES

- A. Pneumatic Operated Hammers: When possible, reduce use of pneumatic operated hammers.

### 3.05 SALVAGED MATERIALS

- A. Recycling of Materials: Wherever possible, salvage materials for recycling or post construction use. Return selected materials to Owner, including but not limited to parking lot light poles and signs.

### 3.06 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from site, debris, rubbish, and other materials resulting from operations. Transport and legally dispose off site.
  - 1. Burning of removed materials is not permitted on project site.
  - 2. Where possible, made use of recycling services and centers for demolished materials.

### 3.07 SITE DEMOLITION

- A. Remove curb work, asphalt and concrete paving noted to be demolished.

### 3.08 CLEANUP AND REPAIR

- A. Upon completion of work, remove tools, equipment, and demolished materials from site.
  - 1. Repair demolition performed in excess of required at no expense to Owner. Return construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by work.
- B. Do not allow rubbish and debris to accumulate. On a daily basis clean and sweep building areas, roads, streets, drives, parking lots, sidewalks, adjoining properties, and areas affected by demolition operation.
- C. Remove temporary protections and barriers.

END OF SECTION 02 41 00

## SECTION 03 11 00 - CONCRETE FORMWORK

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Formwork for cast-in place concrete, with shoring, bracing and anchorage.
- B. Openings for other work.
- C. Form accessories.
- D. Form stripping.

#### 1.2 PRODUCTS INSTALLED BUT NOT FURNISHED UNDER THIS SECTION

- A. Section 03 30 00 - Concrete: Supply of concrete accessories for placement by this Section.

#### 1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 03 20 00 - Concrete Reinforcement.

#### 1.4 REFERENCES

- A. ACI 347 - Recommended Practice For Concrete Formwork.
- B. ACI 301 - Structural Concrete for Buildings.

#### 1.5 DESIGN REQUIREMENTS

- A. Design, engineer and construct formwork, shoring and bracing to conform to code requirements; resultant concrete to conform to required shape, line and dimension.

#### 1.6 SUBMITTALS

- B. Shop Drawings: Indicate pertinent dimension, materials and installation requirements.
- C. Product Data: Provide data on void form materials and installation requirements.

#### 1.7 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 347.

#### 1.8 QUALIFICATIONS

- A. Design all vertical cast-in-place formwork (if applicable) under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State of Nevada.

#### 1.9 REGULATORY REQUIREMENTS

- A. Conform to applicable local code for design, fabrication, erection and removal of formwork.

## 1.10 DELIVERY, STORAGE, AND HANDLING

- B. Store off ground in ventilated and protected manner to prevent deterioration from moisture.

## 1.11 COORDINATION

- B. Coordinate this Section with other Sections of work which require attachment of components to formwork.
- C. If formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement, request instructions from Architect/Engineer before proceeding.

## PART 2 PRODUCTS

### 2.1 WOOD FORM MATERIALS

- A. Plywood: Douglas Fir or Spruce species.
- B. Lumber: Douglas Fir species; S & B grade; with grade stamp clearly visible.

### 2.2 PREFABRICATED FORMS

- A. Preformed Steel Forms: Minimum 16 gage matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished surfaces.
- B. Glass Fiber Fabric Reinforced Plastic Forms: Matched, tight fitting, stiffened to support weight of concrete without deflection detrimental to tolerances and appearance of finished concrete surfaces.
- C. Tubular Column Type: Round spirally wound laminated fiber material, surface treated with release agent, of sizes indicated.

### 2.3 FORMWORK ACCESSORIES

- A. Form Ties: Snap-off type, galvanized metal, fixed length, 1 inch back break dimension, free of defects that could leave holes larger than 1/4 inch in concrete surface.
- B. Form Release Agent: Colorless mineral oil which will not stain concrete, or absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.
- C. Corners: Chamfered, wood strip type.
- D. Nails, Spikes, Lag Bolts, Through Bolts, and Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with Drawings.
- B. Notify architect of discrepancies immediately.

### 3.2 EARTH FORMS

- A. Hand trim sides and bottom of earth forms for footings. Remove loose soil prior to placing concrete.

### 3.3 ERECTION – FORMWORK

- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval before framing openings in structural members which are not indicated on Drawings.
- F. Provide chamfer strips on external corners of beams, columns, etc.

### 3.4 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations. Apply retarder in accordance with manufacturer's instructions.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings which are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

### 3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Provide formed openings where required for items to be embedded in or passing through concrete work.
- B. Locate and set in place items which will be cast directly into concrete.
- C. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors, and other inserts.
- D. Install accessories in accordance with manufacturer's instructions, straight, level, and plumb. Ensure items are not disturbed during concrete placement.
- E. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.
- F. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

### 3.6 FORM CLEANING

- A. Clean and remove foreign matter within forms as erection proceeds.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.



- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts or water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### 3.7 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 301.

### 3.8 FIELD QUALITY CONTROL

- A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and that supports, fastenings, wedges, ties, and items are secure.
- B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

### 3.9 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.

END OF SECTION 03 11 00

## SECTION 03 20 00 - CONCRETE REINFORCEMENT

### PART 1 GENERAL

#### 1.1 SECTION INCLUDES

- A. Reinforcing steel bars, wire fabric and accessories for cast-in-place concrete.

#### 1.2 RELATED SECTIONS

- A. Section 03 30 00 - Concrete.
- B. Section 03 11 00 - Concrete Formwork.

#### 1.3 REFERENCES

- A. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- B. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- C. CRSI - Concrete Reinforcing Steel Institute Manual of Practice.
- D. CRSI 63 - Recommended Practice For Placing Reinforcing Bars.
- E. CRSI 65 - Recommended Practice For Placing Bar Supports, Specifications and Nomenclature.

#### 1.4 SUBMITTALS

- A. Submit under provisions of the contract.
- B. Shop Drawings: Indicate bar sizes, spacing, locations, and quantities of reinforcing steel and wire fabric, bending and cutting schedules, and supporting and spacing devices, for information only. Drawings will not be returned to contractor.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with CRSI 63, 65 and Manual of Practice.
- B. Submit certified copies of mill test report of reinforcement materials analysis.

#### 1.6 COORDINATION

- A. Coordinate with placement of formwork, formed openings and other Work.

## PART 2 PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615, 60 yield grade; plain deformed billet steel bars, plain finish.
- B. Weld-able reinforcing steel conforming to ASTM A706 (Grade 60)
- C. Stirrup Steel: ASTM A82, plain finish.
- D. Welded Steel Wire Fabric: ASTM A185 Plain Type in flat sheets; plain finish.

### 2.2 ACCESSORY MATERIALS

- A. Tie Wire: Minimum 16 gage annealed type.
- B. Chairs, Bolsters, Bar Supports, and Spacer's: Sized and shaped for strength and support of reinforcement during concrete placement conditions.

### 2.3 FABRICATION

- A. Fabricate concrete reinforcing in accordance with CRSI Manual of Practice.
- B. Locate reinforcing splices not indicated on Drawings, at point of minimum stress.

## PART 3 EXECUTION

### 3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- B. Do not displace or damage vapor barrier.
- C. Accommodate placement of formed openings.

### 3.2 FIELD QUALITY CONTROL

- A. Field inspection will be performed under provisions of Contract.

END OF SECTION 03 20 00

## SECTION 03 24 00 - FIBROUS REINFORCING FOR CONCRETE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. This section specifies synthetic fiber reinforcement used as an admixture in concrete. Fibers shall serve as secondary reinforcement for concrete, and to protect concrete from stresses which cause cracking initially after placement.

#### 1.02 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete

#### 1.03 SUBMITTALS FOR REVIEW

- A. Submit under provisions of the contract.
- B. Product Data: Submit manufacturer's product data, installation instructions, use limitations and recommendations for each material.
- C. Test and Performance Data: Submit independent test data substantiating compliance with ASTM C 1116 as specified.

#### 1.04 QUALITY ASSURANCE

- A. Manufacturer: Fibers shall be manufactured by a firm with a minimum of five (5) years experience in the production of similar products. Manufacturers proposed for use but not named in these specifications shall submit evidence of ability to meet all requirements specified, and include a list of projects of similar design and complexity completed within the past five years.
- B. Materials: For all admixtures required for the work of this Section, provide materials which are the products of one manufacturer.
- C. Manufacturer's Representative: A representative of the manufacturer shall be present for project start-up during initial concrete placement. Engineer may waive requirement for manufacturer's representative if Contractor provides sufficient evidence that producer and finisher have adequate experience with fiber admixtures required.

#### 1.05 PROJECT CONDITIONS

- A. Perform work only when existing and forecasted weather conditions are within the limits established by the manufacturer of the materials and products used.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURER

- A. Provide Grace MicroFiber concrete admixture by Grace Construction Products (or equal) meeting specified requirements. Regional sales offices (for grace Construction Products) providing technical support include the following:
  - 1. California, Pleasanton Tel. (510) 462-9620.
  - 2. Texas, Houston Tel. (713) 223-8353.

- A. Fiber Reinforcement: Provide Grace MicroFiber concrete admixture by Grace Construction Products (or equal) complying with the following requirements:
  - 1. Fibers: ½ “ or ¾ “ (13mm or 40mm) polypropylene fibers, maximum 3 denier, complying with ASTM C 1116, Type III, Par. 4.1.3 and applicable building code requirements.
  - 2. Fibers Per Pound: Not less than 50 million individual fibers.
  - 3. Fibers shall be supplied in cellulose Concrete Ready Bags which disperse during mixing.

## 2.02 CONCRETE MIX

- A. Application Rate: 1 pound per cubic yard (600 grams per cubic meter) of concrete unless recommended otherwise by manufacturer. For uniform distribution, mix in truck for a minimum of 20 minutes after fiber addition. Add fibers at the batch plant to ensure proper mixing.
- B. Additional Concrete Admixtures: Additional concrete admixtures conforming to ASTM C 494 or equivalent CSA 266 standards may be used as required including the following:
  - 1. Type A: Water reducing admixture, WRDA series or Daracem-55 by Grace Construction Products or equal.
  - 2. Type D: Water reducing and retarding admixture, Daratard-17 by Grace Construction Products or equal.
  - 3. Type F or G: Water reducing, high range admixture, WRDA-19 or Daracem-100 by Grace Construction Products or equal.
  - 4. Type C: Accelerating admixture, PolarSet by Grace Construction Products or equal.
  - 5. DCI or DCI-S Corrosion Inhibitor by Grace Construction Products or equal may also be used if required, at rate recommended by manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine conditions of substrates and other conditions under which work is to be performed and notify Owner, in writing, of circumstances detrimental to the proper completion of the work. Do not proceed until unsatisfactory conditions are corrected.

### 3.02 CONCRETE PLACEMENT, FINISHING AND CURING

- A. Concrete Fibers: Comply with manufacturer’s recommendations for adding and mixing requirements.
- B. Concrete Finishing and Curing: Comply with ACI 302 “Guide for Concrete Floor and Slab Construction”. ACI 308 “Standard Practice for Curing Concrete”, ACI 305 “Hot Weather Concreting” and ACI 306 “Standard Practice for Cold Weather Concreting”. Finished concrete surface shall be smooth surface with no exposed fibers.

### 3.03 PROTECTION

- A. Protect completed work from damage and construction operations throughout finishing and curing operations.

END OF SECTION 03 24 00

## SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Cast-in-place concrete foundations.
- B. Control, and expansion and contraction joint filler material.
- C. Formwork, shoring, bracing and anchorage.
- D. Concrete reinforcement and accessories.
- E. Concrete curing and finishing.
- F. Concrete curbs, gutters and channels.

#### 1.02 RELATED SECTIONS

- A. Section 03 11 00 – Concrete Forming
- B. Section 03 20 00 – Concrete Reinforcing
- C. Section 03 24 00 – Fibrous Reinforcing for Concrete
- D. Section 32 13 13 – Portland Cement Concrete Paving

#### 1.03 REFERENCES

- A. ACI 301 – Structural Concrete for Buildings.
- B. ACI 304 – Measuring, Mixing, Transporting and Placing Concrete.
- C. ACI 305R – Hot Weather Concreting.
- D. ACI 306R – Cold Weather Concreting.
- E. ACI 308 – Curing Concrete.
- F. ACI 347R – Recommended Practice for Concrete Formwork.
- G. ASTM A185 – Steel Welded Wire Fabric.
- H. ASTM A615 – Deformed and Plain Billet Steel Reinforcement.
- I. ASTM C33 – Concrete Aggregates.
- J. ASTM C94 – Ready-Mixed Concrete.
- K. ASTM C150 – Portland Cement.
- L. ASTM C260 – Air Entrainment Admixtures.
- M. ASTM C309 – Liquid Membrane Curing Compound.

- N. ASTM C494 Admixtures for Concrete.
- O. ASTM D1751 – Preformed Expansion Joints.
- P. CRSI – Concrete Reinforcing Steel Institute Manual of Practice.
- Q. Uniform Building Code (UBC), current edition.
- R. Americans with Disabilities Act (ADA).

#### 1.04 SUBMITTALS

- A. Submit under provisions of the contract.
- B. Product Data: Provide manufacturer’s product data on admixtures and accessories.
- C. Mix Design: Submit proposed mix design of each concrete to the Owner for review prior to commencement of work. All mix designs shall bear the project name and the location where the concrete mix is to be used. All mix designs shall bear the wet seal and signature of a Registered Professional Engineer licensed to practice in the state of Nevada.

#### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with ACI 301.
- B. Acquire cement and aggregate from same source for all work.
- C. Conform to ACI 305R when concreting during hot weather.
- D. Conform to ACI 306R when concreting during cold weather.

### PART 2 PRODUCTS

#### 2.01 FORM MATERIALS

- A. Conform to ACI 301 and ACI 347R unless noted otherwise.

#### 2.02 REINFORCING STEEL

#### 2.03 CONCRETE MATERIALS

#### 2.04 ADMIXTURES

- A. Water Reducer: ASTM C494, Type A.
- B. Air Entrainment: ASTM C260.

#### 2.05 ACCESSORIES

- A. Bonding Agent: Two component modified epoxy resin.
- B. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.
- C. Concrete Sealer: “X-Crete 500” by SEMCO.

## 2.06 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick.
- B. Construction Joint Devices: Refer to Architectural Drawings.
- C. Expansion and Contraction Joint Devices: Refer to Architectural Drawings.

## 2.07 CURING MATERIALS

- A. Water: clean and drinkable.
- B. Absorptive Mat: Cotton or burlap fabric.
- C. Membrane Curing Compound: ASTM C309, Type 1-D, Class A Acrylic type.

## 2.08 CONCRETE MIX

- A. Mix Concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301.
- C. Provide concrete to the criteria as indicated in the Structural Drawings.
- D. Use accelerating admixtures in cold weather only when accepted by Owner. Use of admixtures will not relax cold weather placement requirements.
- E. Do not use calcium chloride.
- F. Use set retarding admixtures during hot weather only when accepted by Owner.
- G. All exterior concrete sidewalks and slabs shall contain between four (4) to six (6) percent air entraining in the mix.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify requirements for concrete cover over reinforcement.
- B. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

### 3.02 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. Wet all soils to receive concrete, if there is no moisture barrier.
- C. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solid with non-shrink grout.

### 3.03 FORMWORK ERECTION



- A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with ACI 301.
- B. Provide bracing to ensure stability of formwork and to prevent overstressing by construction loads.
- C. Hand trim sides and bottom of earth forms, remove loose dirt.
- D. Coordinate work of other Sections in forming and placing openings, slots, reglets, recesses, chases, sleeves, bolts, anchors and other inserts.

#### 3.04 REINFORCEMENT

- A. Fabricate and place reinforcement in accordance with CRSI.
- B. Place, support and secure reinforcement against displacement. Do not deviate from required position.
- C. Provide additional reinforcement at all formed openings in accordance with structural drawings.
- D. Maintain concrete cover around reinforcement in accordance with the structural drawings.

#### 3.05 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify Owner a minimum of 24 hours prior to commencements of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed joint fillers and joint devices are not disturbed during concrete placement.
- D. Place joint filler in required locations. Set top to required elevations. Secure to resist movement by wet concrete.
- E. Separate slabs on grade from vertical surfaces with joint filler unless noted otherwise on drawings.
- F. Extended joint filler from bottom of slabs to within 1/8 inch of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- G. Install construction joint devices in accordance with manufacturer's instructions and in coordination with floor slab pattern placement sequences. Set top to required elevations. Secure to resist movement by wet concrete.
- H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.
- I. Install joint covers in longest practical length, when adjacent construction activity is complete.
- J. Place concrete continuously between predetermined expansion, control, and construction joints.
- K. Do not interrupt successive placement; do not permit cold joints to occur.
- L. Place floor slabs in pattern indicated on Structural and Architectural Drawing.
- M. Saw cut joints within 24 hours after placing. Provide 1/8inch thick cut by 1/4 depth of slab thickness.
- N. Screed slabs on grade level, maintaining surface flatness of maximum 1/4 inch in 10 ft for exterior work and 1/8 inch in 10 ft for interior work.

- O. Slope slabs to floor drains where floor drains are shown on drawings.

### 3.06 CURING AND PROTECTION

- A. 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.
- C. Wet curing using fog spraying/sprinkling or cotton/burlap mats shall commence immediately after finishing operations have been completed and as soon as marring of the concrete will not occur. Wet curing shall continue for a minimum of 7 days.

### 3.07 TOLERANCES

- A. Maximum variation of surface flatness for interior concrete slabs, exposed and covered, shall be 1/8" in 10 ft.
- B. Maximum variation of surface flatness for exterior concrete slabs and walks shall be 1/4 " in 10 ft.

### 3.08 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed in accordance with ACI 301 and under provisions of the contract.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Four (4) concrete test cylinders of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete nor less than once for each 5,000 square feet of surface area.
- D. One (1) additional test cylinder will be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- E. One (1) slump test will be taken for each set of test cylinders taken.
- F. Provide for special inspection of concrete work where required by UBC.

### 3.09 PATCHING

- A. Allow Owner to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Owner upon discovery.
- C. Patch imperfections in accordance with ACI 301 with epoxy-based grouting/patching compound.

### 3.10 CONCRETE FINISHING

- A. Finish concrete floor and slab surfaces in accordance with ACI 301.
- B. Wood float surfaces, which will receive topping, slab, quarry and ceramic tile with full bed setting system.
- C. Steel trowel surfaces to receive carpeting, resilient flooring and thin-set tile. This includes areas scheduled to receive Owner furnished, Owner installed carpet.

- D. Steel trowel all exposed interior horizontal surfaces unless noted otherwise on drawings.
- E. Exterior concrete slabs and walks:
  - 1. Provide light broom finish at all slabs and walks unless noted otherwise.
  - 2. Provide medium embedded salt finish where shown on plans.
  - 3. Provide stamped concrete tactile detectable warning walking surfaces complying with requirements of ADA at all ramps and curb ramps.
- F. Sandblast exposed vertical concrete surfaces where noted on the drawings. Use of retarder in lieu of sandblasting is acceptable.
- G. Seal concrete where called for on finish schedule with specified concrete sealer.
- H. Immediately prior to Owner installation of carpet, clean concrete surfaces and remove concrete and other spillage and remove all paint overspray.

### 3.11 SCHEDULE

- A. Footings: As shown on drawings.
- B. Exterior slabs and walks outside building complex perimeter: 4 inch thick, 4500 psi, Type V unless noted otherwise.

END OF SECTION 03 30 00

## SECTION 11 68 33.43 - TRACK & FIELD EQUIPMENT

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section covers all labor and materials required to install a first-class track & field equipment.
- B. The General Contractor is responsible for the purchase and installation of all track & field equipment. The Synthetic Surfacing Contractor is responsible for installation of synthetic surface in, around and on top of the specified equipment.

#### 1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the International Association of Athletics Federations, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NCAA shall be enforced.

#### 1.3 ABBREVIATIONS

- A. IAAF = International Association of Athletics Federations
- B. NCAA = National Collegiate Athletic Association
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. GC = General Contractor
- H. TBD = To Be Determined

#### 1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
  - 1. Track & Field Synthetic Surfacing
  - 2. Track & Field Line Markings

#### 1.5 SUBMITTALS

- A. The following information must be submitted by the GC prior to installation.

1. Standard printed specifications and diagrams or drawings depicting installation directions and dimensions for all in-ground sports equipment.
2. Installation process and requirements for subbase (stone and asphalt) and any conditions that may limit the installation or affect quality of installation.
3. Material safety data sheets on all products, as necessary.

## 1.6 QUALITY ASSURANCE

- A. The GC shall only accept bids from those vendors or manufacturers that have been pre-approved or identified as approved equal.

## PART 2 - PRODUCTS

### 2.1 SPORTS EQUIPMENT

- A. The following vendors/manufacturers are approved for bidding:

1. UCS:
  - a. Mike Chappell at 530-228-5826
  - b. www.ucsspirit.com

- B. Basis of Design: the manufacturer's product number listed in this specification establishes the minimum quality for each product. GC may substitute products from the other approved manufacturers listed above. These products will be considered by the Owner, subject to compliance with the specifications and requirements.

