

**SECTION 11 66 23.33
TENNIS EQUIPMENT**

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all equipment and materials and do all work necessary to furnish and install the athletic equipment, as indicated on the drawings and as specified herein. Athletic equipment shall include, but not be limited to:
 - 1. Tennis net posts w/steel plated gears
 - 2. Center hold down anchor
 - 3. Tennis net cable and connectors

1.02 REFERENCES

- A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
 - 1. American Sports Builders Association (ASBA)
 - 2. United States Tennis Association (USTA)

1.03 SUBMITTALS

- A. Manufacturers Product Data
 - 1. Provide manufacturers product data prior to actual field installation work, for Engineers or Owners representatives review.
- B. Shop Drawings
 - 1. Provide catalog cuts and drawings of the manufacturers recommended installation and foundation requirements prior to actual field installation work, for Engineers or Owners representatives review.

1.04 RELATED SECTIONS

- A. Section 32 12 16 - Asphalt Pavement
- B. Section 32 13 13 - Concrete Pavement
- C. Section 32 18 23 - Tennis Court Surfacing System
- D. Section 32 31 00 - Fences and Gates
- E. Section 33 46 16 - Sub-Drainage Piping

1.05 QUALITY ASSURANCE

- A. Manufacturers warranties shall pass to the Owner and certification made that the product materials meet all applicable grade trademarks or conform to industry standards and inspection requirements.

1.06 PRODUCT DELIVERY AND STORAGE

- A. Materials delivered to the site shall be examined for damage or defects in shipping. Any defects shall be noted and reported to the Owners representative. Replacements, if necessary, shall be immediately re-ordered, so as to minimize any conflict with the construction schedule. Sound materials shall be stored above ground under protective cover or indoors so as to provide proper protection.

PART 2 - PRODUCTS

2.01 TENNIS EQUIPMENT

- A. Net posts shall have the following features.
 - 1. 3" OD Round 7 Gauge Galvanized Steel main post
 - 2. Gear winding mechanism with all internal self-locking gears with a 30:1 ratio

3. Welded lacing rods
 4. Cast aluminum-alloy post caps and gear housings
 5. Polyester powder coat finish, black
 6. Aluminum ground sleeves
 7. Include center anchor
 8. Douglas DTP-37 Tennis Posts
- B. Wind Screens shall be provided and installed.
1. Douglas VCP Max Windscreen or equivalent - Color red.
- C. Tennis nets shall be provided by owner.
- D. Pre-approved manufacturers include tennis posts, windscreen, and tennis nets as manufactured by:
- Douglas Industries, Inc.
3441 S. 11th Ave.
Eldridge, IA 52748
Phone: 800-553-8907
Fax: 800-443-8907
www.douglas-sports.com

PART 3 EXECUTION

3.01 INSTALLATION OF EQUIPMENT

- A. All athletic equipment shall be installed as recommended with manufacturer's written directions, and as indicated on the drawings.

END OF SECTION

**SECTION 31 10 00
SITE CLEARING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of the existing fencing, posts, post foundations, poles, gates, net posts and hold downs. All to be become the contractor's property for recycle/reuse excepting items noted otherwise.
- B. Removal of all tennis court surface, bases and sub-base as needed to construct the sections, drainage and utilities shown on the plans.
- C. Removal of topsoil, subsoil, existing base as needed, rough grading, and site contouring.

1.02 RELATED SECTIONS

- A. Section 31 22 00 Earthwork - Grading
- B. Section 31 23 00 Earthwork - Excavation and Fill
- C. Section 31 25 00 Earthwork - Erosion and Sediment Control

1.03 REGULATORY REQUIREMENTS

- A. Conform to applicable local and state code for disposal of debris.
- B. Coordinate clearing work with utility companies.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Identify and protect utilities to remain from damage.
- B. Identify, tag, and protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Verify that survey benchmark and intended elevations for the Work are as indicated.

3.02 CLEARING

- A. Clear areas required for access to site and execution of work to a minimum depth of 6 inches or as indicated on the drawings
- B. Areas of pavement removal shall be sawcut to full depth of pavement prior to removal. Protect edge of pavements to remain.
- C. Remove trees and shrubs indicated. Remove stumps, main root ball and root system to a depth of 24 inches. Dispose of trees offsite per local ordinances.

3.03 CLEAN UP

- A. Dispose of all debris from site according to all State and Federal solid waste disposal laws and regulations and solid waste determinations of the EPA at the Contractor's expense.
- B. Remove demolished materials from site as work progresses.

END OF SECTION

**SECTION 31 22 00
GRADING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Compliance with erosion control requirements.
- B. Grading for aggregate bases and subgrades.
- C. Rough grading the site for ground water and storm water management, electrical utilities, and pavement.
- D. Finish grading.