1. The vendor submitting their product, different than the basis of design product, must prepare a technical comparison of their product to the basis of design product. This product must clearly be superior in design, material and installation method.

- C. T&F Inground Equipment

1. UCS products are the basis of design.
2. Four cast aluminum, white, pole vault boxes with the cover/lid. Model # 711-1100 & 711-1400 respectively.
3. Four mesh sand pit covers. Color grey with NO logo. Model # 519-1230. Note: The weight system must be sufficient to hold the mesh covers in place under very windy conditions, if not the Vendor must provide an alternate system to hold them in place.
4. Twelve take-off boards for the long & triple jump runway. This product is the 8 inch wide synthetic board, with 4 inch foul board and blanking lids are required. Model # 519-2100.
5. Steeplechase Water Jump Cover shall be aluminum with recessed tray to receive SS by SSC and all handle must fit flush to the top of the cover. Model # 506-5420. The existing water jump pit is a prefabricated product by ACO Sport, the vendor must custom design this cover so it fits properly.
6. Two web style shot put circles, powder coated white. Model # 725-2540.
7. Two toe boards for depressed circles. Model # 716-1630.
8. ALTERNATE #1: The Contractor shall determine the manufacturer of the existing hammer/discus cage and provide & install a new net on the existing cage.
9. ALTERNATE #2: One aluminum curb, non-powder coated, for a 400 meter oval & steeplechase lane. UCS Model # 792-9412.

- a. The sections shall be numbered on the bottom side.

- b. The curb will break at the steeplechase water jump lane approach & exit.
  - c. The steeplechase water jump run-up will have a curb.
  - d. No pins and sleeves are required, this curb will sit on top of the SS.
10. ALTERNATE #3: Steeplechase Water Jump Barrier is adjustable and white & black in color. Model # 506-5413.
- a. Steeplechase Water Jump Barrier Seal shall be made of aluminum, powder coated and with a custom graphic. Color and graphic logo TBD by Owner. Model # 506-5419.
- D. Communication & Power Junction Boxes
- 1. UCS products are the basis of design.
  - 2. Four Junction Boxes for power:
    - a. With recessed aluminum covers and the trays to receive 1/2" SS by SSC.
    - b. Two small hand hole covers or access covers (1 is solid and 1 has slots for cables) and the recessed trays shall receive 1/2" SS by SSC.
    - c. Model # 712-1150H.
- E. T&F Loose Equipment – not included in the project.

## PART 3 - EXECUTION

### 3.1 INSTALLATION REQUIREMENTS

- A. The installation of the in-ground sports equipment shall follow the directions of the manufacturer and/or vendor. Shop drawings must be submitted and approved prior to ordering and installation of equipment.

END OF SECTION 116833.43

## SECTION 26 00 00 0 – BASIC ELECTRICAL REQUIREMENTS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Basic Electrical Requirements specifically applicable to Division 16 Sections, in addition to Division 1 General Requirements.

#### 1.2 ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at the Owner's option. Accepted Alternates will be identified in Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work as required.

#### 1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS

- A. Proposed Products List: Include Products specified in the following Sections:
  - 1. Section 26 00 00 – Basic Electrical Requirements
  - 2. Section 26 05 03 – Equipment Wiring Systems
  - 3. Section 26 05 05 – Selective Demolition for Electrical
  - 4. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
  - 5. Section 26 05 26 – Grounding and Bonding for Electrical Systems
  - 6. Section 26 05 33 – Raceway and Boxes for Electrical Systems
  - 7. Section 26 05 53 – Identification for Electrical Systems
  - 8. Section 26 05 70 – Testing
  - 9. Section 26 27 26 – Wiring Devices
- B. Submit shop drawings and product data grouped to include complete submittals of related systems, products, and accessories in a single submittal.
- C. Mark dimensions and values in units to match those specified.

#### 1.5 REGULATORY REQUIREMENTS

- A. Conform to Uniform Building Code.
- B. Electrical: Conform to NFPA 70.
- C. Electrical: Conform to local electrical ordinance.
- D. Obtain permits, and request inspections from authority having jurisdiction.

#### 1.6 PROJECT/SITE CONDITIONS

- A. Install Work in locations shown on Drawings, unless prevented by Project conditions.

- B. The drawings are diagrammatic unless indicated otherwise. The drawings reflect equipment installation and circuiting only and are not depicting exact conduit routing unless specifically noted otherwise. Home run circuits may be combined per requirements of NEC. All circuits indicated shall be run with dedicated neutral conductors.
- C. Prepare drawings showing proposed rearrangement of Work to meet Project conditions, including changes to Work specified in other Sections. Obtain permission of Owner before proceeding.
- D. Data presented on these drawings are as accurate as planning can determine, but field verification of all dimensions, locations, levels, etc., to suit field conditions is required. Review all architectural, structural, and civil drawings; and adjust all work to meet the requirements of conditions shown. Discrepancies between different plans, or between drawings and specifications, or regulations and codes governing the installation shall be brought to the attention of the engineer in writing before the date of bid opening. If discrepancies are not reported, the contractor shall bid the greater quantity or better quality, and appropriate adjustments will be made after contract award. Contractor shall be responsible to field measure and confirm mounting heights and location of electrical equipment with respect to roadways, structures, etc. Do not scale distances off the electrical drawings. Use actual building and site dimensions.
- E. Guarantee all material furnished and all workmanship performed for a period of one year from the date of final acceptance of the work. Any defects developing within this period, traceable to material furnished as a part of this section or workmanship performed hereunder, shall be made good at no additional expense to the owner.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION



## SECTION 26 05 03 – EQUIPMENT WIRING SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Electrical connections to equipment specified under other sections.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 19 – Low-Voltage Electrical Power conductors and Cables.
- B. Section 26 05 33 – Raceways and Boxes for Electrical Systems.

#### 1.3 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices.
- B. NEMA WD 6 - Wiring Device Configurations.
- C. ANSI/NFPA 70 - National Electrical Code.

#### 1.4 SUBMITTALS

- A. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of Product.

#### 1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.6 COORDINATION

- A. Obtain and review shop drawings, product data, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation schedule for equipment.
- D. Sequence electrical connections to coordinate with start-up schedule for equipment.

## PART 2 - PRODUCTS

### 2.1 CORDS AND CAPS

- A. Manufacturers:
  - 1. Woodhead.
  - 2. Hubbell.
  - 3. Leviton.
- B. Attachment Plug Construction: Conform to NEMA WD 1.
- C. Configuration: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
- D. Cord Construction: ANSI/NFPA 70, Type SO multi-conductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
- E. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

### 3.2 ELECTRICAL CONNECTIONS

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment subject to vibration using flexible conduit, maximum 36 inch length. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations. Make final connections to interior lighting fixtures using flexible conduit, maximum 72 inch length.
- C. Make wiring connections using wire and cable with insulation suitable for temperatures encountered in heat producing equipment.
- D. Provide receptacle outlet where connection with attachment plug is indicated. Provide cord and cap where field-supplied attachment plug is indicated.
- E. Provide suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- F. Install disconnect switches, controllers, control stations, and control devices as indicated.
- G. Modify equipment control wiring with terminal block jumpers as indicated.
- H. Provide interconnecting conduit and wiring between devices and equipment where indicated.

END OF SECTION

## SECTION 26 05 05 – SELECTIVE DEMOLITION FOR ELECTRICAL

### PART 1 - GENERAL

#### 1.1 SUMMARY

##### A. Section Includes:

1. Removal of existing electrical equipment, wiring, and conduit in areas to be remodeled; removal of designated construction; dismantling, cutting and alterations for completion of the Work.
2. Disposal of materials.
3. Storage of removed materials.
4. Identification of utilities.
5. Salvaged items.
6. Protection of items to remain as indicated on drawings.
7. Relocate existing equipment to accommodate construction.

#### 1.2 CLOSEOUT SUBMITTALS

- A. Project Record Documents: Record actual locations of capped capped conduits and equipment abandoned in place.
- B. QUALITY ASSURANCE
- C. Perform Work in accordance with Public Works standard.
- D. PRE-INSTALLATION MEETINGS
- E. Convene minimum one week prior to commencing work of this section.

#### 1.3 SEQUENCING

##### A. Sequence work in the following order:

1. Verify all electrical equipment, wiring devices, and wiring to be removed.
2. Verify existing circuiting of equipment indicated to be removed and any equipment on common circuit that is to remain.
3. Disconnect equipment indicated to be removed from existing circuit and provide for continuity of circuit to existing equipment indicated to remain.
4. Provide protection for removed equipment and store in owner designated location.

#### 1.4 SCHEDULING

- A. Schedule work to coincide with new construction and work of other trades.
- B. Perform demolition work:
  1. Between hours of 7:00am and 3:00pm.
- C. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer. Do not resume operations until directed.

## 1.5 COORDINATION

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Coordinate demolition work with work of other trades.
- C. Coordinate and sequence demolition so as not to cause shutdown of operation of surrounding areas.
- D. Shut-down Periods:
  - 1. Arrange timing of shut-down periods of in service panels with Owner. Do not shut down any utility without prior written approval.
  - 2. Keep shut-down period to minimum or use intermittent period as directed by Owner.
  - 3. Maintain life-safety systems in full operation in occupied facilities, or provide notice minimum seven days in advance.
- E. Identify salvage items in cooperation with Owner.

## PART 2 - PRODUCTS

### 2.1 Not Used

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify wiring and equipment indicated to be demolished serve only abandoned facilities.
- B. Verify termination points for demolished services.

### 3.2 PREPARATION

- A. Erect, and maintain temporary safeguards, including warning signs, barricades for protection of the public, Owner, Contractor's employees, and existing improvements to remain.
- B. Temporary egress signage and emergency lighting

### 3.3 DEMOLITION

- A. Demolition Drawings are based on casual field observation and existing record documents. Report discrepancies to Architect / Engineer before disturbing existing installation.
- B. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces to match existing.
- C. Remove conduit, wire, boxes, and fastening devices to avoid any interference with new installation in accessible locations.
- D. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

- E. Reconnect equipment being disturbed by renovation work and required for continue service to the existing circuit or nearest designated panel.
- F. Disconnect or shut off service to areas where electrical work is to be removed. Remove electrical fixtures, equipment, and related switches, outlets, conduit and wiring which are not part of final project.
- G. Install temporary wiring and connections to maintain existing systems in service during construction.
- H. Perform work on energized equipment or circuits with experienced and trained personnel.
- I. Remove, relocate, and extend existing installations to accommodate new construction.
- J. Repair adjacent construction and finishes damaged during demolition and extension work.
- K. Remove exposed abandoned grounding and bonding components, fasteners and supports, and electrical identification components, including components abandoned components above accessible ceiling finishes. Cut embedded support elements flush with walls and floors.
- L. Clean and repair existing equipment to remain, affected by demolition work, or to be re-installed.
- M. Protect and retain power to existing active equipment remaining.
- N. Identify abandoned empty conduit at both ends as “abandoned”.

#### 3.4 EXISTING PANELBOARDS

- A. Ring out circuits in existing panel affected by the Work. Where additional circuits are needed, use available “spare” circuit breakers or install new breakers.
- B. Identify unused circuits as spare on the updated panelboard directory.
- C. Where existing circuits are indicated to be reused, use sensing measuring devices to verify circuits feeding Project area or are not in use.
- D. Remove existing wire no longer in use from panel to equipment.
- E. Provide new updated (Typed) directories where more than three circuits have been modified or rewired.

#### 3.5 SALVAGE ITEMS

- A. Remove and protect items indicated on drawings or scheduled in this specification section to be salvaged and turn over to Owner.
- B. Items of salvageable value may be removed as work progresses. Transport salvaged items from site as they are removed.

#### 3.6 REUSABLE ELECTRICAL EQUIPMENT

- A. Carefully remove and clean equipment, materials, or fixtures which are to be reused.

- B. Disconnect, remove, or relocate existing electrical material and equipment interfering with new installation.
- C. Relocate existing lighting fixtures as indicated on Drawings. Clean fixtures and re-lamp. Test fixture to see if it is in good working condition before installation at new location.

### 3.7 CLEANING

- A. Remove demolished materials as work progresses. Legally dispose.
- B. Keep workplace neat on a daily basis.

### 3.8 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over unprotected floor surface.

END OF SECTION

## SECTION 26 05 19 – LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Building wire and cable.
- B. Wiring connectors and connections.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 33 - Conduit.
- B. Section 26 05 35 - Boxes.
- C. Section 26 05 53 – Electrical Identification.

#### 1.3 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

#### 1.4 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

#### 1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.6 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Conductor sizes are based on AWG copper.
- C. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions. Include wire and cable lengths within 10 feet of length shown.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact outing and lengths required and document on “as-built” drawings at completion of project.

#### 1.7 COORDINATION

- A. Determine required separation between cable installation and other work.

- B. Determine cable routing to avoid interference with work of other trades.

## PART 2 - PRODUCTS

### 2.1 BUILDING WIRE AND CABLE

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: ANSI/NFPA 70; Type THW, THHN/THWN, or XHHW insulation for feeders and branch circuits larger than 6 AWG; Type THHN/THWN insulation for feeders and branch circuits 6 AWG and smaller.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire has been completed.

### 3.2 PREPARATION

- A. Confirm that entire raceway installation has been completed and thoroughly swab raceway before installing wire.

### 3.3 WIRING METHODS

- A. In All Power Installations:
  1. Building interior locations: Install conductors in EMT required for all exposed public spaces.
  2. Exposed exterior locations: Install conductors in Rigid Galvanized Steel (RGS) conduits.
  3. Underground installations: Install conductors in Schedule 40 PVC conduit.
- B. Use wiring methods indicated on Drawings.

### 3.4 WIRE COLOR

- A. General:
  1. For wire sizes 10 AWG and smaller – wire shall be colored as indicated below.
  2. For wire sizes 8 AWG and larger – identify wire with colored tape at all terminals, splices and boxes. Colors to be as indicated below.
  3. Use black, red, and blue for Phases A, B & C in 120/208 volt circuits. Use brown, orange, and yellow for Phases A, B & C in 277/480 volt circuits.
- B. Neutral Conductors: White for 208Y/120V: 6 AWG and smaller. For 4 AWG and larger, identify with white tape at both ends and visible points included in all junction boxes. Where there are two or more



neutrals in one conduit, each shall be individually identified with the proper circuit. For 480Y/277V: Use gray conductor for 6 AWG and smaller. For 4 AWG and larger, identify with gray tape at both ends and all visible points included in all junction boxes.

- C. Branch Circuit Conductors: Three or four wire home runs shall have each phase uniquely color coded.
- D. Feeder Circuit Conductors: Each phase shall be uniquely color coded.
- E. Ground Conductors: Green for 6 AWG and smaller. For 4 AWG and larger, indentify with green tape at both ends and all visible points included in all junction boxes.

### 3.5 INSTALLATION

- A. Install products in accordance with manufacturers' instructions.
- B. Use solid conductors for feeders and branch circuits 10 AWG and smaller.
- C. Use stranded conductors for control circuits (Minimum wire size is #16 AWG).
- D. Use conductors not smaller than 12 AWG for power and lighting circuits.
- E. Use conductors not smaller than 16 AWG for control circuits.
- F. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet.
- G. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.
- H. Pull all conductors into raceway at same time.
- I. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- J. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- K. Clean conductor surfaces before installing lugs and connectors.
- L. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- M. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- N. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- O. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- P. Do not share neutrals for lighting or receptacle circuits.

### 3.6 INTERFACE WITH OTHER PRODUCTS

- A. Identify wire and cable under provisions of Section 26 05 53.

- B. Identify each conductor with its circuit number or other designation indicated on Drawings.

3.7 FIELD QUALITY CONTROL

- A. Inspect wire for physical damage and proper connection.
- B. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.
- C. Verify continuity of each branch circuit conductor.
- D. Verify continuity of each feeder.

END OF SECTION

## SECTION 26 05 26 – GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Grounding electrodes and conductors.
- B. Equipment grounding conductors.
- C. Bonding.

#### 1.2 RELATED SECTIONS

- A. Section 03 20 00 - Concrete Reinforcement.
- B. Section 03 10 00 - Concrete.

#### 1.3 REFERENCES

- A. NETA ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems (International Electrical Testing Association).
- B. NFPA 70 - National Electrical Code.

#### 1.4 GROUNDING SYSTEM DESCRIPTION

- A. Metal underground water pipe if available.
- B. Rod electrode.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. Grounding System Resistance: 5 ohms.

#### 1.6 SUBMITTALS FOR REVIEW

- A. Product Data: Provide for grounding electrodes and connections.

#### 1.7 SUBMITTALS FOR INFORMATION

- A. Test Reports: Indicate overall resistance to ground.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by Product testing agency specified under Regulatory Requirements. Include instructions for storage, handling, protection, examination, preparation, and installation of Product.

1.8 SUBMITTALS FOR CLOSEOUT

- A. Project Record Documents: Record actual locations of components and grounding electrodes.
- B. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience, and with service facilities within 100 miles of Project.

1.10 REGULATORY REQUIREMENTS

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 - PRODUCTS

2.1 ROD ELECTRODES

- A. Material: Copper-clad steel.
- B. Diameter: 3/4 inch (19mm).
- C. Length: 10 feet (3000 mm).

2.2 MECHANICAL CONNECTORS

- A. Material: Bronze.

2.3 EXOTHERMIC CONNECTIONS

- A. Manufacturers:
  - 1. Erico Cadweld.
  - 2. Burndy.

2.4 GROUND WIRE

- A. Material: 3/0 Stranded copper.
- B. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that final backfill and compaction has been completed before driving rod electrodes.

### 3.2 INSTALLATION

- A. Install up to 2 additional rod electrodes as required to achieve specified resistance to ground. Notify Engineer if resistance to ground is not less than 5 ohms.
- B. Install 3/0 AWG bare copper wire at minimum 30 inch depth underground from rod to rod, make exothermic connections.
- C. Provide bonding to meet Regulatory Requirements.
  - 1. Provide bonding jumpers at all insulated couplings and valves of metallic piping.
- D. Bond together metal siding not attached to grounded structure; bond to ground.
- E. Provide isolated grounding conductor for circuits where indicated on plans.
- F. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- G. Ground all transformers to grounding system as required by code. Increase size of equipment grounding conductor in 3.2 - G per NEC Table 250-94 or install separate concrete encased electrode. Ground rods are not permitted.

### 3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.

END OF SECTION

## SECTION 26 05 33 – RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Metal conduit.
- B. Flexible metal conduit.
- C. Liquidtight flexible metal conduit.
- D. Electrical metallic tubing.
- E. Nonmetal conduit.
- F. Fittings and conduit bodies.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 26 - Grounding and Bonding for Electrical Systems
- B. Section 26 05 53 - Electrical Identification for Electrical Systems.

#### 1.3 REFERENCES

- A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.
- B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.
- C. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.
- D. ANSI/NFPA 70 - National Electrical Code.
- E. NECA "Standard of Installation."
- F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
- G. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
- H. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing.

#### 1.4 DESIGN REQUIREMENTS

- A. Conduit Size: ANSI/NFPA 70. Minimum 1 inch diameter for underground installations.

#### 1.5 PROJECT RECORD DOCUMENTS

- A. Accurately record actual routing of conduits larger than 2 inches.

#### 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

#### 1.8 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### PART 2 - PRODUCTS

#### 2.1 CONDUIT REQUIREMENTS

- A. Minimum Size: 1/2 inch unless otherwise specified.
- B. Underground Installations:
  - 1. More than Five Feet from Foundation Wall: Use PVC Schedule 40 conduit.
  - 2. Within Five Feet from Foundation Wall: Use PVC Schedule 40 conduit.
  - 3. In or Under Building Slab on Grade: Use PVC Schedule 40 conduit with PVC coated RGS elbows and risers when penetrating thru floor slabs and housekeeping pads.
  - 4. Minimum Size: 1 inch.
- C. Outdoor Locations: Above Grade: Use rigid steel and intermediate metal conduit.
- D. Wet and Damp Locations: Use rigid steel and electrical metallic tubing.
- E. Dry Locations:
  - 1. Concealed: Use electrical metallic tubing for Home runs.
  - 2. Exposed: Use electrical metallic tubing.

#### 2.2 METAL CONDUIT

- A. Rigid Steel Conduit: ANSI C80.1.
- B. Intermediate Metal Conduit (IMC): Rigid steel.
- C. Fittings and Conduit Bodies: ANSI/NEMA FB 1; all steel fittings.

### 2.3 PVC COATED METAL CONDUIT

- A. Description: NEMA RN 1; rigid steel conduit with external PVC coating, 20 mil thick.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel fittings with external PVC coating to match conduit.

### 2.4 FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction.
- B. Fittings: ANSI/NEMA FB 1.

### 2.5 LIQUIDTIGHT FLEXIBLE METAL CONDUIT

- A. Description: Interlocked steel construction with PVC jacket.
- B. Fittings: ANSI/NEMA FB 1.

### 2.6 ELECTRICAL METALLIC TUBING (EMT)

- A. Description: ANSI C80.3; galvanized tubing.
- B. Fittings and Conduit Bodies: ANSI/NEMA FB 1; steel, compression, or set screw type with insulated throats.

### 2.7 NONMETALLIC CONDUIT

- A. Description: NEMA TC 2; Schedule 40 PVC.
- B. Fittings and Conduit Bodies: NEMA TC 3.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install conduit in accordance with NECA "Standard of Installation."
- B. Install nonmetallic conduit in accordance with manufacturer's instructions.
- C. Arrange supports to prevent misalignment during wiring installation.
- D. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and



split hangers.

- E. Group related conduits; support using conduit rack. Construct rack using steel channel.
- F. Fasten conduit supports to building structure and surfaces under provisions of Section 26 05 29.
- G. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports
- H. Arrange conduit to maintain headroom and present neat appearance.
- I. Route conduit parallel and perpendicular to walls.
- J. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- K. Route conduit in and under slab from point-to-point.
- L. Do not cross conduits in slab.
- M. Maintain adequate clearance between conduit and piping.
- N. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- O. Cut conduit square using saw or pipe cutter; de-burr cut ends.
- P. Bring conduit to shoulder of fittings; fasten securely.
- Q. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- R. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations and to cast boxes.
- S. Install no more than equivalent of three 90-degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use hydraulic one-shot bender to fabricate bends in metal conduit larger than 2 inch (50 mm) size.
- T. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- U. Provide suitable fittings to accommodate expansion and deflection where conduit crosses expansion joints.
- V. Provide suitable pull string in each empty conduit except sleeves and nipples.
- W. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- X. Ground and bond conduit under provisions of Section 26 05 26.
- Y. Identify conduit under provisions of Section 26 05 53.
- Z. Use suitable insulated bushings and inserts at connections to outlets, boxes, and equipment.

AA. Do not support conduit from roof deck.

3.2 INTERFACE WITH OTHER PRODUCTS

A. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods under the provisions of Section 07 84 00.

END OF SECTION

## SECTION 26 05 53 – IDENTIFICATION FOR ELECTRICAL SYSTEMS

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Nameplates and labels.
- B. Wire and cable markers.

#### 1.2 REFERENCES

- A. ANSI/NFPA 70 - National Electrical Code.

#### 1.3 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

### PART 2 - PRODUCTS

#### 2.1 NAMEPLATES AND LABELS

- A. Nameplates: Engraved three-layer phenolic, white letters on black background. For emergency equipment, white letters on red background.
- B. Locations:
  - 1. Each electrical distribution and control equipment enclosure.
  - 2. Panelboards.
  - 3. Transformers.
  - 4. Shore Stations
- C. Letter Size:
  - 1. Use 1/2 inch letters for identifying individual equipment and loads.
  - 2. Use 1/4 inch letters for identifying voltage systems.
- D. Labels: Embossed adhesive tape, with 3/16 inch white letters on black background. Use only for identification of individual wall switches and receptacles, control device stations.

#### 2.2 WIRE MARKERS

- A. Description: Cloth, tape, split sleeve, or tubing type wire markers.
- B. Locations: Each conductor at panelboard gutters, outlet and junction boxes, and each load connection.
- C. Legend:
  - 1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
  - 2. Control Circuits: Control wire number indicated on shop drawings.

2.3 UNDERGROUND WARNING TAPE

- A. Description: 4 inch wide plastic tape, detectable type, colored red with suitable warning legend describing buried electrical lines.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Degrease and clean surfaces to receive nameplates and labels.

3.2 APPLICATION

- A. Install nameplate and label parallel to equipment lines.
- B. Secure nameplate to equipment front using screws or rivets.
- C. Secure nameplate to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install warning tape along full length of buried conduits, directly above at 6 inches below finished grade.
- E. Identify all conductors, cables, communication, and control wires with wire markers.

END OF SECTION

## SECTION 26 27 26 – WIRING DEVICES

### PART 1 - GENERAL

#### 1.1 SECTION INCLUDES

- A. Receptacles.
- B. Device plates.

#### 1.2 RELATED SECTIONS

- A. Section 26 05 33 – Raceways and Boxes for Electrical Systems

#### 1.3 REFERENCES

- A. NEMA WD 1 - General Purpose Wiring Devices.
- B. NEMA WD 6 - Wiring Device Configurations.

#### 1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Manufacturer's Instructions:
  - 1. Indicate application conditions and limitations of use stipulated by product testing agency specified under regulatory requirements.
  - 2. Include instructions for storage, handling, protection, examination, preparation, operation and installation of product.
- C. Warranty: Provide letter from manufacturer and contractor acknowledging warranty requirements.

#### 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

#### 1.6 REGULATORY REQUIREMENTS

- A. Conform to requirements of ANSI/NFPA 70.
- B. Furnish products listed and classified by Underwriters Laboratories, Inc. as suitable for purpose specified and shown.

#### 1.7 RECEPTACLES

- A. Manufacturers:
  - 1. Leviton.
  - 2. Pass & Seymour.
  - 3. Hubbell.

- B. Description: NEMA WD 1; heavy-duty specification grade side and back wired.
- C. Device Body: Brown nylon.
- D. Configuration: NEMA WD 6; type as specified and indicated.
- E. Convenience Receptacle: Type 5-20.
- F. GFCI Receptacle: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.

#### 1.8 DEVICE PLATES

- A. Device plates shall be weather-proof cast aluminum for device mounting with “in-use” cover.

#### 1.9 EXAMINATION

- A. Verify outlet boxes are installed at proper height.
- B. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

#### 1.10 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install devices plumb and level.
- C. Install receptacles with grounding pole on bottom.
- D. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- E. Connect wiring devices by wrapping conductor around screw terminal or by using screw down clamp.

#### 1.11 INTERFACE WITH OTHER PRODUCTS

- A. Coordinate locations of outlet boxes provided under Section 26 05 35 to obtain mounting heights specified and indicated on Drawings.

#### 1.12 FIELD QUALITY CONTROL

- A. Inspect each wiring device for defects.
- B. Verify that each receptacle device is energized.
- C. Test each receptacle device for proper polarity.
- D. Test each GFCI receptacle device for proper operation.

END OF SECTION

## SECTION 31 01 00 - EARTHWORK

### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. Perform site clearing, grubbing, excavation trenching, hauling, backfilling, compaction of materials and subgrade preparation required to construct the facilities indicated or shown on the Contract drawings.
- 1 Preparation of subgrade for all on-site slab on grade, concrete sidewalks and curb and gutter, and pavements is included as part of this work.
- B. Perform finished grading for all areas as shown on the plans and required by the Permits granted by public agencies having jurisdiction.
- C. Protect existing utilities and improvements that are designated to remain.
- D. Remove unsuitable excavated material, including contaminated material, and transport to an approved off-site disposal facility.

#### 1.02 RELATED SECTIONS

- A. Section 31 23 16 – Excavation
- B. Section 31 23 23 – Backfill
- C. Section 31 23 33 – Trenching
- D. Section 32 11 23 – Aggregate Base Course
- E. Section 32 12 16 – Asphaltic Concrete Paving
- F. Section 32 13 13 – Portland Cement Concrete Paving

#### 1.03 PERMITS AND ORDINANCES

- A. Procure and pay for all necessary permits or certificates required by local authorities having jurisdiction over the work.
- B. Comply with all applicable Federal, State, and Local Ordinances.

#### 1.04 LAYOUT

- A. Layout of all work under this Section, including all lines and levels, shall be made by a Land Surveyor or Civil Engineer Licensed in the State of Nevada.
- B. Maintain and protect from damage and dislocation all benchmarks, control monuments and stakes, whether newly established by surveyor or existing. If it is necessary to disturb existing benchmarks, a Professional Land Surveyor licensed in the State of Nevada shall be contracted to re-establish it in a safe place.
- C. If any discrepancies are found between the drawings and actual conditions at the site, the Architect and Engineer shall be notified as soon as possible. If necessary, the Engineer shall make minor adjustments in the specified work without any additional cost to the Owner in order to accomplish the intent of the contract documents.

## 1.05 CODES AND STANDARDS

- A. Apply the latest editions of the following codes and standards as indicated and applicable.
  - 1. The Uniform Standard Specifications and Drawings for Public Works Construction Off-site Improvements Clark County Area Nevada and all amendments thereto also known as the Uniform Standard Specifications and Drawings.
  - 2. Occupational Safety & Health Administration (OSHA) Standards.
  - 3. Any other indicated local, regional, state, or federal regulations.

## 1.06 SUBMITTALS

- A. Submit all required information in accordance with General Conditions of this Contract.
- B. If warranted by site conditions, a detailed proposed plan for construction de-watering and groundwater control shall be submitted prior to commencement of earthwork operations. The submittal shall include schedule, plans, design and calculations for control of surface flows and sub-surface groundwater, de-watering system and proposed equipment use.
- C. Test Reports - Submit the following test reports to the Architect per the contract and as prepared by the approved Quality Assurance Testing Laboratory prior to the commencement of construction of the hard improvements:
  - 1. Laboratory Test Reports on import and onsite soil materials proposed for use in the earthwork operations for the project.
  - 2. Engineering Certification of bearing support soils for all foundation spread footings.
  - 3. Field Density Compaction Test Reports of all earthwork operations.
  - 4. Pad Certification Report signed/sealed by the Geotechnical Engineer of Record in “responsible charge” of the Quality Assurance Testing Laboratory.

## 1.07 PROJECT CONDITIONS

- A. Soils boring log data presented in the Geotechnical Report indicate subsurface conditions and are not intended as representations of continuity between soil borings or warranties of accuracy. It is expressly understood that the Owner, Architect, and Engineer shall be held harmless and otherwise not responsible for conclusions drawn from or interpretations of the data. The soils report data is available for convenience only and no warranty is either expressed or implied.
- B. If additional test borings and other subsurface exploratory operations are performed, there shall be no additional cost to the Owner.
- C. All existing on and off-site underground utilities in the areas of the work shall be located prior to commencing earthwork. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.
- D. Contact “CALL BEFORE YOU DIG” as shown on the plans and coordinate with respective owners/responsible parties for all utilities. All utility companies shall be notified at least two working days prior to start of construction.
- E. Should unmapped or incorrectly mapped piping or other utilities be encountered during excavation, consult with the utility owner immediately. Cooperate with the Owner and utility companies in keeping respective services and facilities in operation at all times. Repair damaged utilities to satisfaction of the Owner’s representative and utility owner. Notify the Architect of any conflicts with the proposed work in the contract and existing or proposed utilities.



- F. Do not interrupt existing utilities, except when permitted in writing by the Architect and only after acceptable temporary utility services have been provided. Provide minimum of forty-eight (48) hours notice to Architect and obtain written Notice to Proceed before interrupting any utility services.
- G. The use of explosives shall not be permitted.
- H. In order to protect persons and property, barricade open excavations occurring as part of the work and post with warning signs and lighting to the satisfaction of the Owner.
- I. Operate warning lights as required by authorities having jurisdiction.
- J. All new and existing structures, utilities, sidewalks, pavements, and other facilities shall be protected from damage caused by settlement, lateral movement, undermining, washout, heavy equipment operations, and other hazards created by earthwork operations
- K. Preserve and protect all land survey monuments of record that are located within the limits of construction. Preserve and protect any land survey monuments of record found during the course of construction in accordance with NRS 329. If any land survey monument of record is disturbed as a result of the work, re-establish it under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

#### 1.08 FIELD MEASUREMENTS

- A. Verify that survey benchmark datum and proposed elevations for the work are consistent with the vertical control for the project as indicated.

#### 1.09 REFERENCES

- A. All work shall comply with the latest edition and supplements of the Uniform Standard Specifications and Drawings for the Public Works' Construction Off-Site Improvements Clark County Area Nevada. Materials and workmanship specified herein with reference to these Uniform Standard Specifications shall be in accordance with the referenced sections, articles and paragraphs except that contractual, measurement, and payment provisions do not apply.
- B. Project Geotechnical Investigation (Soils Report) prepared by:
- C. ANSI/ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- D. ANSI/ASTM D1556 - Test Method for Density of Soil in Place by the Sand-cone Method.
- E. ANSI/ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort
- F. ASTM D2487 – Classification of Soils for Engineering Purposes (Unified Soil Classification System)
- G. ASTM D2922 - Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- H. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

#### 1.10 QUALITY ASSURANCE

- A. The Owner will provide all Quality Assurance Testing of the earthwork operations. A written request shall be submitted a minimum 24 hours in advance of areas completed and ready for testing.

- B. All inferior or damaged portions of the work not meeting the requirements of the Quality Assurance Testing Program shall be removed and/or reconstructed. Retesting of previously "Failed Test" areas shall be at no additional cost to the owner. The Architect shall be notified immediately of any impacts to the schedule as the result of rework of previously constructed facilities not conforming to the project requirements.

## PART 2 PRODUCTS

### 2.01 SOIL MATERIALS

#### A. Definitions

1. Structural Fill should be used for support of footings, slabs-on-grade, exterior concrete flatwork (including the Exterior Learning Center), driveways, and other asphalt areas. Structural fill material may consist of onsite natural soils and uncontrolled fill material that have a swell potential less than 6 percent and are free of deleterious materials. The Project Geotechnical Engineer should approve onsite materials proposed as use for structural fill prior to placement.
2. Imported fill materials should have a low expansive potential (less than 4 percent), and free of all deleterious materials. Imported fill should also have a liquid limit less than 35, a plasticity index of less than 15, soluble sulfates less than 0.2%, and solubility less than 2%. These materials should also have between 8 to 30 percent passing the #200 sieve, 100 percent passing a 6-inch sieve and be reasonably well-graded. Imported material proposed for use, as structural fill should be approved by the Project Geotechnical Engineer prior to being transported to the site.
3. Subbase Material: Engineered select fill processed and compacted to ninety-five percent (95%) of the maximum density or Type I aggregate base.
4. Type II aggregate base course (ASTM C136) compacted to ninety-five percent (95%) of the maximum density. Material to conform to requirements of Uniform Standard Specification, Section 704, with the exception that the use of crushed asphalt or concrete will not be permitted in Type II base course materials under the building structures or in utility trenches.
5. Drainage Fill: Washed, evenly graded mixture of crushed stone or crushed or uncrushed gravel, with one-hundred percent (100%) passing a 1 ½-inch sieve, and not more than five percent (5%) passing a No. 4 Sieve.
6. Type I aggregate base material conforming to requirements of Uniform Standard Specifications, Section 704, for 2-inch maximum size material.
7. The term uncontrolled fill refers to any existing fill that was not properly placed, inspected and/or tested.

## PART 3 EXECUTION

### 3.01 PROTECTION

- A. Actual soils encountered during construction may necessitate that slopes of temporary excavations and trenches be flatter than those indicated on the Drawings. The slopes of temporary excavations and trenches shall be flattened as required for slope stability and safe execution of the work at the Contractor's expense.
- B. Construct facilities required for diversion of storm water drainage around or through the construction area per the requirements of the Nevada Department of Conservation and Natural Resources, Division of Environmental Protection, Bureau of Water Pollution Control.
- C. Prevent damage to the work or adjoining property.
  1. Furnish, place, and maintain all supports and shoring that may be required for the sides of the excavations.

2. Furnish, place and maintain all pumping, ditching, or other measures for the removal or exclusion of water, including storm water and wastewater reaching the site of the work from any source.
  3. The Contractor is responsible for any damage to persons or property due to interruption or diversion of such storm water or wastewater during the course of work operations.
- D. Slopes on the sides of excavations shall be maintained to insure safe execution of the work. Excavations shall be in accordance with applicable requirements of the Standard Specifications, requirements of NOSHA, and with the requirements of the rules, orders, and regulations specified in this project manual.
- E. Utilities: Contact “CALL BEFORE YOU DIG” not less than forty-eight (48) hours prior to starting excavation.
- F. Protection and Restoration of Surfaces: Protect newly graded areas from traffic, erosion, and settlement. Repair and reestablish damaged eroded slopes, elevations or grades, and restore surface construction prior to acceptance.

### 3.02 EXCAVATION

- A. Excavation is unclassified and includes excavation to subgrade elevations indicated, regardless of character of materials and obstructions encountered.
- B. Unauthorized excavation consists of removal of materials beyond indicated subgrade elevations or dimensions without specific direction of the Soils Engineer.
1. Unauthorized excavation, as well as remedial work to correct unauthorized excavation as directed by Architect or Soils Engineer shall be at no additional costs to the owner.
  2. Under spread footings, foundation bases, or retaining walls, backfill unauthorized excavation areas by extending indicated bottom elevation of footing or base to excavation bottom within a 45-degree splay of the bottom of footing, without altering required top elevation. Backfill material shall be Type II aggregate base.
- C. If unsuitable soil load bearing materials are encountered at required subgrade elevations, notify the soils engineer immediately and over excavate and backfill excavated material as directed by Soils Engineer or Architect.
- D. Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavations in safe condition until completion of backfilling.
- E. Shoring and Bracing: All trench shoring and bracing to comply with local codes and authorities having jurisdiction.
- F. Dust Control: Maintain a dust free condition in the grading area by the application of water in sufficient amounts throughout the earthwork operations. Obtain a dust control permit in accordance with Clark County Air Quality Management Codes and Regulations. Throughout the contract period use water trucks and other measures as required to prevent dispersion of dust into adjacent buildings and properties.
- G. Material Storage: Stockpile suitable excavated and import materials where directed until required for backfill or fill. Place, grade, shape, and protect stockpiles to ensure proper drainage and avoid erosion.
- H. Locate and retain soil stockpile and windrow materials away from edge of excavations.
- I. Dispose of excess soil material and waste materials as herein specified.

- J. Excavation for Structures:
  - 1. Conform to elevations and dimensions shown within a tolerance of plus or minus 0.10 feet and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and to allow for inspection.
  - 2. In all structural areas including the exterior learning center native soils in the upper 3.5 feet or 2 feet below the bottom of footings, whichever is lower, should be overexcavated and replaced with compacted structural fill. The over-excavation should extend a minimum of five feet (5') beyond building footprint in plan view.
- K. Perform work as specified herein and in accordance with Section 203 of the Uniform Standard Specifications.
- L. Excavations for pavements and exterior flatwork: Excavate or fill for pavements to comply with the cross sections, elevations and grades as shown on the plans. Over-excavation should be a minimum of two (2) feet and it should extend two (2) feet beyond in plan view. After over-excavation, the areas should be scarified a minimum of 6 inches, moisture-conditioned and replaced with compacted structural fill.

### 3.03 COMPACTION

- A. Control soil compaction during construction and ensure Quality Assurance testing is requested in a timely fashion and all testing passes the minimum relative density and moisture content requirements for each respective area of work.
- A. Fill materials within structural areas should be moisture conditioned as required, evenly spread on a horizontal plane in 8-inch loose lifts and compacted as follows:
  - 1. Granular structural fills should be compacted to a minimum 95 percent of maximum dry density and within 2 percent of optimum moisture content as determined by ASTM D1557.
  - 2. Fine-grained structural fills should be compacted to a minimum 90 percent of maximum dry density and within 0 to plus 4 percent of optimum moisture content as determined by ASTM D1557.
  - 3. Natural soils exposed at the bottom of excavations in structural areas should be compacted to a minimum of 90 percent of maximum dry density and within 0 to 4 percent optimum moisture content.
- C. Moisture Control: Moisture condition all soils approved for placement as fill or backfill as required by the Soils Engineer to ensure proper compaction is achieved given the specific earthwork operation.
- D. Remove and/or replace, scarify and air dry all soil material that is too wet to permit compaction to specified density or as directed by the Project Soils Engineer. Do not allow fill soils to dry out prior to constructing foundations, pavements, flatwork or other associated site improvements due to their sensitivity to moisture.

### 3.04 GROUND SURFACE PREPARATION

- A. Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills.
- B. All onsite loose, porous, or dry soils as directed by the Soils Engineer shall require removal prior to the placement of backfill and fill.

- C. Following removal of unsuitable/undensified soils and prior to the placement of fill, scarify the upper 6 inches of the approved ground surface, moisture condition, or dry as required, and recompact per above listed requirements.
- D. All in-situ and import fill material as tested and approved by the Quality Assurance Testing Laboratory of Record (Soils Engineer) may be reused in compacted fills.
- E. Plow, strip, or break-up and scarify sloped surfaces steeper than 1 vertical to 5 horizontal and provide keying and benching. Drainage diversion should be provided at the top of slopes to prevent water from flowing over the slope surface. Slope surfaces should also be considered for slope protection to reduce erosion.
- F. Placement and Compaction: Upon completion of over-excavation, scarification, moisture conditioning and recompaction, place backfill and fill materials in thin, loose lifts of eight (8) inches when compacted by heavy compaction equipment and not more than 2 inches in compacted depth for material compacted by hand-operated mechanical equipment.
- G. Before compaction moisten or aerate each layer to provide optimum moisture content as directed by the Soils Engineer. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
- H. Place backfill and fill materials in uniform layers to required elevations and exercise caution adjacent to structures, piping or conduit. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping, or conduit to approximately same elevation in each lift.