1.02 RELATED SECTIONS

- A. Section 31 23 00 – Excavation & Fill.
- B. Section 31 25 00 – Erosion and Sediment Control
- C. Section 32 12 16 – Asphalt Pavement
- D. Section 32 13 13 – Concrete Pavement
- E. Section 33 46 16 – Sub-Drainage Piping

1.03 REFERENCES

- A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Adopted January 1, 2012

1.04 PROJECT CONDITIONS

- A. Contractor shall provide private utility locates of existing utilities prior to beginning earthwork operations.
- B. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs to remain from grading equipment and vehicular traffic.
- C. Protect above- and below-grade utilities that remain.
- D. Promptly repair damage to adjacent facilities caused by earthwork operations. Cost of repairs at Contractor's expense.
- E. Promptly notify Owner of unexpected sub-surface conditions.

1.05 QUALITY ASSURANCE

- A. Installer's qualifications: General Contractor shall demonstrate at least 3 years of successful installation experience on projects with work similar to that required for this project or be preapproved by the Rockford Public School District.
- B. Record drawings: At project close-out, submit record drawings of installed work. Especially note located utilities, areas of over-excavation, removal of unsuitable soils, and backfill.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey benchmark and intended elevations for the work are as indicated.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.

- D. Notify utility company to remove and relocate utilities as necessary.
- E. Protect plant life, lawns, and other features remaining as a portion of the finish landscaping.
- F. Provide separate stockpiles for different soils material types as required.
- G. Protect benchmarks, and survey control point.

3.03 ROUGH GRADING

- A. Remove topsoil from areas to be further excavated or areas to receive structures, or pavement.
- B. Identify required lines, levels, contours, and datum.
- C. Cut and fill to transform site to indicated elevations and contours. Elevations listed on the plans are to top of pavement or top of finished grade for landscape areas. Establish rough grades at proper elevations to receive indicated thicknesses of topsoil, base fill material, slabs, surfacing and other finished materials.
- D. Smooth and level the surface of the existing soil and compact using heavy vibratory equipment until there is no loss of elevation.
- E. When excavating through roots, perform work by hand and cut roots with sharp axe.
- F. Prepare subgrade in accordance with Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, 2012, unless exceeded herein.
- G. Stability: Site is unstable and requires aggregate and geotechnical fabric to provide a working base. Refer to typical sections and soil report. Replace damaged or displaced subsoil to same requirements as for specified fill.
- H. Slope grades so as to provide positive drainage. Remove large stones, boulders and debris from the site. Rough grading shall be finished by blading to reasonably smooth contours with uniform transitions and slopes.

3.04 FINISH GRADING

- A. Before Finish Grading:
 - 1. Verify trench backfilling have been inspected.
 - 2. Verify subgrade has been contoured and compacted.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size.

3.05 CLEANING AND PROTECTION

- A. Remove unused stockpiled topsoil. Grade stockpile area to prevent standing water.
- B. Remove all excess materials and debris from site to proper disposal location according to all state and local ordinances.
- C. Leave site clean and raked, ready to receive landscaping.

END OF SECTION

**SECTION 31 23 00
EXCAVATION AND BACKFILL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Rough grading and filling the site for future base course and paving.
- B. Material for excavation and backfill of trenches for utilities.
- C. Final grading and shaping of site.

1.02 RELATED SECTIONS

- A. Section 31 2500 – Erosion and Sediment Control
- B. Section 32 1216 – Asphalt Pavement
- C. Section 32 31 00 – Fences and Gates
- D. Section 32 1313 – Concrete Pavement
- E. Section 33 4616 – Sub-Drainage Piping

1.03 REFERENCES

- A. Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Adopted January 1, 2012
- B. ASTM C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. ASTM D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method; 2000.
- D. ASTM D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³)); 2000a.
- E. ASTM D2167 - Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method; 1994 (2001).
- F. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System); 2000.
- G. ASTM D2922 - Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth); 2001.
- H. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth); 2001.
- I. ASTM D4253 – Standard test Method for Maximum Index Density and Unit Weight of Soils Using a vibratory Table.
- J. ASTM D4254 – Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

1.04 PROJECT CONDITIONS

- A. Contractor is to provide construction layout stakes for all necessary grading, lines, and control points for the work.
- B. Contractor to provide private utility location markings and protect above and below grade utilities that remain.
- C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs to remain from grading equipment and vehicular traffic.
- D. Protect materials from tracking off site.