### 3.05 GRADING

- A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.
- B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.
- C. Finish surfaces free from irregular surface changes and as follows:
  - 1. Walks: Shape surface of areas under walks to line, grade, and cross section, with finish surface not more than 0.05 feet above or below required subgrade elevation.
  - 2. Pavements: Shape surface of areas under pavement to line, grade, and cross section, with finish surface not more than ½-inch above or below required subgrade elevation.
- D. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of ½-inch when tested with a 10-foot straightedge.
- E. Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

### 3.06 PAVEMENT SUBBASE COURSE

- A. General subbase course consists of placing structural fill (subbase) material in layers of specified thickness, over subgrade surface to support a pavement base course. See other Division 32 Sections for paving specifications.

- B. Grade Control: During construction, maintain lines and grades including crown and cross slope of subbase course.
- C. Placing: Place sub-base course material on prepared subgrade in layers of uniform thickness conforming to indicated cross section and thickness. Maintain within two percent (2%) of optimum moisture content for compacting subbase material during placement operations.
- D. When a compacted subbase course is shown to be 6 inches thick or less, place material in a single layer. When shown to be more than 6 inches thick, place material in equal layers, except no single layer more than 6 inches or less than 3 inches in compacted thickness.

### 3.07 FIELD QUALITY CONTROL

- A. Quality Assurance/Control Testing During Construction: Provide for access and schedule a minimum 24 hours advance notice for all required QA Testing. Requests for testing shall be conducted per the approved testing program guidelines for both notification and frequency of testing. Allow Testing Lab/Soils Engineer to inspect and approve subgrades and fill layers before further construction work is performed.
  - 1. Testing Agency: Shall perform field density tests in accordance with the applicable ASTM Standards for laboratory and field density testing.
  - 2. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design-bearing capacities. The Soils Engineer of Record shall verify all foundation support soils exhibit a firm and unyielding condition and meet the Project Geotechnical Engineer's requirements for bearing capacity.
  - 3. Paved Areas and Building Envelope (Slab on Grade) Subgrade: Perform at least one field density test of subgrade for every 2,000 square feet of building floor footprint or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2,000 square feet of overlying building slab or paved area, but in no case less than three tests.
- B. If the Soils Engineer's opinion, which is based on testing reports and grading observation, is that the subgrade or fills are below the specified density, the Contractor shall remove and replace or provide additional compaction. Re-testing shall be at no additional expense to the Owner.
- C. Prior to the start of construction activities, a sieve analysis and source location of all proposed import soils to be tested shall be provided.
- D. Field inspection and testing will be performed under provisions of Sections 01 45 00 and 01 33 00.

### 3.08 MAINTENANCE

- A. Protection of Graded Areas: Protect graded areas from traffic and erosion. Keep free of trash and debris and maintain on a daily basis.
- B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.
- C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, and recompact to required relative density prior to further construction.
- D. Settlement: Where settlement has occurred as measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.09 DISPOSAL OF EXCESS AND WASTE MATERIALS

- A. Removal to Designated Areas on Owner's Property: Transport acceptable excess excavated material to designated soil storage areas on Owner's property. Stockpile soil or spread as directed by Soils Engineer or Owner's Representative.
- B. Removal from Owner's Property: Remove waste materials, including unacceptable excavated material, trash and debris, deleterious and otherwise unsuitable materials from the Owner's property to an approved disposal facility at no additional cost to the Owner.

END OF SECTION 31 01 00

## SECTION 31 11 00 - SITE CLEARING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Removal of surface debris.
- B. Clear site of plant life, grass, trees, and all related deleterious materials.
- C. Disposal of all "cleared" materials to an approved disposal facility.

#### 1.02 RELATED SECTIONS

- A. Section 31 01 00 – Earthwork
- B. Section 31 23 16 - Excavation
- C. Section 31 23 23 - Backfill

#### 1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable local code for disposal of debris to approved facilities and the abandonment of existing wells in accordance with State of Nevada Statutory Regulations.
- B. Coordinate clearing work with utility companies.
- C. Burning on-site is not allowed.
- D. All work within the public right-of-way shall conform to requirements of the current edition Uniform Standard Specifications and Drawings for the Public Works' Construction Off-site Improvements Clark County Area Nevada also known as the Uniform Standard Specifications and the Uniform Standard Drawings.

### PART 2 PRODUCTS

Not Used.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Prior to construction activities, verify if existing plant life is to remain and if they have been tagged or identified by the Owner.

#### 3.02 PROTECTION

- A. All utilities should be located, identified, and protected from damage. Notify the Engineer of any conflicts with existing utilities and the proposed work.
- B. Protect existing structures from damage or displacement as shown on the plans.
- C. Preserve and protect all land survey monuments of record that are located within the limits of construction. Preserve and protect any land survey monuments of record found during the course of construction in accordance with NRS 329. If any land survey monument of record is disturbed as a result of the work, re-establish it under the direction of a Professional Land Surveyor Licensed in the State of Nevada.



3.03 CLEARING

- A. Clearing and removal work shall be in accordance with Sections 201 and 202 of the Uniform Standard Specifications.
- B. Clear areas as directed by the Engineer required for access to site and execution of work.
- C. Clear undergrowth and deadwood without disturbing subsoil.
- D. Clear debris of any type and remove to an approved disposal facility.
- E. Should a Desert Tortoise or tortoise burrow be encountered, stop work and contact the Owner's Project Manager or Engineer. The Owner will request the proper Authorized Personnel to remove the tortoise. Removal of tortoises from the site other than by U.S. Department of Wildlife Authorized Personnel shall be constituted as a "TAKE" action.

3.04 REMOVAL

- A. Remove all debris and otherwise deleterious materials to approved disposal facilities in accordance with all Local Municipal and State of Nevada Statutory Regulations.

END OF SECTION 31 11 00

## SECTION 31 23 16 - EXCAVATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Excavation for slabs-on-grade, landscaping, and utilities.
- B. Excavation for site structures.

#### 1.02 RELATED SECTIONS

- A. Section 31 11 00 – Site Clearing
- B. Section 31 23 23 - Backfilling
- C. Section 31 23 33 - Trenching

#### 1.03 FIELD MEASUREMENTS

- A. Verify that survey benchmark and intended elevations for the work are as indicated.
- B. Preserve and protect all land survey monuments of record that are located within the limits of construction. Preserve and protect any land survey monuments of record found during the course of construction in accordance with NRS 329. If any land survey monument of record is disturbed as a result of the work, re-establish it under the direction of a Professional Land Surveyor Licensed in the State of Nevada.

### PART 2 PRODUCTS

Not used.

### PART 3 EXECUTION

#### 3.01 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Over-excavated areas are to be backfilled and re-compacted with structural fill materials or suitable excavated material as directed by the Soils Engineer.

#### 3.02 GRADING

- A. After removing existing vegetation, all debris, existing uncontrolled fill, and soft, loose or disturbed natural soils shall be removed in accordance with the Project Geotechnical Investigation as directed by the Soils Engineer from within the proposed building areas, beneath adjacent walks, slabs, and in areas to be paved. The term uncontrolled fill refers to any existing fill that was not properly placed, inspected, and/or tested.

#### 3.03 EXCAVATION

- A. Excavate subsoil required to accommodate building foundations, slabs-on-grade, paving and site structures, construction operations, and miscellaneous surface features.
- B. Slope all surfaces and embankment to the slopes as indicated on drawings.
- C. Excavated soil line and grade shall not interfere with normal forty-five (45) degree bearing splay of foundation.

- D. Grade and provide temporary slopes as required at the top perimeter of excavation to prevent surface water flows from draining into excavation.
- E. Notify Architect and Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- F. Correct unauthorized excavation at no additional cost to Owner.
- G. Excavation and excavation slopes for all construction shall be confined within the limits indicated by the lines and grades shown on the Drawings, and/or as staked in the field.
  - 1. Any highly porous soils shall be over excavated to a depth of at least one-foot below subgrade level as directed by the Geotechnical Engineer.
  - 2. Materials outside the limits of the proposed improvements that constitute a threat to the maintenance or protection of the improvements as determined by the Geotechnical Engineer shall be removed at no additional cost to the Owner.
- H. Scarification of Existing Ground Surface:
  - 1. Areas upon which proposed Type II gravel base material is to be placed shall first be cleared in accordance with Section 31 11 00 and shall then be scarified to minimum depth of 6 inches or as shown on the plans.
  - 2. Rocks larger than 6 inches in maximum dimension or as directed by the Soils Engineer shall be removed from the scarified material and disposed of by the Contractor at its own expense in accordance with Section 31 11 00.

Compacting of Existing Ground Surface: Following scarification, moisture conditioning and blending operations, the existing ground surface shall be compacted to not less than ninety percent (90%) of maximum density prior to the placement of any fill material.

#### 3.04 FIELD QUALITY CONTROL

- A. Field Quality Assurance Testing and Inspection will be performed by an independent Testing Laboratory under the direction of a Professional Geotechnical Engineer under contract with the Owner. Retesting as a result of inferior work shall be retested at no additional cost to the Owner.

#### 3.05 PROTECTION

- A. Protect all excavations by methods required to prevent cave-in or loose soil from falling into excavation.
- B. In order to prevent damage, provide sufficient setback of windrows and stockpiles from the top of excavations.

#### 3.06 OVER-EXCAVATION

- A. Beneath Miscellaneous Concrete Structures: The area beneath the applicable concrete structures shall be over-excavated as shown unless otherwise requested by the Engineer at no additional cost to the Owner. After the over-excavation has been completed, the area shall be refilled to the required grade with structural fill material per Section 31 23 23. The material shall be brought to within two percent (2%) of optimum moisture content and compacted to ninety-five percent (95%) of maximum density.
- B. Unauthorized Over-Excavation: Any excavation carried below the grades shown, and as specified herein, or below the grades requested by Engineer, shall be backfilled to the required grades with structural fill materials as approved by the Soils Engineer. Such material shall be moisture conditioned to within two

percent (2%) of optimum moisture content as required and compacted to ninety-five percent (95%) of maximum density. Such work shall be performed at no additional cost to the Owner.

3.07 DISPOSAL OF EXCESS AND/OR UNSUITABLE MATERIAL

- A. Excess material and/or excavated material unsuitable for backfill, as determined by the Soils Engineer, shall be removed from the site at no additional cost to the Owner.

END OF SECTION 31 26 16

## SECTION 31 23 23 - BACKFILLING

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Site filling and backfilling.
- B. Fill under slabs-on-grade, paving, and utilities.
- C. Consolidation and compaction.
- E. Fill for over-excavation.

#### 1.02 RELATED SECTIONS

- A. Section 31 11 00 – Site Clearing
- B. Section 31 23 16 - Excavation

#### 1.03 REFERENCES

- A. ASTM C136 – Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- B. ASTM D698 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- C. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
- D. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- E. ASTM D2922 - Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth).
- F. ASTM D3017 - Test Method for Water Content of Soil and Rock in Place by Nuclear Method (Shallow Depth).
- G. Uniform Standard Specifications and Drawings for Public Works' Construction Off-site Improvements Clark County Area Nevada, latest edition also known as Uniform Standard Specifications and Drawings. Materials and workmanship specified herein with reference to these Uniform Standard Specifications shall be in accordance with the referenced sections, articles, and paragraphs except that contractual, measurement, and payment provisions do not apply.

#### 1.04 SUBMITTALS

- A. Submit under provisions of the contract all proposed material samples and test certification reports for same.
  - 1. No soil material shall be imported, stockpiled on-site or placed from any sources, until the material has been tested and accepted by the Quality Assurance Testing Agency of record and approved for use in the project.
- B. Samples: Submit each type of proposed backfill/fill material for laboratory testing by the Quality Assurance Agency of record. Soil submittals shall be a minimum 5-gallon samples contained in plastic containers with airtight covers.

- C. Certified Test Reports: In addition to the requirements for materials submittals per Subsection 31 23 23-1.04(B.) above provide materials certification/test reports from a qualified Clark County approved laboratory for all proposed import sources. The test reports shall state the location of the source and provide the dates and type of testing conducted.

## PART 2 PRODUCTS

### 2.01 BACKFILL/FILL MATERIALS

- A. All proposed imported backfill/fill materials shall conform to the specifications stated in the Section 31 01 00 and be tested and approved as certified for use by the Owner- approved Quality Assurance Testing Laboratory prior to import operations and stockpiling on the project site per the requirements of Subsection 31 23 23 –1.04. The material certification laboratory testing report shall be obtained from the supplier and submit with the samples for testing. Based on the area of backfill and the approval of the Soils Engineer the following are descriptions of the various types of backfill materials.
- B. Type I Aggregate Base: As specified in Uniform Standard Specifications Section 704.03.02 for 2-inch size material with the exception that no crushed asphalt and concrete materials shall be permitted under foundations and/or building floor “slab on grade” or in utility trenches.
- C. Type II Aggregate Base Material: All natural stone material from mineral deposits free of clay, shale, organic matter; graded in accordance with ASTM C136. Type II material shall meet the requirements of the Uniform Standard Specifications Section 704.03.04 with the exception that no crushed asphalt and concrete materials shall be permitted under foundations and/or building floor “slab on grade” or in utility trenches.
- D. Type C Sand: Natural River or Bank Sand, washed; free of silt, clay, loam, friable or soluble materials, or organic matter graded in accordance with ASTM C136.
- E. Structural Fill/Fill: As approved by the Soils Engineer in accordance with the requirements of Section 31 01 00.
- F. Drain Backfill: Washed, evenly graded mixture of crushed stone, crushed or uncrushed gravel, with 100 percent passing a 1 ½-inch sieve, and not more than 5 percent passing a No. 4 sieve.
- G. Selected Backfill: As specified in Uniform Standard Specifications Section 207.02.01.
- H. Granular Backfill: As specified in the Uniform Standard Specifications Section 207.02.02

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. All field testing will be performed by an independent Quality Assurance Testing Laboratory under the supervision of a Professional Geotechnical Engineer under contract with the Owner. Verify with the Geotechnical Engineer if excavated materials to be re-used as fill meet the specifications as stated in the Section 31 01 00.

### 3.02 PREPARATION

- A. Generally, compact subgrade to density requirements for subsequent backfill materials.
- B. Prior to placement of aggregate base course material at paved areas, over excavate, scarify and re-compact subgrade soils per the requirements as contained in these specifications.

- C. Provide dust control as required in accordance with the Clark County Air Quality Management Division and the Permit.

### 3.03 BACKFILLING

- A. Backfill areas to contours and elevations with approved materials at the specified compaction and optimum moisture content.
- B. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces. The Soils Engineer prior to backfill operations shall approve all subgrade.
- C. Place and compact material in continuous layers not exceeding 8 inches in loose lift thickness.
- D. Maintain within two percent (2%) of optimum moisture content and compact as specified in Section 31 01 00 for all backfill materials.

### 3.04 TOLERANCES

- A. Top Surface of Backfilling Under Paved Areas: Plus or minus 1/10-foot from required elevations.

### 3.05 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed by an Independent Quality Assurance Testing Laboratory under the supervision of a Geotechnical Engineer under contract with the Owner.
- B. If the results of field-testing indicate work does not meet the minimum specified requirements, remove work, replace, and retest at no additional cost to the Owner.
- C. Frequency of Tests: Per the Owners requirements as contained herein and per the testing program as established by the Soils Engineer.
- D. Field inspection and testing will be performed under provisions of Sections 01 40 00 and 01 43 26.

### 3.06 COMPACTION REQUIREMENTS

- A. Definitions:
  - 1. Building Envelope Areas: All areas within 5 feet outside the building footprint.
  - 2. Onsite Areas: All areas within the site boundary property lines as shown on the plans and included in the contract scope of work.
  - 3. Off-site Areas: All areas outside the site boundary areas within dedicated Right-of-Way or easements and as included in the Contract Scope of Work.
- B. Compaction Optimum Moisture and Relative Density
  - 1. Compact fill and backfill materials to not less than the minimum percentage of the maximum laboratory density per Section 31 01 00 and generally prescribed as follows:
    - a. Building envelope areas for all foundations and slab on grade floors: Ninety-five percent (95%).
    - b. Onsite concrete flatwork and asphalt paved areas: Ninety-five percent (95%).
    - c. On-site open space areas (unpaved areas): Ninety percent (90%).
    - d. Utility trenches: As specified for applicable area of trench, but not less than ninety percent (90%) and per the above requirements in the top one foot of subgrade for the applicable area of work.

2. All soils shall be placed after sufficient blending and within two percent (2%) of optimum moisture content per Section 31 01 00 and as directed by the Soils Engineer.
3. All requests for testing services shall be written and made at a minimum 24 hours advance notice (one working day) of the work to be tested.

3.07      COMPACTION TESTS

- A. Compaction and laboratory testing for compliance will be made by the Quality Assurance Testing Laboratory of record under the direct supervision of a Geotechnical Engineer, at the expense of the Owner, using the test procedures specified in Section 111 of the Uniform Standard Specifications and ASTM D1557.
- B. Retesting as a result of noncompliance shall be at no additional expense to the Owner.
- C. The location and frequency of field tests shall be at the discretion of the Soils Engineer. Sufficient time shall be allotted before attempting to place new fill material for performing the necessary control test for acceptance of a compacted layer. Any layer or portion thereof that does not meet density requirements shall be reworked and recompacted until it meets the specified density requirements as determined by the Soils Engineer per the Project Soils Report.

END OF SECTION 31 23 23



## SECTION 32 11 23 - AGGREGATE BASE COURSE

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Aggregate Base Course.

#### 1.02 RELATED SECTIONS

- A. Section 31 01 00 - Earthwork
- B. Section 31 23 23 - Backfilling: Compacted Fill Under Base Course
- D. Section 32 13 13 – Portland Cement Concrete Paving

#### 1.03 REFERENCES

- A. AASHTO M147-65 - Materials for Aggregate and Soil-Aggregate.
- B. ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D698 - Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
- D. ASTM D1557 - Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.
- E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- F. Current edition Uniform Standard Specifications and Drawings for the Public Works' Construction Off-site Improvements Clark County Area Nevada also known as the Uniform Standard Specifications and the Uniform Standard Drawings.

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Aggregate base course shall be Type II aggregate base with crushed Portland Cement Concrete and/or Asphalt Concrete conforming to the requirements Section 704.03.04 of the Uniform Standard Specifications with the following exceptions:
  - 1. The use of crushed Portland Cement Concrete and/or Asphalt Concrete will not be permitted under building floors (slabs on grade) and in utility trenches.
  - 2. All off-site work shall be in accordance with the Permit from the applicable Agency.

### PART 3 EXECUTION

#### 3.01 EXAMINATION

- A. Verify subgrade has been tested and passed inspection and that grades and elevations are correct (within tolerance).
- B. Submit Materials Certification Reports and provide samples for laboratory testing per Section 31 23 23 – 1.04 of these Specifications.

3.02 AGGREGATE PLACEMENT

- A. Place Type II aggregate base course material over prepared subgrade in areas as designated on the plans. Compact all aggregate base courses to a minimum ninety-five percent (95%) of the maximum density.
- B. Place Type II aggregate base courses in not less than 3 inches but not more than 6 inches in compacted thickness.
- C. Level and contour surfaces to elevations and grades indicated.
- D. Use mechanical vibrating and tamping equipment in areas inaccessible to heavy compaction equipment.

3.03 TOLERANCES

- A. Flatness: Maximum variation of ¼-inch measured with 10-foot straight edge.
- B. Scheduled Compacted Thickness: Plus or minus ½-inch.
- C. Variation from True Elevation: Plus or minus ¼-inch.

3.04 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the contract by the Owner provide Quality Assurance Testing Laboratory.
- B. Gradation of Aggregate: In accordance with Subsection 704.03.04 of the Uniform Standard Specifications.
- C. If tests indicate work does not meet specified requirements, remove work, replace, and retest at no additional cost to Owner.
- D. Frequency of Tests: The minimum required testing shall be one test for every lift of aggregate base per 2000 square feet of surface area or as directed by the Soils Engineer or required by the permitting Agency (off-site).

END OF SECTION 32 11 23

## SECTION 32 13 13 - PORTLAND CEMENT CONCRETE PAVING

### PART 1 GENERAL

#### 1.01 WORK INCLUDED

- A. All related concrete flatwork including, curbs and aprons.
- B. Steel and welded wire reinforcement.
- C. Surface finish.
- D. Curing.

#### 1.02 RELATED SECTIONS

- A. Section 32 11 23 – Aggregate Base Course: Placement of Type II Base Course Materials for concrete flatwork

#### 1.03 REFERENCES/REQUIREMENTS

- A. ACI 301 - Structural Concrete.
- B. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.
- C. ACI 305 R-99 – Hot Weather Concreting.
- D. ACI 306 R-88 – Cold Weather Concreting.
- E. ACI 330 R-01 - Guide for Design and Construction of Concrete Parking Lots.
- F. ACI 330 1-94 – Standard Specification for Plain Concrete Parking Lots.
- G. ANSI/ASTM A185 - Steel Welded Wire Reinforcement, Plain, for Concrete.
- H. ANSI/ASTM A497 - Steel Welded Wire Reinforcement, Deformed for Concrete.
- I. ANSI/ASTM A615 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- J. ASTM C31 – Practice for Making and Curing Concrete Test Specimens in the Field.
- K. ASTM C33 - Specification for Concrete Aggregates.
- L. ASTM C39 - Test Method for Compressive Strength of Cylindrical Concrete Cylinders.
- M. ASTM C94 - Specification for Ready-Mixed Concrete.
- N. ASTM C143 – Test Method for Slump of Hydraulic Cement Concrete.
- O. ASTM C150 - Specification for Portland Cement.
- P. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- Q. ASTM C494 - Chemical Admixtures for Concrete.

- R. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.
- S. ANSI/ASTM D1752 – Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- T. Reference Standard Specifications: Materials and workmanship specified herein with reference to the Uniform Standard Specifications for Public Works’ Construction Off-site Improvements Clark County Area Nevada latest edition and the Standard Specification for Ready-Mixed Concrete (ASTM C94), shall be in accordance with the referenced articles, sections and paragraphs of the standards except that contractual, measurement, and payment provisions do not apply.

#### 1.04 QUALITY ASSURANCE

- A. Perform work in accordance with Sections 409 and 501 of the Uniform Standard Specifications and these Specifications.
- B. Obtain cementaceous material from same source throughout construction.

#### 1.05 REGULATORY REQUIREMENTS

- A. Conform to Uniform Standard Specifications, for Public Works’ Construction, Off-site Improvements, Clark County Area, Nevada, latest edition and supplements, for site concrete work on public or private property.

#### 1.06 TESTS

- A. Quality Assurance testing and analysis will be performed under provisions of the contract by a Certified Testing Laboratory under direct contract with the Owner.
- B. Submit proposed mix design of each class of concrete to the Architect for review prior to commencement of work.
- C. Quality Assurance Testing Laboratory will take cylinders and perform slump and air entrainment tests in accordance with ACI 301.

#### 1.07 SUBMITTALS

- A. Submit product data under provisions of the contract.
- B. Include data on joint filler, admixtures, and curing compounds.
- C. Submit manufacturer’s instructions under provisions of Sections the contract.
- D. The Contractor’s proposed concrete mix design shall be submitted to the Engineer for review and approval prior to use in the work.

### PART 2 PRODUCTS

#### 2.01 CONCRETE MATERIALS

- A. Cement: Type V and conforming to the provisions of Section 701 of the Uniform Standard Specifications.

- B. Fine and Coarse Aggregates: Shall conform to Section 706 of the Standard Specifications and to the requirements of ASTM C33. Coarse aggregate shall be of 1½-inches maximum size, except as otherwise specified herein.
- C. Water: Clean and not detrimental to concrete. Water shall be of potable quality.

## 2.02 FORM MATERIALS

- A. Conform to ACI 301.

## 2.03 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615; Grade 60; plain or deformed billet steel bars, as noted on Drawings.
- B. All reinforcing steel shall have a minimum 75% post-consumer recycled content.
- C. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185, in flat sheets, uncoated.
- D. Tie Wire: Annealed steel, minimum 16-gage size.
- E. Dowels: ASTM A615, 40 ksi yield grade, plain steel, uncoated finish.
- F. Synthetic Structural Fibers: Euclid TUF-STRAND SF Fibers.

## 2.04 ACCESSORIES

- A. Curing Compound: FS TT-C-800, Type 1, 30 percent (30%) solids.
- B. Joint materials shall conform to Section 707 of the Uniform Standard Specifications, except as otherwise noted on Drawings or by Engineer.

## 2.05 ADMIXTURES

- A. Per the approved concrete mix design and in accordance with the permitting agency requirements.

## 2.06 AGGREGATES

- A. Aggregates shall conform to Section 706 of the Uniform Standard Specifications and to the requirements of ASTM C33. Coarse aggregate shall be of 1½-inch maximum size, except as otherwise specified herein.

## 2.07 CONCRETE MIX

- A. Concrete shall conform to the requirements of Section 501 of the Standard Specifications and to the requirements of ASTM C94, subject to the modifications and supplemental requirements contained in these Specifications. The use of Fly Ash will be permitted in Accordance with Section 701 of the Standard Specifications.
- B. Water-Cement Ratio and Compressive Strength
  - 1. The minimum compressive strength and cement content of concrete shall be not less than that shown in Section 501.03.04 - Table 1 of the Uniform Standard Specifications or per the requirements of the Geotechnical Engineer, whichever is greater. The Engineer may request the cement content for any concrete to be increased over the quantity specified herein or contained in the concrete mix designs if he determines that such increase is necessary in order to attain the required strengths. Such increased quantities of cement, if so requested, shall be furnished by the

Contractor at no additional cost to the Owner. The maximum Water-Cement (W/C) ratio shall be 0.45 unless otherwise approved by the Architect or Engineer.

2. Provide concrete to the following mix design:

<u>Concrete Use</u>	<u>Min. 28 Day Strength</u>	<u>Max. Aggregate Size</u>
Flatwork, on-site curb, gutters headwalls, building slabs, etc.	4,500 psi	¾ inch

3. The Contractor is hereby cautioned that the cement contents shown in the above referenced Table 1 are minimum values. The contractor or concrete supplier shall, at its own expense, furnish additional quantities of cement as required to consistently obtain the compressive strengths designated for the intended work item.

## 2.08 PIGMENTED CURING COMPOUND

- A. Techkote Product No. 82 as manufactured by National Expansion Joint Co., Oakland, California; Burke Pigmented Cure; or approved equal.
- B. A type which will not prevent the adherence of paint or coating to finish concrete surfaces.

## PART 3 EXECUTION

### 3.01 INSPECTION

- A. Provide written verification that compacted granular base is ready to support paving and imposed loads.
- B. Provide written verification that gradients and elevations of base are correct.
- C. Beginning of installation means acceptance of existing conditions.

### 3.02 PREPARATION

- A. Moisten condition all aggregate base material (base grade) to minimize the absorption of water from concrete curing.
- B. Obtain mix design approvals and notify Architect/Engineer and required Agencies a minimum of twenty-four (24) hours (one working day) prior to commencement of concrete operations.
- C. Protect the surfaces of manholes, catch basins, and other surfaces as required to prevent bonding with concrete pavement. Provide expansion and weakened planed joints as required by the plans.

### 3.03 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- C. Place joint fillers vertical in position, in straight lines. Secure to formwork during concrete placement.

### 3.04 REINFORCEMENT

- A. Place reinforcement at mid-height of slabs-on-grade unless otherwise indicated on Plans.
- B. Interrupt reinforcement at joints as shown on Drawings.
- C. Provide doweled joints at interruptions of concrete with one end of dowel lubricated to allow longitudinal movement.

### 3.05 FORMED JOINTS

- A. Locate joints as specified herein or shown on the plans.
- B. Make all joints perpendicular and straight.
- C. Weakened Plane Joints.
  - 1. Sidewalk: Weakened plane joints shall be constructed every 5 feet (maximum) and shall conform to Section 613 of the Uniform Standard Specifications unless otherwise noted on Drawings or by Engineer.
  - 2. Curb and Gutter: Weakened plane joints shall be constructed every 10 feet (maximum) and shall conform to the provisions of Section 613 of the Uniform Standard Specifications.
  - 3. Mow Strips: Every 10 feet by scoring the surface ¼-inch wide by 1-inch in depth.
  - 4. Immediately after the forms are removed, the Clark County School District shall inspect the construction joints carefully. Any concrete or mortar that has sealed across the joint shall be sawcut neatly and removed.
- D. Expansion joints.
  - 1. Sidewalk: Expansion joints one-half inch in thickness shall be constructed every 30 feet by using premolded expansion joint material and shall conform to Section 613 of the Uniform Standard Specifications. Expansion joints shall be placed where the new sidewalk meets existing sidewalks and new curbs. Also, expansion joints and caulking shall be placed where the new sidewalk meets fixed objects. No dowel bars shall be required at the joints. Top of joint material shall be ½-inch below top of finished concrete.
  - 2. Curb, Gutter, and Mow Strips: Expansion joints, ½-inch in thickness, shall be constructed every 30 feet and at changes in direction by using premolded expansion joint filler and shall conform to Section 613 of the Uniform Standard Specifications. Joint filler material shall also be placed between the curb and/or gutter and storm drainage structures.

### 3.06 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and Sections 501 and 502 of the Uniform Standard Specifications
- B. Ensure reinforcement, inserts, embedded parts, formed joints and dowels are not disturbed during concrete placement.
- C. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
- D. Place concrete to straight-line pattern. Saw cut weaken planed joints ¼-inch wide and 1-inch into the depth of slab at the optimum time after finishing and curing. Refer to contract drawings for spacing requirements.

### 3.07 FINISHING OF CONCRETE SURFACES

- A. All finished or formed surfaces shall conform accurately to the shape, alignment, grades and sections as shown or requested. Surfaces shall be free of fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous, hard surface.

- B. Exposed vertical corners of all concrete structures shall be given a 3/4-inch chamfer. Forms shall not be removed until permission to do so has been received from Engineer.
- C. Exposed uniformed surfaces of concrete shall be given the following finishes: Area paving – heavy broom finish; concrete aprons - heavy broom finish; sidewalk paving - broom finish; curbs and gutters- broom finish; inclined vehicular ramps - broomed perpendicular to slope; other surfaces - steel trowel finish.
- D. Dusting on of dry cement or sand to absorb excess moisture will not be permitted.
- E. Unless otherwise shown, the edges of all exposed horizontal surfaces shall be finished with an edging tool to a radius of 1/2-inch.

### 3.08 CURING

- A. Place curing compound on exposed concrete surfaces immediately after finishing. All structural concrete shall be cured by being moist for fourteen (14) days after placing or, at the option of the Contractor, may be cured by use of a curing compound meeting the requirements of Section 702 of the Uniform Standard Specifications, and which has been approved by the Engineer.
- B. The curing compound shall be applied in accordance with the manufacturer’s instructions at a minimum coverage rate of 150-square feet per gallon in such a manner as to cover the surface with a uniform film, which will seal thoroughly.

### 3.09 CONCRETE CURB AND GUTTER

- A. General: Concrete curb and gutters shall be constructed in accordance with Section 613 of the Uniform Standard Specifications, except as otherwise provided herein.
- B. Extruded Curb and Gutter and/or Curb: Extruded curb and gutter shall be in accordance with the requirements of Section 613 of the Uniform Standard Specifications, and the requirements contained herein.
  1. Upon prior approval by Engineer, a curb and gutter extrusion machine may be used to produce the curb and gutter and/or curb in place. However, the product produced by such a machine must be equal to or exceed the product produced by steel forms. Extruded curb and gutter and/or curbs shall not be permitted for longitudinal slopes of 0.5 percent or less.
  2. When the concrete is in place, the voids in the concrete shall not exceed seven percent (7%) of the total volume of the concrete mass.
  3. Where curb and gutter extrusion machines are approved for use, expansion joints shall be required at the E.C. and B.C. of curb returns, and also along the line of the work at regular intervals not to exceed 30 feet. Unless otherwise specified, transverse weakened plane joints on curb and gutter produced by an extrusion machine shall be constructed at 10-foot intervals long the line of work.

### 3.10 PARKING BUMPERS

- A. Install precast concrete parking bumpers as shown on the drawings.
- B. Drill through pavement and secure with steel rods as shown on the plans.

### 3.11 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of the contract by the Quality Assurance Testing Laboratory under direct contract with the Owner. All requests for testing and inspection shall be in writing with 24 hours (one working day) advanced notice and shall be coordinated through the Owner’s designated representative.



B. Concrete Tests

1. Three (3) concrete cylinders will be taken for every seventy-five (75) or less cubic yards of each class of concrete placed each day. One (1) additional test cylinder will be taken during cold weather and cured on site under the same conditions as the concrete it represents.
2. One (1) slump test will be taken for each set of test cylinders taken.
3. Maintain records of placed concrete items. Record data, location of placement, quantity, air temperature, and test samples taken.
4. Portland cement concrete shall be subject to the requirements and test methods contained in Section 501.02.04 of the Uniform Standard Specifications.
5. The determination of compressive strength in psi will be made by testing 6-inch diameter by 12-inch cylinders, made and cured in accordance with ASTM C31 and ASTM C39. Engineer will make tests and analysis of the aggregates and of the resulting concrete and the mixes used shall be changed whenever, in the opinion of the Engineer, such change is necessary or desirable to secure the required workability, density, impermeability, surface finish and strength; and the Contractor shall be entitled to no additional compensation because of such changes. The cost of laboratory tests on cement, aggregate, and concrete will be borne by the Owner, but the Contractor shall assist the Engineer in obtaining specimens for testing.
6. Failed compression tests shall be cause for removal of the work by the contractor. Additional testing as a result of failed test results shall be at no additional cost to the Owner.

3.12 PROTECTION

- A. Immediately after placement, protect concrete by any means necessary from premature drying or inadequate curing, excessive hot or cold temperatures, and damage as a result of pedestrian or vehicular traffic.

END OF SECTION 32 13 13

## SECTION 32 18 16 - SYNTHETIC GRASS SURFACING SYSTEM – PLAY AREAS

### PART 1 GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes synthetic grass surfacing for installation as indicated on the Drawings and specified herein.

#### 1.3 SYSTEM DESIGN

- A. The synthetic grass surfacing system shall be specifically designed and recommended by the manufacturer for installation as a play area.
- B. The synthetic grass surfacing system shall be constructed to maximize dimensional stability, to resist damage during normal use, and to minimize UV degradation, including fading.
- C. The synthetic grass surfacing system shall be resistant to staining, weather, insects, rot, mildew, and fungus growth, and shall be non-allergenic and non-toxic.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: Submit manufacturer's product data, specifications and installation instructions for each product specified.
  - 1. Include sources for component materials.
- B. Material Certificates: Signed by manufacturer, certifying the materials and system proposed for the project comply with the specified performance criteria.
- C. Shop Drawings: Submit shop drawings that include scaled plans, sections, and large-scale details showing the installation and attachment of the synthetic grass surfacing system.
  - 1. Include locations of all seams in fabric surfacing.
- D. Samples:
  - 1. 18 inch by 18 inch samples showing details of finished installation. Include an example of a field joined seam between adjacent rolls and outside edge attachment.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualifications for Installer.
- B. Qualifications for Manufacturer.
- C. Maintenance Data: For synthetic grass surfacing system and maintenance equipment, to be included in maintenance manuals. Include the following:

1. Manufacturer's written instructions manual for routine cleaning, adjustment, grooming, and other maintenance procedures. Include activities and procedures that could be detrimental to the synthetic grass surfacing system and should be avoided.
  2. Owner's manuals for field grooming and sweeping equipment.
  3. Warranty information for field grooming and sweeping equipment.
- D. Project Record Drawings: Record actual locations of seams and drains on the Record Drawings.
- E. Warranty: 3 signed copies of signed warranty.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm specializing in the manufacturing of synthetic grass surfacing for a minimum of five years and who has completed work similar in design and extent to that required for the project, in not less than 15 synthetic grass dog runs in the last three years and whose work has resulted in construction with a record of successful in-service performance.
- B. Installer Qualifications: Firm experienced in the installation of synthetic grass dog runs, who is certified by the synthetic grass manufacturer to install their materials, who has successfully installed work similar in design and extent to that required for the project, in not less than 10 projects of similar scope, to the satisfaction of the Architect, in the last three years, who employs trained workmen that are experienced in the installation of the synthetic grass system proposed for the project, and whose work has resulted in construction with a record of successful in-service performance.
- C. Single-Source Responsibility: Obtain synthetic grass surfacing system materials, including drainage mat, adhesives and seaming materials, from a single manufacturer regularly engaged in manufacturing the materials.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the site in original, unopened containers, wrapping, or packaging, with manufacturer's labels intact, identifying project, material, and production run or lot number for fabric roll.
- B. Immediately following delivery, inspect materials and components for damaged or defective items, including materials that are not uniform in color, out of tolerance regarding edge alignment and minimum pile height. Materials that are found to be damaged or defective shall be replaced at no additional cost to the Owner.
- C. Store materials in a secure, dry, well-ventilated location where protected from weather, exposure to UV, soil, dust, moisture and other contaminants. Store fabric rolls horizontally, on a flat surface.
- D. Handle according to manufacturer's recommendations to prevent damage, deterioration, distortion, or soiling.

#### 1.8 PROJECT CONDITIONS

- A. Environmental Limitations:
1. Do not install synthetic grass surfacing materials when:
    - a. Substrate surfaces/materials are wet, excessively damp, or have standing water.
    - b. Rain is imminent or forecast within 48 hours following proposed time of installation.

- c. Weather conditions, or forecasted conditions, in the opinion of the installer or manufacturer's representative, will have an adverse effect on the installation.
- d. Humidity levels are outside of the limits recommended by adhesive manufacturer.
- 2. Install synthetic grass surfacing materials only when:
  - a. Material surface temperatures, including aggregate base materials, are above 45 degrees F, and anticipated to remain above 45 degrees F for not less than 48 hours following installation.
  - b. Ambient air temperature is 50 degrees F and rising, but not more than 95 degrees F, and forecast to remain above 50 degrees F for not less than 48 hours following installation.
    - 1) Ambient air temperatures shall be taken in the shade, away from artificial heat sources, such as exposed pavement and stone aggregate fill.

#### 1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Synthetic Grass Surfacing System Fabric: For repairs and/or replacement of areas displaying excessive wear.
    - a. 100 sq. ft. of fabric, 15 ft. wide roll.
  - 2. Cleaning Solution: One gallon of industrial-strength cleaning solution, recommended in writing by fabric manufacturer, and fabric manufacturer's written cleaning instructions.

#### 1.10 WARRANTY

- A. Warranty: Submit a written warranty for the synthetic grass surfacing system agreeing to repair or replace materials and components of the synthetic grass surfacing system that develop defects in materials or workmanship within the specified warranty period and any other deterioration of the surfacing system or evidence of failure to meet performance requirements. Defects include the following:
  - 1. Excessive Fading: Defined as the synthetic grass surfacing system shall remain a uniform color, without a change in appearance that is perceptible and objectionable, as determined by the Architect, when viewed visually in comparison with the original samples.
  - 2. Ultraviolet (UV) and heat degradation.
  - 3. Excessive Wear: Defined as the synthetic grass surfacing system pile height shall not decrease by more than 10 percent each year, or more than 50 percent within the specified warranty period beyond that attributable to normal use.
  - 4. Tuft bind loss.
  - 5. Fabric delamination.
  - 6. Loss of backing integrity.
  - 7. Seam and edge raveling.
  - 8. Perimeter attachments.
  - 9. Distortion, either vertically or horizontally, due to dimensional instability.
- B. Warranty Period: 15 years from the date of Substantial Completion.
- C. The warranty shall include that if the synthetic grass surfacing system is determined to no longer be serviceable within the specified warranty period, the manufacturer and installer shall, at no cost to the Owner, remove and replace those areas of the surfacing system not meeting the specified performance criteria for pile height and impact/shock absorption.

- D. The warranty shall not be limited by the amount of use and shall not be prorated.
- E. Provide warranty signed by the Contractor, surfacing system manufacturer, and installer.
- F. The above warranties are in addition to, and not a limitation of, other rights the Owner may under the Contract Documents.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers and Systems: Subject to compliance with requirements, provide one of the following:
  - 1. SYNLawn Play, SYNLAWN, 2680 Abutment Road, SE, Dalton, GA 30721. Phone: (866) 796-5296.
  - 2. Or other as approved by Architect.

### 2.2 PERFORMANCE REQUIREMENTS

- A. The synthetic grass surfacing system shall comply with the following:
  - 1. Linear Density: Not less than 4,200 Denier; ASTM D1557.
  - 2. Pile Weight: Total pile weight 56 oz/sq yd; ASTM D5848.
  - 3. Primary Backing Weight: 8 oz/sq yd; ASTM D 5848.
  - 4. Secondary Backing Weight: Average 20 oz/sq yd; ASTM D 5848.
  - 5. Total Weight: 84 oz/sq yd; ASTM D 5848.
  - 6. Tuft Bind: Not less than 8 lbs; ASTM D 1335.
  - 7. Flame Resistance: Pass; ASTM D 2859.
  - 8. Drainage Through Fabric: Not less than 30 inches per hour; ASTM F 1551.
  - 9. Lead Content: Comply with ASTM F 2765 for maximum lead content. Meet all federal and state heavy metal compliance standards.

### 2.3 SYNTHETIC GRASS FABRIC

- A. Yarn: Athletic quality polyethylene parallel-long slit fiber yarn engineered specifically for outdoor use and stabilized to resist the effects of ultra-violet breakdown, heat, wear, water, fungus attacks, and airborne pollution.

### 2.4 ACCESSORIES

- A. Perimeter Board: Wood and plastic composite materials made from reclaimed wood fibers and reclaimed or recycled thermoplastic polymer plastic material.
- B. Provide all additional materials, equipment and accessories necessary for a complete installation as recommended by the manufacturer. Included are all perimeter fasteners, backings, tools, labor, equipment, and means for protection of adjacent surfaces and materials.

### 2.5 FABRICATION

- A. Fabric Rolls: Fabricate synthetic grass fabric in strips, 15 ft wide by length required to extend completely across the grass surfacing area, without intermediate cross seams.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine area to receive synthetic grass surfacing system, with installer present, for compliance with manufacturer's requirements and other conditions affecting performance.
  - 1. Verify the finish elevations, slopes, and planarity of the base comply with requirements of the Project and surfacing system manufacturer.
  - 2. Record findings, prepare a written report, signed by Contractor and installer, and submit copies of report to the Architect and the Owner.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of installation shall indicate acceptance of existing conditions.

### 3.2 PREPARATION

- A. Thoroughly clean the area to receive the synthetic grass system of foreign material and all other substances and materials that may be detrimental to permeability and/or installation of the synthetic grass system.

### 3.3 INSTALLATION

- A. General: All work shall be performed by skilled workmen, who are experienced and trained by the manufacturer in the installation of the synthetic grass system. Work shall be performed in accordance with the Drawings, reviewed shop drawings, and manufacturer's written installation instructions.
- B. Synthetic grass surfacing fabric rolls shall be unrolled and allowed to relax prior to installation.
- C. Fabric Roll Installation:
  - 1. Install perimeter boards as recommended by the surfacing system manufacturer, including board attachment fasteners.
  - 2. Synthetic grass surfacing fabric rolls shall be installed across entire width of area, parallel to long dimension, or as directed by the Architect.
    - a. Rolls shall extend from edge to edge. Cross seams are not allowed.
    - b. Rolls shall be rolled out in same direction and installed with uniform pile direction of fibers.
    - c. Rolls shall be laid straight and true to line. Adjacent rolls, when laid together, shall form a tight fitting seam for the entire length of the fabric. Fitted pieces are not allowed.
  - 3. Spot glue the surfacing fabric to the foam pad as recommended by the surfacing system manufacturer.
- D. Seaming of Fabric:
  - 1. Seams in the synthetic grass fabric rolls shall be glued together with seaming cloth, utilizing the manufacturer's standard seaming procedures and materials, ensuring that each roll is properly attached to the next.
    - a. Seams shall be flat, tight, and permanent, with no separation or fraying.
    - b. Seams, when completed, shall display no visible signs of joining, with fibers brushed to provide full coverage of fibers over the seam.

### 3.4 CLEANING AND PROTECTION

- A. The installer shall keep the site clean and clear of debris throughout the project. Waste materials, including excess materials remaining after completion of the Work, shall be removed and legally disposed of offsite.
- B. Installer shall provide all labor, supplies, and equipment required to completely remove stains and other blemishes from all finished surfaces.
- C. Provide protection over installed synthetic grass surfacing systems, including closing the area to traffic, as required to ensure installed system will be free of damage at time of Substantial Completion.

### 3.5 INSPECTION

- A. Inspection: After installation is complete, the synthetic grass surfacing system installer, synthetic grass surfacing system manufacturer's representative, and Architect shall inspect the installation. Any corrections shall be noted in a written report and completed prior to Substantial Completion.

### 3.6 DEMONSTRATION AND TRAINING

- A. Train Owner's staff regarding maintenance and repair/replacement of the synthetic grass surfacing system, and maintenance. Training dates and times shall be coordinated by the Owner.
- B. All training shall be completed prior to Substantial Completion of the project.

END OF SECTION 32 18 16

## SECTION 32 18 23.40 - TRACK & FIELD SYNTHETIC SURFACE

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section covers all labor and materials required to install a first-class track & field surface. The T&F SSC is responsible for installing:
  - 1. All T&F SS materials and labor
  - 2. All T&F line markings

#### 1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the International Association of Athletics Federations, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NCAA shall be enforced.

#### 1.3 ABBREVIATIONS

- A. IAAF = International Association of Athletics Federations
- B. NCAA = National Collegiate Athletic Association
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. SSM = Synthetic Surfacing Manufacturer
- H. GC = General Contractor
- I. SBR = Styrene Butadiene Rubber
- J. EPDM = Ethylene Propylene Diene Monomer
- K. UV = Ultra-Violet
- L. PU = Polyurethane
- M. MDI = Methylene Diphenyl Isocyanate
- N. TDI = Toluene Diisocyanate Isocyanate



#### 1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
1. T&F Surveying
  2. Sports Equipment
  3. T&F Line Markings
  4. T&F Certification

#### 1.5 SUBMITTALS

- A. The following information must be submitted by the SSC prior to installation.
1. On-site Project Manager/Superintendent Qualifications:
    - a. This person will be on-site during all SS operations.
    - b. Once the installation of the SS begins, no substitution of this person is allowed.
    - c. This person must have completed a minimum of 5 facilities which are certified to meet NCAA or IAAF rules & regulations in the past 3 years utilizing the product specified in these specifications.
  2. Standard printed specifications of the SS system that is being installed and notify the Design Team of any deviations between this technical specification and the SSC specification.
  3. Installation process and requirements for subbase (stone, asphalt and concrete) and any conditions that may limit the SS installation or affect quality of installation.
  4. Temperature/climatic conditions limiting quality of installation.
  5. Standard specification and application for recommended subbase primers, crack filler, patching and leveling material.
  6. Two product samples (one for the Owner and one for the GC), a minimum of 6" x 6" in size, the same color, same texture, same thickness, etc. of the SS being installed. This must be a representative sample of the product. This sample must be submitted and approved by the Owner, prior to installation. During installation of the SS or at completion of the project this sample may be used as a comparison to judge the quality of the installed product. Separate SS samples are required for each color being installed.
  7. Material safety data sheets on all individual components of the product being installed.
  8. Provide a letter stating the SSC reviewed and accept the concrete and asphalt specification. Prior to installing the SS, the SSC must accept the installation of the concrete and asphalt as acceptable to receive the SS.
  9. Provide a letter from the SSM approving the SSC as a certified/acceptable installer of their SS.
  10. Written notice and acceptance that all inground track equipment is installed as per the Contract Documents and as per the rules of the sport.
- B. The following information shall be submitted after completion of the specified work:
1. SSC's and SSM's standard Warranty, for installation and material respectively, noting any exceptions to the Warranty information included in this Specification Section.
  2. Provide a "Care and Maintenance" manual for the Owner's use in maintaining the SS.

#### 1.6 QUALITY ASSURANCE

- A. The GC shall coordinate and insure the SSC has talked with and provided all necessary information to the other sub-contractors that are working on the site. For example:
  - 1. The use of curing agents in concrete.
  - 2. Subbase and concrete curb tolerances.
  - 3. No vehicles allowed on the wearing layer of asphalt.
  - 4. Etc.
  
- B. GC must insure all finished products by all contractors are properly protected throughout the construction of this facility. For example:
  - 1. The asphalt contractor must take great care NOT to damage the installed concrete curbs when rolling the asphalt.
  - 2. The installed junction boxes are NOT damaged by adjacent construction.
  - 3. The installed precast channel drain is NOT damaged by adjacent construction.
  - 4. Etc.
  
- C. Prior to installation, or during installation or at completion of installation of the SS, if the Owner has any question or doubt about the quality or formulation of the material, the SSC shall have the product tested. If the product meets these specifications, then the Owner shall pay for the cost of the testing; if the product does not meet these specifications or the SSM's specifications, then the SSC shall pay for the testing. Any material failing to meet specifications will be replaced with new material at the SSC's expense.
  
- D. Slopes & Tolerances as listed below or as per the current the NCAA rule book:
  - 1. The maximum lateral inclination permitted for the outdoor oval track across the full width of the track, preferable toward the inside lane, across all separate outdoor straightaways and across all runways, should not exceed 1:100 (1%). The inside edge of the curb or lane line shall be horizontal throughout the length of the outdoor track.
  - 2. The maximum overall downward inclination permitted in the running direction for the track, the running direction for all runways and the throwing direction for all landing sectors shall not exceed 1:1000 (0.1%). Inclination shall be measured by comparing the start and end points of the races that use a straightaway or a portion of the oval, the last 20 meters of the javelin runway, the start and end points of other runways, not to exceed 40 meters, and the full graded length of each landing sector.
  - 3. In the high jump approach and takeoff area, the maximum overall downward inclination of the last 15 meters shall not exceed 1:250 (0.4%), in the direction toward the center of the crossbar.
  - 4. The surface of a throwing circle shall be level.
  - 5. Depressions can not exceed 3mm under a 1m straight edge or 6mm under a 4m straight edge.

## 1.7 SPECIAL PROJECT CONDITIONS

- A. The SSC will provide a project manager/superintendent on-site daily through the completion of the SSC's portion of the contract.
  
- B. This on-site person shall remain on-site through the completion of the project. Substitution of this person is not permitted.
  
- C. The SSC must provide a technician that will serve as a consultant to the Owner and GC during the Asphalt Paving, first reviewing the asphalt specification, accepting the specification as correct, and then, providing daily review and guidance of the construction of the Asphalt Paving which will directly effect the tolerances and longevity of the eventual SS installation.

- D. Prior to installing any concrete, the GC must verify with the SSC, if any curing compounds or agents are allowed or acceptable.

## 1.8 SPECIFIC SCOPE OF WORK

- A. Some existing SS areas will be resurfaced and other areas will receive the full depth PU product.
- B. The SSC shall repair all worn, damaged and delaminated areas prior to installing any new PU.
- C. The SSC shall verify all horizontal dimensions and vertical elevations prior to performing any work, as well as, the following items below:
  - 1. The resurfaced 400 meter oval and all line markings will accurately fit onto the existing SS on the track oval, the chutes, steeplechase running lane, runways and D-area.
  - 2. The slopes, tolerances and elevations meet the required tolerances of these specifications and the rules of the NCAA.
  - 3. No bird baths or areas exceed the allowable limits as specified.
- D. The SSC shall provide all labor, materials and equipment to perform the following work as designated in these specifications:
  - 1. The installation of all SS materials and line markings.
  - 2. Provide technical assistance and approve the Asphalt Paving or Concrete base work as required in the specifications.
  - 3. Review and approve installation of all T&F event inground equipment before any SS is installed as specified and shown on the project drawings.
  - 4. Brush, blow, clean, wash down, etc. all areas to receive SS, as often as necessary during the installation of the SS.
  - 5. Install removable SS (full pour polyurethane) plugs in all pole vault boxes, long/triple jump take-off boards (1" x 1" corner notches on one short side (12" side) of the plug) and all throwing circles (cut plugs in half); apply synthetic surfacing to the steeplechase water jump cover, sand pit covers (if included in the project) and junction box covers (if included in the project).
  - 6. SSC must prevent PU from entering the channel drain's slot opening, if utilized. The drainage slot opening shall be neatly trimmed out (vertical 90 degree cuts only), after the PU installation. No polyurethane is allowed on the inside of the drainage slot opening. This shall apply only if the precast channel slot drain is installed and/or is included in this project.
  - 7. Repair all damaged areas, clean-up all glue, and remove excess PU, primers and similar products. All trim cuts shall be neat and clean; on all curves & straights the trim-out shall follow the adjoining object for accuracy and neatness; i.e. concrete curb or painted line, etc.

## 1.9 WARRANTY/GUARANTEE

- A. Warranty period to be ten years on the SS.
- B. Warranty shall cover all labor and materials to remove and dispose of existing materials and replace with new material, including labor, during the warranty period.
- C. Warranties / Guarantees specified in this section shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and are in addition to and run concurrent with other warranties/guarantees made by the GC under requirements of the Contract Documents.

- D. The following are inclusive of the term “Track & Field Synthetic Surface” for provisions of the guarantee:
1. All slopes & tolerances as required in this specification.
  2. SS product as specified and represented by the SSC and SSM.
  3. All materials and products specified.
  4. All line markings installed in accordance with the Contract Documents.
- E. SSC Guarantee: Provide in writing a “Full System Guarantee” agreement. The President/Principal(s) of both the SSC and the SSM (if different) shall sign this document and it shall include the following:
1. All work executed under this section will be free from defects of material and workmanship for the specified period from date of Substantial Completion/Acceptance of the Owner.
  2. Any defects will be remedied on written notice at no additional cost to the Owner.
  3. The warranty shall not be prorated.
  4. All material shall be guaranteed to the extent that the surfacing:
    - a. Has been manufactured, applied and will perform in accordance with these specifications, the SSC and SSM specifications and industry standards.
    - b. Will hold fast and/or adhere to the primer, asphalt, concrete, edging, filler, patches or overlay materials.
    - c. Is Ultra-Violet resistant, will not bubble, blister, fade, crack, or wear excessively during the warranty period.
  5. One replacement of high stress areas during the warranty period at no cost to the Owner; High stress areas are estimated at 300 square yards.
  6. One restriping of the T&F Line Markings during the warranty period at no cost to the Owner.
- F. The SSC shall, in the presence of the Owner, inspect the SS each year until the end of the warranty period, or at any time requested by the Owner. Any defects in workmanship or materials (at no fault of the Owner) shall be repaired at the expense of the SSC to the satisfaction of the Owner.
- G. The Warranty does not cover any defect, failure, damage caused by or connected with abuse, neglect, deliberate acts, acts of God, casualty or loads exceeding the SSC’s “Care and Maintenance” manual.

## PART 2 - PRODUCTS

### 2.1 TRACK & FIELD SYNTHETIC SURFACE

- A. The SS shall be as per the SSC’s specifications, plus the following requirements and where discrepancies exist, they shall be brought to the attention of the Owner or Owner’s representative prior to Bidding and Installation.
- B. The following SSC and their SS product are approved for bidding.
1. Beynon Sports Surfaces, Greg Hall at 602-421-5722.
    - a. Product #1 - BSS 2000 Resurfacing System.
    - b. Product #2 - BSS 1000 System with Embedded EPDM Granules.
- C. Colors
1. SSC to provide their standard colors that are as close to the stated colors below:

2. Main color – Beynon Red (shop drawing & submittal with finalize color).

D. Product #1 – BSS 2000 Resurfacing System

1. Two component, impermeable full depth PU with an embedded EPDM granulate wearing layer.
2. Primers: PU based primers specifically formulated to be compatible with the concrete, asphalt subbase and SS material.
3. UV stabilized PU: This consists of a two-component PU which is self-leveling and compounded from a proprietary, pigmented polyol and MDI based, "TDI Free", isocyanate. The liquid PU shall contain no mercury, lead, or any other heavy metals added by design and no solvents or fillers added.
4. EPDM Granules: 1mm to 3mm EPDM granules shall be graded to match SSC's product specifications. The EPDM granules must match the PU in color.
5. Patching Material: All materials must be approved by the SSC and compatible with the SS.
6. All installed materials must be the standard materials as identified in the SSC's specifications and brochures.

E. Product #2 – BSS 1000

1. Two component, impermeable full depth PU with an embedded EPDM granulate wearing layer.
2. Primers: PU based primers specifically formulated to be compatible with the concrete, asphalt subbase and SS material.
3. SBR rubber granules in the base layer to be a fine mesh and not to exceed 20 mesh in size.
4. UV stabilized PU: This consists of a two-component PU which is self-leveling and compounded from a proprietary, pigmented polyol and MDI based, "TDI Free", isocyanate. The liquid PU shall contain no mercury, lead, or any other heavy metals added by design and no solvents or fillers added.
5. EPDM Granules: 1mm to 3mm EPDM granules shall be graded to match SSC's product specifications. The EPDM granules must match the PU in color.
6. Patching Material: All materials must be approved by the SSC and compatible with the SS.
7. All installed materials must be the standard materials as identified in the SSC's specifications and brochures.

## PART 3 - EXECUTION

### 3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

### 3.2 INSTALLATION REQUIREMENTS

- A. The following installation requirements must be met by the SSC:
  1. Installation by SSC approved project manager/superintendent, applicators and technicians. Local laborers may be hired for non-technical work, only.
  2. Upon SSC arrival, the GC shall have the subbase clean and free of dirt, oil, grease or any other residue. Once the SSC begins installation, it is the SSC's responsibility to clean the areas to receive the SS.
  3. Apply SS in dry weather when pavement and atmospheric temperatures are 50 degrees or above,

and are anticipated to remain above 50 degrees for 24 hours after SS installation.

### 3.3 PRODUCT #1 – BSS 2000 RESURFACING SYSTEM INSTALLATION

#### A. Primer

1. Primer shall be spray-applied in accordance with the SSC's specifications. Only those areas which can be installed the same day should be primed. All concrete areas to be surfaced shall receive SSC's approved primer.

#### B. Flow applied, two component, impermeable full depth PU leveling layer.

#### C. Thickness

1. Leveling layer at 2mm.
2. Wearing layer at 5mm.

#### D. Wearing Layer

1. Flow apply the two component PU.
2. Broadcast to excess with colored EPDM granules ensuring all PU is covered. After initial cure, the excess EPDM granules are removed by means of a mechanical sweeper. All loose granules shall be thoroughly removed prior to installation of line markings.
3. The final wearing layer shall be a dense matrix of EPDM granules embedded into the polyurethane with no "bald" spots.
4. All head seams shall be flush to adjacent PU installation.

### 3.4 PRODUCT #2 – BSS 1000 SYSTEM INSTALLATION

#### A. Primer

1. Primer shall be spray-applied in accordance with the SSC's specifications. Only those areas which can be installed the same day should be primed. All concrete areas to be surfaced shall receive SSC's approved primer

#### B. Two component, impermeable full depth PU with an EPDM embedded wearing layer.

#### C. Thickness

1. BSS 1000 at 13mm, as certified by the IAAF.

#### D. Base Layer

1. The base layer shall be a mixture of black SBR rubber mesh and pigmented PU.
2. Base layer PU to match wearing layer colors.

#### E. Wearing layer

1. Wearing layer to be between 4mm to 5mm thickness.
2. Flow apply the two component PU.
3. Broadcast to excess with colored EPDM granules ensuring all PU is covered. After initial cure, the

excess EPDM granules are removed by means of a mechanical sweeper. All loose granules shall be thoroughly removed prior to installation of line markings.

4. The final wearing layer shall be a dense matrix of EPDM granules embedded into the polyurethane with no "bald" spots.
5. All head seams shall be flush to adjacent PU installation.

### 3.5 ALTERNATE PRODUCT INSTALLATION

- A. None.

### 3.6 TIMING, LIMITATIONS, AND CONDITIONS AFFECTING INSTALLATION

- A. Weather and Climate: If in the opinion of the SSC or the Owner, weather and climatic conditions are having or will have an adverse effect on installation; work shall be delayed until the adverse condition has passed.
- B. Adjacent and Concurrent Construction: Installation shall not take place until the completion of the adjacent or concurrent construction operations which generate dust, airborne abrasives, or any other by-product that, in the opinion of the Owner or SSC, would be harmful to the SS material. Under specific direction of the Owner, the SSC may be allowed to cover the track material with an approved covering if such harmful construction operations must occur after the SS material has been installed.

END OF SECTION 321823.40

SECTION 32 18 23.41 - TRACK & FIELD LINE MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section covers all labor and materials required to install the NCAA T&F line markings. The SSC is responsible for the layout and installation of all painted line markings.

1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the International Association of Athletics Federations, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NCAA shall be enforced.

1.3 ABBREVIATIONS

- A. IAAF = International Association of Athletics Federations
- B. NCAA = National Collegiate Athletic Association
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. GC = General Contractor
- H. UV = Ultra-Violet

1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
  - 1. Track & Field Surveying
  - 2. Track & Field Equipment
  - 3. Track & Field Synthetic Surface

1.5 SUBMITTALS

- A. The following information must be submitted by the SSC and approved by the Owner prior to installation.
  - 1. The submittal must verify the new line markings will meet the rules of the NCAA and the 400m



oval's line markings will fit properly. The steeplechase entry & exit lanes with the appropriate radius must be included.

2. A drawing and list depicting the colors of all line markings and labels of the events. Also, all symbols and markings clearly identified, illustrated, and their colors stated. The recommended NCAA colors shall be used.
3. Review and submit this specification, as a submittal, plus any modifications.
4. Installation process and requirements for line markings and any conditions that may limit the installation or affect quality of installation.
5. Material safety data sheets on all products, as necessary.

B. The following information shall be submitted at the completion of the specified work.

1. Upon completion of all line markings, the SSC shall submit to the Owner five diagram/drawing depicting and identifying all line markings: 1) a key to the color codes, 2) a chart for all symbols, and 3) labels for all events.

## PART 2 - PRODUCTS

### 2.1 PAINT

- A. The paint must be approved by the SSC & SSM.
- B. Temporary reference markings must be removed at the completion of the project or within the following 14 days; i.e. chalk.
- C. Paint shall be UV stable.

## PART 3 - EXECUTION

### 3.1 SUMMARY

- A. General line markings of the 400 meter T&F events shall be spray applied, using only paint, primers and finishes supplied and guaranteed by the SSC & SSM.
- B. No line markings shall be installed if the weather conditions are not proper; i.e. too windy, cold or wet.
- C. All line markings must be reviewed and verified with the Owner's representative prior to installation.
- D. The line striper must NOT make any changes to the approved line marking submittal without the written approval from the Owner's representative (Architect, Engineer or T&F Consultant).

### 3.2 LINE MARKINGS

- A. Paint – all markings to receive sufficient paint to fully cover the SS, no SS shall be visible under the installed paint. All paint shall be crisp with clean edges, no excessive overspray from working too fast or in excessive wind.
- B. Track Oval
  1. The measure line is not painted.

2. Oval is 400.001 meters.
3. Track oval and steeplechase lane will utilize a regulation curb, 30 cm rule.
4. Radius to the oval measure line shall be determined by the SSC so all line markings fit properly.

C. Painted Line Precedence

1. Lane lines to take precedence over other markings.
2. Numbers and letters to be broken at all lane lines.
3. Waterfall starting lines take precedence over straight starting lines.
4. Straight starting lines to taper at waterfall starting lines and maintain a 1/2" unpainted gap.

D. Straightaway Chute Extensions

1. Lines to be solid, not dashed.
2. Break chute extension lies 2" either side of track oval lines.

E. Assembly Lines – not to be painted.

F. 100 Meters

1. Two directions on both straightaways
2. Event label
  - a. 100
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the starting line
3. Color of starting line is white

G. 100 Meter Hurdles

1. Two directions on both straightaways
2. Event label
  - a. 100
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the starting line
3. Color of the starting line is white
4. The hurdle tic marks are yellow
  - a. Hurdle tic marks are small triangles and pointing in the direction of running
  - b. Two tic marks per lane with each tic mark adjacent to the lane line

H. 110 Meter Hurdles

1. Two directions on both straightaways
2. Event label
  - a. 110
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the starting line
3. Color of the starting line is white
4. The hurdle tic marks are blue

- a. Hurdle tic marks are small triangles and pointing in the direction of running
- b. Two tic marks per lane with each tic mark adjacent to the lane line

I. 200 Meters

1. All in lanes
2. Both turns (normal & reverse)
3. Event label
  - a. 200
  - b. Approximately 3" high
  - c. The color of the label to be white
  - d. Located in lane 2 and is above/past the starting line
4. Color of the main starting line is white and the reverse starting line is black

J. 300 Meter Hurdles

1. All in lanes
2. Event label
  - a. 300
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2, and is above/past the starting line
3. Color of the starting line is white
4. The hurdle tic marks are red; if SS is red, then tic marks are black
  - a. Hurdle tic marks are small triangles and pointing in the direction of running

K. 400 Meters

1. All in lanes
2. Event label
  - a. 400
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2 and is above/past the starting line
3. Color of the starting line is white

L. 400 Meter Hurdles

1. All in lanes
2. Event label
  - a. 400
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2 and is above/past the starting line
3. Color of the starting line is white
4. The hurdle tic marks are green; if SS is green, then tic marks are black
  - a. Hurdle tic marks are small triangles and pointing in the direction of running

M. 800 Meters

1. Waterfall start and one turn stagger
2. Event label
  - a. 800
  - b. Approximately 3" high
  - c. The color is white
  - d. The 1 turn stagger start line label is in lane 2, the waterfall start line label is in the outside lane, and the labels are above/past the start line
3. Color of the 1 turn stagger start line is white with a green insert, 2" by approx. 16" green insert centered
4. The color of the waterfall start line is white

N. 1500 Meters

1. Waterfall start
2. Event label
  - a. 1500
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the start line
3. The start line is white in color

O. 1600 Meters

1. Waterfall start
2. Event label
  - a. 1600
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the start line
3. Color of the start line is white

P. Mile Run

1. Waterfall start
2. Event label
  - a. Mile
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the start line
3. Paint three 1" wide by 3" long tic mark on the infield side of lane 1
  - a. Tic marks are for  $\frac{1}{4}$  mile,  $\frac{1}{2}$  mile and  $\frac{3}{4}$  mile splits, no labels
4. Color of the start line is white

Q. 2000 Meter Steeplechase

1. Waterfall start
2. Event label
  - a. 2000 ST
  - b. Approximately 3" high
  - c. The color is white

- d. Located in the outside lane and is above/past the start line
- 3. Color of the start line is white
- 4. Hurdle tic marks are black and approximately 5" by 5" in size
- 5. Paint 2" white line at the inside and outside of the water jump lane (approach and exit)
  - a. The lane is 12' wide and is measured from the right-hand side to the right-hand side of the painted line (same as track lanes)
- 6. See Item 3.2, B, 5 above for radius

R. 3000 Meter Steeplechase

- 1. Waterfall start
- 2. Event label
  - a. 3000 ST
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the start line
- 3. Color of the start line is white
- 4. Hurdle tic marks are black and approximately 5" by 5" in size
- 5. Paint 2" white line at the inside and outside of the water jump lane (approach and exit)
  - a. The lane is 12' wide and is measured from the right-hand side to the right-hand side of the painted line (same as track lanes)
- 6. See Item 3.2, B, 5 above for radius

S. 3200 Meters

- 1. Waterfall start
- 2. Event label
  - a. 3200
  - b. Approximately 3" high
- 3. The color is white
- 4. Located in the outside lane and is above/past the start line
- 5. Color of the start line is white

T. 5000 Meters

- 1. Waterfall start
- 2. Event label
  - a. 5000
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in the outside lane and is above/past the start line
- 3. Color of the start line is white

U. 10000 Meters

- 1. Waterfall start
- 2. Event label
  - a. 10000
  - b. Approximately 3" high

- c. The color is white
  - d. Located in the outside lane and is above/past the start line
3. Color of the start line is white

V. 400 Meter Relay (4 x 100m)

- 1. All in lanes or two turn stagger
- 2. Event label
  - a. 400
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2 and is above/past the start line
- 3. Color of the start line is white, same starting line as the two turn staggered starting line for the 400 meters
- 4. The relay exchange zone markers and the acceleration zone markers are yellow
  - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 20 meter long exchange zone and the zone markings are included in the 20 meter long exchange zone
  - b. Acceleration zone marks are approximately 6" wide by 6" tall triangles, 10 meters before the exchange zone marker, one triangle per lane and centered in the lane
- 5. Center of the relay exchange zone mark is a 2" by 16" white line, centered in the lane, for 1<sup>st</sup> & 3<sup>rd</sup> exchanges (2<sup>nd</sup> exchange uses the 200 meter start lines)

W. 800 Meter Relay (4 x 200m)

- 1. All in lanes or four turn stagger
- 2. Event label
  - a. 800MR
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2 and is above/past the start line
- 3. Color of the start line is white with a red insert, 2" by 16" red insert centered
- 4. The relay exchange zone markers and acceleration zone markers are red
  - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 20 meter long exchange zone and the zone markings are included in the 20 meter long exchange zone
  - b. Acceleration zone markings are approximately 6" wide by 6" tall triangles, 10 meters before the exchange zone marking, one triangle per lane and centered in the lane
- 5. Center of the relay exchange zone mark is a 2" by 16" white line, centered in the lane, for 1<sup>st</sup> & 2<sup>nd</sup> exchanges (3<sup>rd</sup> exchange uses the 200 meter start lines)

X. 1600 Meter Relay (4 x 400m)

- 1. Three turn stagger
- 2. Event label
  - a. 1600MR
  - b. Approximately 3" high
  - c. The color is white
  - d. Located in lane 2 and is above/past the start line
- 3. Color of the start line is white with a blue insert, 2" by 16" blue insert centered

4. The relay exchange zone markers and acceleration zone markers are blue
  - a. Exchange zone markings are approximately 36" wide by 36" tall triangles, triangles point into the 20 meter long exchange zone and the zone markings are included in the 20 meter long exchange zone
  - b. The first exchange of the baton shall use the staggered triangles
  - c. The second and third exchange of the baton shall use triangles in a straight line, 10 meters before the finish line; and the end of this exchange zone shall use the painted triangle in lane one (same as used in the first exchange) and triangles in lanes two thru five are in a straight line 10 meters past the finish line and parallel to the finish line or paint a straight line in lieu of the triangles

Y. Break Lines

1. One turn break line on the back straight is a solid line, curved and the color is green; painted from the outside lane to the inside of lane two
2. One turn break line on the home straight is a 2" by 2" green mark on lane five's inside lane line (a single cone will be placed on this mark during competition)
3. Provide 2" by 2" green tic marks, every 4 meters, on lane five's inside lane line from the box alley start to the break line (both turns); these tic marks will indicate the location of the 15cm tall cones

Z. Finish Lines

1. Locations:
  - a. Common finish line at the point of curvature (PC)
  - b. Reverse 200 meter finish line located at the PC, at the end of the back straight
  - c. Reverse 100 meters & 110 meter hurdles finish lines located at the PC, at the opposite end of both straightaways
2. 2" wide and white in color
3. The intersection of all finish lines with the lane lines shall be alternating black marks as per the current NCAA Rule Book
4. No lean lines are to be provided

AA. Staggered Alleys

1. Provide two 1 turn staggered alley start lines, two in turn 1 and one in turn 2, and the color is white for all staggered start lines
  - a. Normal 1 turn stagger in turn 1, label painted as – 1 Turn Alley
  - b. Normal 1 turn stagger in turn 2, label painted as – 1 Turn Alley
2. Staggered alley start lines painted in lanes 5 thru 9

BB. Long/Triple Jump

1. Runway lines
  - a. 2" wide lines
  - b. White in color
  - c. 48" wide runways (inside edge to inside edge of line)

CC. Pole Vault

1. Runway lines

- a. 2" wide lines
  - b. White in color
  - c. 48" wide runways (inside edge to inside edge of line)
  - d. Terminate runway lines at zero line
2. Zero line
- a. 1/2" wide line and 24' long centered on back edge of box (not flange); should extend a minimum of 1 foot past the standards
  - b. White in color
3. NCAA Marks (as per the current NCAA Rule Book)
- a. Provide 36" long by 2" wide white line in the center of the runway at 12' from the back of the plant box
  - b. Provide 12" long by 2" wide white lines in the center of the runway at 9', 10', 11', 13', 14' and 15' feet from the back of the plant box
  - c. Labels not to be painted

DD. Javelin

1. Runway lines
- a. 2" wide lines
  - b. White in color
  - c. 13.123 feet wide (inside edge to inside edge of line)
2. Foul line
- a. 2.76" (7cm) wide line
  - b. White in color
  - c. Extend foul line at a right angle to the runway lines at the intersection of the foul line arc and runway lines 2.46' (75cm)
3. Radius Mark
- a. 6" tall triangle
  - b. White in color
  - c. Angle to match sector lines; Outside edge of 6" tall triangle to align with the inside edge of the sector lines and the point of 6" tall triangle shall mark the 8 meter distance to foul line

EE. Shot Put

1. Dividing lines
- a. 2" wide lines
  - b. White in color
  - c. Extend 2.46' (75cm) from outer edge of throw circle
  - d. The 2" line is painted toward the top half of the circle, in the direction of throwing
2. Sector lines (34.92 degrees)
- a. 2" wide white lines
  - b. White in color
  - c. Outside the recessed throwing circle and from outer edge of throw circle to the end of concrete pad
  - d. Install 2" wide sector tic marks at the end of the landing area on the face of the concrete curb

FF. Discus



1. Dividing lines
  - a. 2" wide lines
  - b. White in color
  - c. Extend 2.46' (75cm) from outer edge of throw circle
  - d. The 2" line is painted toward the top half of the circle, in the direction of throwing
2. Sector lines (34.92 degrees)
  - a. 2" wide white lines
  - b. White in color
  - c. Outside the recessed throwing circle and from outer edge of throw circle to the end of concrete pad

#### GG. Hammer

1. Dividing lines
  - a. 2" wide lines
  - b. White in color
  - c. Extend 2.46' (75cm) from outer edge of throw circle
  - d. The 2" line is painted toward the top half of the circle, in the direction of throwing
2. Sector lines (34.92 degrees)
  - a. 2" wide white lines
  - b. White in color
  - c. Outside the recessed throwing circle and from outer edge of throw circle to the end of concrete pad

#### HH. Lane Numbers

1. The numbers are a block style, approximately 24" high and the numbers will NOT have a color shadow
2. The color of the numbers will be white
3. Paint the following numbers:
  - a. There is 1 set of numbers 1 foot before the common finish line, facing to the outside of the track oval
  - b. There is 1 set of numbers in turn one, 1 foot above/past the 400M staggered start lines
  - c. There is 1 set of numbers in turn two, 1 foot above/past the 200M staggered start lines
  - d. Paint a set of numbers at the very end of each chute (1 foot from the end/edge of SS), in the chute & not in the oval lanes, if possible

#### II. Letters & Logos

1. The stencils for custom font for the letters shall be provided by the SSC
2. The Letters "UNLV" with no quotation marks shall be approximately 24" to 30" high, exact size & font TBD by Owner
3. The color of the letters TBD by Owner
4. The painted set of letters will be field located by Owner
5. No logo is required

#### JJ. Interval Marks

1. Provide a 1" wide by 3" long white line on the infield side of lane one
2. These lines are to be at 50 meter intervals starting at the common finish line and running the entire length of the track oval

END OF SECTION 321823.41

## SECTION 32 18 23.42 - TRACK & FIELD EVENT MATERIALS

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. This section covers all labor and materials required to install high quality track & field event special materials. The GC is responsible for installing:
  - 1. Sand for the long and triple jump sand pits.

#### 1.2 CODES AND STANDARDS

- A. Codes and standards follow the current guidelines set forth by the International Association of Athletics Federations, the National Collegiate Athletic Association and National Federation of State High School Associations. Where discrepancies are noted between these various governing bodies, the rules of the NCAA shall be enforced.

#### 1.3 ABBREVIATIONS

- A. IAAF = International Association of Athletics Federations
- B. NCAA = National Collegiate Athletic Association
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. GC = General Contractor

#### 1.4 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
  - 1. T&F Synthetic Surface
  - 2. T&F Equipment
  - 3. T&F Line Markings

#### 1.5 SUBMITTALS

- A. The following information must be submitted by the GC prior to installation.
  - 1. Installation process and requirements for the special materials and any conditions that may limit the

- installation or affect quality of installation.
- 2. Material safety data sheets on all products, as necessary.
- 3. GC to supply Owner with a one gallon sample of product for visual inspection and testing.

## 1.6 QUALITY ASSURANCE

- A. The physical make-up of these products varies across the country; therefore, the GC shall use his best efforts to supply the Owner with a product that best meets the performance specifications listed below.

## PART 2 - PRODUCTS

### 2.1 SAND FOR LONG & TRIPLE JUMP SAND PITS

- A. The SSC shall match the existing sand in the sand pits if additional sand is needed. If the additional sand cannot be matched, then the SSC shall remove & dispose of the existing sand and install new sand as identified below.
- B. All sand for the long/triple jumps sand pits shall follow the specifications outlined by the United States Golf Association (USGA) guidelines for Bunker Sand.
- C. Contact the local golf course or country club and they should be able to tell you where to find this high quality sand.
- D. The sand shall be washed and sized as follows:
  - 1. Screen Number 10 – 99% Passing
  - 2. Screen Number 18 – 92% Passing
  - 3. Screen Number 35 – 19% Passing
  - 4. Screen Number 60 – 2% Passing
  - 5. Screen Number 100 – 1% Passing
- E. Sand shall be white in color (as white as possible for that region of the country), free of trash, organic matter, clay, silt, rocks, etc.
- F. Sand shall have the following technical data:
  - 1. Water permeability or filtration rate with a minimum of 20 inches/hour
  - 2. Bulk density of 1.55 grams per cubic centimeter
  - 3. Penetrometer Reading of 1.8 to 2.2 kg/cm<sup>2</sup>
  - 4. Sand shape of high sphericity and rounded

## PART 3 - EXECUTION

### 3.1 INSPECTION AND ACCEPTANCE

- A. Examine all surfaces and contiguous elements to receive work of this section and correct, as part of the Work of this Contract, any defects affecting installation.
- B. Commencement of work will be construed as complete acceptability of surfaces and contiguous elements.

### 3.2 INSTALLATION REQUIREMENTS

A. The following installation requirements must be met by the GC:

1. These materials should be one of the last items installed on the facility to maintain the physical properties. Keep newly installed materials clean and free from debris.
2. Do not install these materials until drain pipes are installed and connected to drainage system.
3. Upon completion of installation, test materials to demonstrate satisfactory operation acceptable to Owner and clean or replace unsuitable or contaminated materials.

END OF SECTION 321823.42

## SECTION 32 18 23.43 - TRACK & FIELD CERTIFICATION

### Part 1 - GENERAL

#### 1.1 SUMMARY

- A. This section covers all labor and materials required to provide certification of the final track & field facility. The Contractor is responsible for completing all survey work.

#### 1.2 CODES AND STANDARDS

- A. The survey work must be completed by a licensed surveyor or engineer.
- B. Codes and standards follow the current guidelines set forth by the International Association of Athletics Federations (IAAF), the National Collegiate Athletic Association (NCAA) and National Federation of State High School Associations (NFHS). Where discrepancies are noted between these various governing bodies, the rules of the NCAA shall be enforced.

#### 1.3 ABBREVIATIONS

- A. IAAF = International Association of Athletics Federations
- B. National Collegiate Athletic Association = NCAA
- C. NFHS = National Federation of State High School Associations
- D. T&F = Track & Field
- E. SS = Synthetic Surface
- F. SSC = Synthetic Surfacing Contractor
- G. SSM = Synthetic Surfacing Manufacturer
- H. GC = General Contractor

#### 1.4 Related Sections

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section. The following Sections are specifically related to this Section:
  - 1. Track & Field Surveying
  - 2. Track & Field Synthetic Surfacing
  - 3. Track & Field Line Markings
  - 4. Track & Field Equipment

### Part 2 - CERTIFICATION SURVEY

2.1 Facility Information

- A. Owner: \_\_\_\_\_
- B. Facility Name: \_\_\_\_\_
- C. Location: \_\_\_\_\_

2.2 Surveyor / Engineer Information

- A. Firm Name: \_\_\_\_\_
- B. Contact: \_\_\_\_\_
- C. Phone #: \_\_\_\_\_
- D. Registration: \_\_\_\_\_

2.3 Survey Information

- A. Date of Survey: \_\_\_\_\_
- B. Weather Conditions: \_\_\_\_\_

Part 3 - TRACK OVAL MEASUREMENTS

3.1 All measurements and calculations to 0.001m

3.2 The stated running event cannot exceed  $+0.01\% \times \text{length of race}$  (i.e.  $400\text{m} \times 0.01\% = 0.04\text{m}$  or  $400.04\text{m}$ )

3.3 Raised aluminum curb (Y/N): \_\_\_\_\_

- A. Note: measure line at 30cm for raised curb and 20cm for no curb

3.4 Radius to measure line: \_\_\_\_\_

3.5 Distance between radius points: \_\_\_\_\_

3.6 Oval - lane 1 distance: \_\_\_\_\_

3.7 Lane widths

- A. Note: lanes shall have the same width with a minimum of 1.067m and a maximum of 1.220m including the white line to the right (+/- 1cm)

Location	Lane Width								
	1	2	3	4	5	6	7	8	9
Beginning of turn 1									
Middle of turn 1									
End of turn 1									
Middle of back straight									
Beginning of turn 2									
Middle of turn 2									
End of turn 2									
Middle of main straight									

3.8 Track Oval – Lateral Slope

- A. Note: maximum lateral slope across the full width of the track oval shall not exceed 1.0%
- B. Slope from outside lane to inside lane 1 (Y/N): \_\_\_\_\_
- C. Elevation shots taken on the right-hand edge of lane 1 to the right-hand edge of outer lane



Oval Location	Max.	Lateral Incline
1/4 of the way around turn 1	1.0%	
1/2 of the way around turn 1	1.0%	
3/4 of the way around turn 1	1.0%	
Beginning of back straight	1.0%	
Middle of back straight	1.0%	
End of back straight	1.0%	
1/4 of the way around turn 2	1.0%	
1/2 of the way around turn 2	1.0%	
3/4 of the way around turn 2	1.0%	
Beginning of main straight	1.0%	
Middle of main straight	1.0%	
End of main straight	1.0%	

### 3.9 Overall Slope – Running Events

- A. Maximum *downward* inclination in the direction of running shall not exceed 0.1% over the entire length of the event

Overall Incline %										
Event	Max	Lane 1	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8	Lane 9
100m	0.1%									
100m Rev.	0.1%									
110m	0.1%									
110m Rev.	0.1%									
200m	0.1%									
200m Rev.	0.1%									
300m	0.1%									
400m	0.1%									

## Part 4 - EVENT MEASUREMENTS AND MARKINGS

4.1 All entries to be in meters unless otherwise noted

4.2 No event distance can be less than the event length

4.3 The stated running event cannot exceed  $+0.01\% \times \text{length of race}$  (i.e.  $400\text{m} \times 0.01\% = 0.04\text{m}$  or  $400.04\text{m}$ )

4.4 Races run on straightaway – distance shall be measured in a straight line from the starting line to the finish line.

4.5 Races run around a turn (counter-clock-wise), in lane one and all distances not run in lanes – distance shall be measured 30cm from lane one’s inside painted line and from the right-hand side of that painted line if a regulation curb is installed, if a curb is not present, lane one shall be measured 20cm from lane one’s inside painted line and from the right-hand side of that painted line.

4.6 Races run around one or more curves in lanes 2 thru the outside running lane – distance shall be measured 20cm from the lane’s inside painted line and from the right-hand side of that painted line.

A. Notes:

1. 400 meter relay (4 x 100m) start line is the same as the 400m start line run in lanes with a 2 turn stagger
2. Sprint medley relay start line is the same as the 1600 meter relay (4 x 400m) with a 3 turn stagger

Event	Max.	Lanes								
		1	2	3	4	5	6	7	8	9
100m	100.010									
100m Rev.	100.010									
110m	110.011									
110m Rev.	110.011									
200m	200.020									
200m Rev.	200.020									
300m	300.030									
400m	400.040									
800m	800.080									
4 x 200m	800.080									
4 x 400m	1600.160									

4.7 Waterfall Starting Lines

A. Note: box alley for inner lanes is the same as the main waterfall start line

Event	Max.	Lanes								
		1	2	3	4	5	6	7	8	9
800m	800.080									
1500m	1500.150									
1600m	1600.160									
Mile	1609.505									
3000m	3000.300									
5000m	5000.500									
10000m	10001.000									
800m	800.080	Box Alley Starts								
1600m	1600.160									
3000m	3000.300									
3200m	3200.320									
5000m	5000.500									
10000m	10001.000									

4.8 Relay Races – Measured distance of exchange zones

- A. Exchange zone is 20m in length with 10m acceleration zone
- B. IAAF allows +/- 2cm tolerance to the 20m exchange zone

<b>Event</b>	<b>Lanes</b>								
<b>4x100m</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Acceleration Zone									
Length of Zone 1									
Length of Zone 2									
Length of Zone 3									
<b>4x200m</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Acceleration Zone									
Length of Zone 1									
Length of Zone 2									
*Note: Exchange zone 3 for the 4x200m relay is the same as exchange zone 2 for the 4x100m relay									
<b>4x400m</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
Acceleration Zone									
Length of Zone 1									
Length of Zone 2									

4.9 Hurdle Events

- A. Hurdle 1 is the distance of start to first hurdle
- B. Hurdle 2-9 is the distance between hurdles
- C. Hurdle 10 is the distance of last hurdle to finish line
- D. Tolerance of +/- 0.01m (1cm) for 100mh and 110mh
- E. Tolerance of +/- 0.03m (3cm) for 400mh

<b>Event: 100mh</b>		<b>Lanes</b>								
<b>Hurdle</b>	<b>Distance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1	13.00									
2	8.50									
3	8.50									
4	8.50									
5	8.50									
6	8.50									
7	8.50									
8	8.50									
9	8.50									
10	10.50									
<b>Event: 110mh</b>		<b>Lanes</b>								
<b>Hurdle</b>	<b>Rule</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1	13.72									
2	9.14									
3	9.14									
4	9.14									
5	9.14									
6	9.14									
7	9.14									
8	9.14									
9	9.14									
10	14.02									
<b>Event: 400mh</b>		<b>Lanes</b>								
<b>Hurdle</b>	<b>Rule</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>

1	45.00									
2	35.00									
3	35.00									
4	35.00									
5	35.00									
6	35.00									
7	35.00									
8	35.00									
9	35.00									
10	40.00									

<b>Event: 100mh Reverse</b>		<b>Lanes</b>								
<b>Hurdle</b>	<b>Distance</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1	13.00									
2	8.50									
3	8.50									
4	8.50									
5	8.50									
6	8.50									
7	8.50									
8	8.50									
9	8.50									
10	10.50									

<b>Event: 110mh Reverse</b>		<b>Lanes</b>								
<b>Hurdle</b>	<b>Rule</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>
1	13.72									
2	9.14									
3	9.14									
4	9.14									
5	9.14									
6	9.14									
7	9.14									
8	9.14									
9	9.14									
10	14.02									

4.10 Steeplechase

- A. Water jump location (inside/outside oval): \_\_\_\_\_
- B. Raised curb at water jump (Y/N): \_\_\_\_\_
- C. Dimensions of water jump
  - 1. Length from face of barrier to end of water (3.66m +/- 2cm): \_\_\_\_\_
  - 2. Width (3.66m +/- 2cm): \_\_\_\_\_
  - 3. Depth (at least 70cm): \_\_\_\_\_
  - 4. Flat bottom (30cm past barrier to beginning of up slope): \_\_\_\_\_
- D. Barrier height
  - 1. Women's (0.762m +/- 3mm): \_\_\_\_\_
  - 2. Men's (0.914m +/- 3mm): \_\_\_\_\_

4.11 Pole Vault

- A. Rules:
  - 1. Recommended runway width 1.22m (+/- 0.01m)
  - 2. Minimum runway length of 40m and optimum length of 45m

<b>Runways</b>		
<b>Location/Direction of Runway</b>	<b>Length (m)</b>	<b>Width (m)</b>
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		

- B. Runway markings
  - 1. Line width of 5cm
  - 2. Short line length of 30cm
  - 3. Long line length of 90cm at 3.650m or 12'
  - 4. Distance: the distance from the edge of the long line closest to the landing pit to the point where the back of the vaulting box meets the runway is 3.65m (12'). Each line is 30cm from the same respective point of an adjacent line

Line	Distance Rule IAAF (NCAA)	Distance from back of line to back of box
Line 1	4.550m (15')	
Line 2	4.250m (14')	
Line 3	3.950m (13')	
Line 4	3.650m (12')	
Line 5	3.350m (11')	
Line 6	3.050m (10')	
Line 7	2.750m (9')	

C. Lateral Slope

1. Rule: Maximum lateral inclination across the full width of runways shall not exceed 1.0%

Runway - Lateral Incline %									
Location	Max	1	2	3	4	5	6	7	8
40m	1.0%								
20m	1.0%								
Box	1.0%								

D. Overall Slope

1. Rule: Maximum downward inclination in the direction of running shall not exceed 0.1% over the entire length of the runway, not to exceed 40 meters

Runway - Overall Incline %									
Event	Max	1	2	3	4	5	6	7	8
Pole Vault	0.1%								

4.12 Long & Triple Jump

A. Rules:

1. Recommended width 1.22m (+/- 1cm)
2. Minimum length 40m (131.234ft.) from longest event's take-off board edge nearest the pit
3. Distance between long jump takeoff board and the nearer edge of the landing area shall not be less than 1m or greater than 3m.
4. Distance between the foul line and the farther edge of the landing area shall be at least 10m.
5. Distance from nearest edge of landing area to the triple jump foul line
  - a. Men's: 11m (min) and 12.5m (recommended)
  - b. Women's: 8.5m (min.) and 11m (recommended)



Runways						
Location/Direction of Runway	Length (m)	Width (m)	Takeoff Boards (Distance in meters from foul line to nearest edge of sand)			
			Board 1	Board 2	Board 3	Board 4
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

Take-off Boards Centered on Sand Pit				
Location/Direction of Runway	Take-off Boards Centered (Yes or No)			
	Board 1	Board 2	Board 3	Board 4
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				

B. Sand Pit Width

1. Sand pit #1 inside width (2.75m – 3.0m): \_\_\_\_\_
2. Sand pit #2 inside width (2.75m – 3.0m): \_\_\_\_\_
3. Sand pit #3 inside width (2.75m – 3.0m): \_\_\_\_\_
4. Sand pit #4 inside width (2.75m – 3.0m): \_\_\_\_\_

C. Sand Pit Lateral Slope

1. Sand pit #1 (no greater than 1%) (Y/N): \_\_\_\_\_
2. Sand pit #2 (no greater than 1%) (Y/N): \_\_\_\_\_
3. Sand Pit #3 (no greater than 1%) (Y/N): \_\_\_\_\_
4. Sand Pit #4 (no greater than 1%) (Y/N): \_\_\_\_\_

D. Lateral Slope

1. Rule: Maximum lateral inclination across the full width of runways shall not exceed 1.0%

<b>Runway - Lateral Incline %</b>									
<b>Location</b>	<b>Max</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
40m	1.0%								
20m	1.0%								
LJ Board	1.0%								

E. Overall Slope

1. Rule: Maximum downward inclination in the direction of running shall not exceed 0.1% over the entire length of the runway, not to exceed 40m

Runway & Sand Pit - Overall Incline %									
Location	Max	1	2	3	4	5	6	7	8
40m to men's TJ board	0.1%								
40m to women's TJ board	0.1%								
40m to LJ board	0.1%								
<b>Below: Measure center of take-off board down centerline of sand pit:</b>									
Men's TJ board to end of sand pit	0.1%								
Women's TJ board to end of sand pit	0.1%								
LJ board to end of sand pit	0.1%								

#### 4.13 High Jump

##### A. Rules:

1. The maximum overall downward inclination of the last 15 meters shall not exceed 1:250 or 0.4%, in the running direction toward the center of the crossbar
2. The minimum overall length shall be 15m for NCAA & IAAF; optimum of 25m for IAAF
3. Takeoff area shall be a semicircle enclosed by a 3m radius, whose center point is directly under the center of the crossbar

Runways		
Location	Max %	High Jump Approach
Last 15m of Approach	0.4%	
Last 15m of Approach	0.4%	

#### 4.14 Javelin

##### A. Rules:

1. Maximum lateral inclination across the full width of the runways shall not exceed 1.0%
2. Maximum downward inclination in the direction of running or throwing shall not exceed 0.1% over the last 20 meters of the javelin runway
3. The Javelin runway shall have a minimum length of 33.5m for NCAA and 30m for IAAF
4. The Javelin Runway shall be 4m wide (13.123')
5. Arc Radius: 8m
6. Maximum downward inclination of the landing area shall not exceed 0.1%

<b>Runway</b>				
<b>Location/Direction of Runway</b>	<b>Length (m)</b>	<b>Width (m)</b>	<b>Radius of Arc (m)</b>	<b>Landing Area Incline %</b>
1.				
2.				

B. Lateral Slope

<b>Lateral Inclination %</b>			
<b>Location</b>	<b>Max</b>	<b>Runway 1</b>	<b>Runway 2</b>
Beginning of runway	1.0%		
Middle of runway	1.0%		
End of runway	1.0%		

C. Overall Slope

<b>Overall Inclination %</b>			
<b>Location</b>	<b>Max</b>	<b>Runway 1</b>	<b>Runway 2</b>
Last 20m of runway	0.1%		

4.15 Shot Put

A. Rules:

1. Throwing circles level (Y/N): \_\_\_\_\_
2. The interior of the throw circles is 19mm +/- 6mm for NCAA or to be between 13.0 – 25.0 millimeters lower than the surface outside the circle; IAAF is 20mm +/- 6mm
3. The diameter of the shot put throw circle is 2.135m +/- 5mm or to be between 2.130 - 2.140 meters
4. Maximum downward inclination in the direction of throwing shall not exceed 0.1% over the entire length of the event
5. Sector Line Angle to be 34.92 degrees; no tolerance is stated by the IAAF

Shot Put Area				
Location	Sector Line Angle (degrees)	Circle Depth At 3/6/9/12 o'clock (mm)	Circle Diameter (m)	Landing Area Incline %
1.				
2.				
3.				
4.				

4.16 Hammer

A. Rules

1. Throwing circles to be level (Y/N): \_\_\_\_\_
2. The interior of the throw circles is 19mm +/- 6mm for NCAA or to be between 13.0 – 25.0 millimeters lower than the surface outside the circle; IAAF is 20mm +/- 6mm
3. The diameter of the Hammer throw circle to be 2.130 – 2.140 meters
4. Maximum downward inclination in the direction of throwing shall not exceed 0.1% over the entire length of the event
5. Sector Line Angle: 34.92 degrees; no tolerance is stated by the IAAF

Hammer Throw				
Location	Sector Line Angle (degrees)	Circle Depth At 3/6/9/12 o'clock (mm)	Circle Diameter (m)	Landing Area Incline %
1.				
2.				
3.				
4.				

4.17 Discus

A. Rules:

1. Throwing circles to be level (Y/N): \_\_\_\_\_
2. The interior of the throw circles is 19mm +/- 6mm for NCAA or to be between 13.0 – 25.0 millimeters lower than the surface outside the circle; IAAF is 20mm +/- 6mm
3. The diameter of the Discus throw circle to be between 2.495 - 2.505 meters
4. Maximum downward inclination in the direction of throwing shall not exceed 0.1% over the entire length of the event
5. Sector Line Angle: 34.92 degrees

<b>Discus Throw</b>				
<b>Location</b>	<b>Sector Line Angle (degrees)</b>	<b>Circle Depth At 3/6/9/12 o'clock (mm)</b>	<b>Circle Diameter (m)</b>	<b>Landing Area Incline %</b>
1.				
2.				
3.				
4.				

END OF SECTION 321823.43

## SECTION 32 93 23 - SODDING

### PART 1 GENERAL

#### 1.01 REFERENCES

- A. TPI (Turfgrass Producers International) - Guideline Specifications to- Guideline Specifications to Sodding.
- B. FS O-F-241 Fertilizers, Mixed, Commercial.

#### 1.02 QUALITY ASSURANCE

- A. Submit fill material samples under provisions of the contract.
- B. Submit a minimum of one 10 pound random composite sample of imported top soil for every 100 cubic yards of fill to testing laboratory, in clean containers. Testing to be performed by an independent testing lab for complete agronomy testing and fertilizer recommendation. Verification will be mandated to prove that the material on-site is the same as the material used for the soul test presented and approved with the submittal package.
- C. Quality Assurance:
  - 1. Nevada Licensed Contractor specializing in installing the sod specified in this section.
  - 2. Sod is grown on sand base. Sand content will be over 75 percent, less than 15 percent silt, and less than 10 percent clay or the sod will not be accepted.
- D. Sod Producer: Company specializing in sod production and harvesting with minimum five years experience and certified by the State of Nevada.
- E. Installer: Company approved by the sod producer.
- F. Sod: Provide strongly rooted sod in a sand base not less than 18 months old, free of stones, burned or bare spots, weeds, and undesirable native grasses, and machine cut to pad thickness of 3/4 inch (plus or minus 1/4 inch), excluding top growth and thatch. Provide only sod capable of vigorous growth and development when planted (viable, not dormant).
- G. Submit sod certification for grass species and location of sod source. Submit soil analysis from an independent testing lab to Owner's Representative and/or Civil & Landscape Quality Assurance Construction Inspector/Manager for approval of sod base material.

#### 1.03 REGULATORY REQUIREMENTS

- A. Comply with regulatory agencies for fertilizer and herbicide composition.

#### 1.04 MAINTENANCE DATA

- A. Include maintenance instructions, cutting method and maximum grass height; and types, application frequency, and recommend coverage of fertilizer.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver sod on pallets or big rolls. Protect exposed roots from dehydration.
- B. Do not deliver more sod than can be laid within 24 hours.

- C. Sod must have been cut and rolled within the last 24 hours.

#### 1.06 MAINTENANCE SERVICE

- A. Maintain installed sod for 120 days from Date of Substantial Completion.
- B. Sod installed between September 15 and January 15 will be maintained by the contractor until May 15.
- C. Adjust all piping and sprinklers affected by the regrading and installation of the sod.

#### 1.07 EXTRA MATERIALS

- A. Provide the following extra components under provisions of the contract.
  - 1. 200 lbs. NPK fertilizer.
  - 2. 200 lbs. "Grow Power Plus"
  - 3. 200 lbs. Iron fertilizer

### PART 2 PRODUCTS

#### 2.01 MATERIALS

- A. Approved Sod Suppliers:
  - 1. 'West Coast Turf 888-893-8873
  - 2. 'Valley Sod Farms' 888-925-6875
  - 3. Other sod producers are to be pre-approved in writing prior to use.
- B. Provide sod of uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting its own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.
- C. Sod is to be grown in a sand base. Sand content will be over 75 percent, less than 15 percent silt, and less than 10 percent clay or the sod will not be accepted.
- D. Provide sod matching existing surrounding grass in locations shown on plans.
- E. Sod is not to be grown with a nylon mesh backing and the nylon mesh used to secure the large rolls must be removed during installation. Any sod installed with the mesh backing will not be accepted.
- F. Commercial Fertilizer: Iron and NPK ratio as noted in PART 3 EXECUTION, 3.05 MAINTENANCE of this section. Slow release nitrogen apply (14) pounds per 1,000 square feet and apply (10) pounds of iron per 1,000 square feet. Submit receipts of fertilizer types applied.
- G. Water: Clean, fresh, and free of substances or matter, which could inhibit vigorous growth of grass.
- H. Soil Amendments:
  - 1. Grow Power Plus by "Grow Power"
  - 2. Soil amendment, Soils Plus by "Biorem"
  - 3. Soil Sulfur
  - 4. NPK Fertilizer
  - 5. Iron Fertilizer



## 2.2 SOILS

- A. Fill Material: No rocks larger than 1 inch in diameter are allowed in the fill material.
- B. Imported topsoil, loamy/sandy texture - no gravel particles for all soil requirements.

## PART 3 EXECUTION

### 3.01 SOD LOCATION

- A. Sod is to be installed in locations as shown on the plans.

### 3.02 INSPECTION

- A. Verify that prepared soil base is ready to receive the work of this Section.
- B. Beginning of installation means acceptance of existing site conditions.
- C. Prior to installation of grasses finish grades are to be approved by Owner's Representative

### 3.03 SOIL AMENDMENTS AND FERTILIZING

- A. Incorporate the specified amendments to existing soil.
  - 1. Scarified subgrade, a minimum depth of 6 inches, to be approved and rock removed with a semi finish grade for all of the grass areas (prior to topsoil application).
  - 2. Mix "Soils Plus" soil amendment and other fertilizer amendments prior to placing sod on the field.
  - 3. Grade topsoil and obtain grade approval from the Owner's Representative prior to sod application.
- B. Soil Amendments: To be blended with topsoil.
  - 1. Soil sulfur at a rate of (30) lbs per 1,000 square feet.
  - 2. "Grow Power Plus" (150) pounds per 1,000 square feet.
  - 3. "Soils Plus" soil amendment (5) cubic yards per 1000 square feet.
- C. Apply fertilizer after smooth raking of topsoil and prior to installation of sod.
- D. Apply (14) pounds of NPK 15-15-15 fertilizers per 1,000 square feet, no more than 48 hours prior to installing sod.
- E. Mix thoroughly into upper 1 inch of topsoil.
- F. Lightly water to aid the dissipation of fertilizer.

### 3.04 LAYING SOD

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod immediately on delivery to site to prevent deterioration.
- C. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches (300 mm) minimum. Do not stretch or overlap sod pieces.
- D. Lay smooth. Place top elevation of sod 1" below adjoining edging, paving, and curbs. Exception to this

is for areas that the water flow is engineered to flow over the curbing. Where water flows over the curb install the sod level to the curb.

- E. On slopes lay sod perpendicular to slope/parallel to contours.
- F. Sod is to be flush with the infield mix.
- G. Water sodded areas immediately after installation. Saturate sodded areas to 3 inches to 4 inches into soil.
- H. Sod is to be rolled within 7 days after installation to remove minor depressions or irregularities.
- I. Sod is to have one full cutting prior to the maintenance period starting.

### 3.05 MAINTENANCE

- A. Mow grass once a week to maintain the grass at the required heights (Additional mowing may be required during the week to maintain the grass at the specified height. Do not cut more than 1/3 of grass blade at any one mowing).
- B. Neatly trim edges and hand clip where necessary.
- C. Immediately remove clippings after mowing and trimming.
- D. Water to prevent grass and soil from drying out.
- E. Add amended topsoil with soil amendments to remove minor depressions or irregular ties. Maintain positive drainage.
- F. Control growth of weeds. Apply herbicides in accordance with manufacturer's instructions. Remedy damage resulting from improper use of herbicides.
  - 1. Supply individual school a schedule of pesticides, herbicide and fertilizers applications at least seven (7) days before chemical treatment of all pesticides, weed problems and fertilizing. This is to conform to the Clark County School District's policy and regulations concerning the "Right to Know".
- G. Immediately replace sod with specified grass to areas which show deterioration or bare spots.
- H. Protect sodded areas with warning signs during maintenance period.
- I. Low areas in the grass resulting from settling or improper grading must be filled for proper drainage.
- J. All grass areas are to be fertilized after laying sod and during the maintenance period. Apply Ammonium Sulfate 21-0-0, or approved equal, two weeks after installation of sod at a minimum 1/2 pound of nitrogen per 1,000 square feet (Ammonium Sulfate - 2.45 of fertilizer pounds per 1,000 square feet) and every two weeks for two additional applications. Two weeks after the last application of Ammonium Sulfate, apply fertilizer appropriate to the season every 30 days at a rate of one pound of nitrogen per 1,000 square feet until the end of the maintenance period. The last application is to be a slow release fertilizer. All fertilizers are to be approved prior to application.
  - 1. Apply two iron applications at 10 pounds per 1,000 square feet for Bermuda or Fescue grasses during maintenance period.
  - 2. Submit dates, amounts, and receipts of fertilizer material applied during the maintenance period.
- K. Seasonal Fertilizing Requirements: All grass areas are to be fertilized within their growing seasons. Due to winter dormancy the Bermuda grass should not be fertilized between October 30th and March 1st. The

Fescue Grass may go dormant during the winter season if not managed properly, do not fertilize dormant grasses in the winter. All grass areas are to receive the required fertilizer amounts, type and applications. If the winter season causes a postponement resume fertilizing between March and April.

- L. Review and maintain irrigation heads by adjusting arch, cleaning nozzles on a weekly basis. Prevent over watering and under watering by adjusting the water duration based upon the current weather conditions and season.

END OF SECTION 32 93 23