1.05 SUBMITTALS

- A. Submit catalog cut sheets for intended products,
- B. Submit sources for aggregates including gradations.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General Fill: Suitable Subsoil from on site, off-site borrow, or Contractor Furnished borrow.
 - 1. Free of organic soil lumps larger than 3 inches, rocks larger than 2 inches, and debris.
 - 2. Off Site Borrow: Conforming to ASTM D 2487 Group Symbol GC, GW, GM, SC, SM, SW, and SP or a combination of these groups. Soils classified with ASTM D 2487 Group Symbol CL, CL-ML, OR ML may also be used. When using soil classified as CL the liquid limit and plasticity index shall be less than 45 and 20 respectively.
 - 3. Soil conforming to ASTM D 2487 Group Symbol OL, OH, MH, CH, or PT shall not be used under paving, structures, or as backfill around foundations.
- B. Stabilization Backfill Material– Illinois CA-1 or approved equal conforming to Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Adopted January 1, 2012. Recycled concrete is acceptable providing it meets the gradation and quality requirements of this section.
- C. Granular base and sub-base: Illinois CA-6 (non-free draining) or approved equal conforming to Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Adopted January 1, 2012. Recycled concrete is acceptable providing it meets the gradation and quality requirements of this section.
- D. Drainable Base or free draining Aggregate: Drainable base shall be clean crushed limestone to be free draining and having an air void content by volume $\geq 35\%$. Acceptable aggregate: Illinois CA-7.
- E. Topsoil - Per Illinois DOT Standard Specifications. Topsoil furnished by the Contractor shall consist of a natural friable surface soil without admixtures of undesirable subsoil, refuse, or foreign materials. It shall be shredded and free from roots, hard clay, rocks larger than one inch (1") in any dimension, noxious weeds, tall grass, brush, sticks, stubble, or other litter, and shall have indicated by a healthy growth of crops, grasses, trees, or other vegetation that it is free-draining and non-toxic. Topsoil shall contain not more than ten percent (10%) gravel by dry weight of total sample. For the purposes of this specification gravel is defined per ASTM D422 modified to include only material passing one inch (1") and retained on the No. 4 sieve.
- F. Geotechnical Fabric for Ground Stabilization: Material shall be a woven Polypropylene fabric with an ASTM D4632 grab strength not less than 200 psi, ASTM D 4355 500 hour UV resistance not less than 70%, ASTM D4731 AOS of 30. Approved fabric: Mirafi 500X, or equal.
- G. Geotechnical Filter Fabric: Material shall be a geotextile composed of high-tenacity monofilament polypropylene yarns (or equal) and exhibit the following properties.

<u>Mechanical Properties</u>	<u>Test Method</u>	<u>Unit</u>		<u>Minimum Average Roll Value</u>	
				MD	CD
Wide Width Tensile Strength	ASTM D4595	lbs./in (kN/m)	200 (35.0)	140	(24.5)
Grab Tensile Strength	ASTM D4632	lbs. (N)	365 (1624)	200	(890)
Grab Tensile Elongation	ASTM D4632	%	24	10	
Trapezoid Tear Strength	ASTM D4533	lbs./in (N)	115 (512)	75	(334)

<u>Mechanical Properties</u>	<u>Test Method</u>	<u>Unit</u>	<u>Minimum Average Roll Value</u>
CBR Puncture Strength	ASTM D6241	lbs./in (N)	675 (3004)
Apparent Opening Size (AOS)1	ASTM D4751	U.S. Sieve (mm)	40 (0.43)
Percent Open Area	COE-02215	%	10
Permittivity	ASTM D4491	sec-1	2.1
Permeability	ASTM D4491	cm/sec	0.14
Flow Rate	ASTM D4491	gal/min/ft2 (l/min/m2)	145 (5907)
UV Resistance (at 500 hours)	ASTM D4355	% strength retained	90

<u>Physical Properties</u>	<u>Unit</u>	<u>Typical Value</u>
Mass/Unit Area (ASTM D5261)	oz./yd2 (g/m2)	5.6 (207)
Thickness (ASTM D5199)	mils (mm)	24 (0.7)
Roll Dimensions (width x length)	ft. (m)	12.5 x 300 (3.8 x 91)
Roll Area	yd2 (m2)	417 (348)
Estimated Roll Weight	lbs. (Kg)	169 (77)

Suggested products include Mirafi FW402, US Fabrics US 1540, Propex/Geotex 111F, and WinFab 2197. Geotechnical filter fabric shall be placed in accordance with the manufacturers specifications including preparation, edge lap and handling procedures.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that survey benchmarks and intended elevations for the work are as indicated.
- B. Fill areas in the order shown on the drawings. Other fill sources: Excavations from on-site provided they meet the requirements of 2.01 Materials above.
- C. Topsoil – Salvage from on-site sources unless off site sources are approved.

3.02 PREPARATION

- A. Identify required lines, levels, contours, and datum.
- B. Stake and flag locations of known utilities.
- C. Locate, identify, and protect utilities that remain, from damage.
- D. Notify utility company to remove and relocate utilities as necessary.
- E. Mark and verify removal items and limits.
- F. Protect plant life, lawns, and other features remaining as a portion of the finish landscaping.
- G. Provide separate stockpiles for different soil material types as required.
- H. Comply with the site erosion control plan and permit requirements.
- I. Clean and maintain a tire cleaning area at the entrance to the site during operations.
- J. Protect benchmarks, survey control points, fences, paving, and curbs to remain from excavating equipment and vehicular traffic. Prevent fill materials from tracking off site.

3.03 ROUGH GRADING

- A. Identify required lines, levels, contours, and datum. Remove any debris, vegetation, or organic material.
- B. Before placing aggregate stabilization fill, smooth and level the surface of the existing soil and compact as reasonable. Do not over compact.
- C. Do not remove wet subsoil, unless it is subsequently processed to obtain optimum moisture content.

- D. Install geotechnical fabric for ground stabilization and stabilizing aggregate per cross section.
- E. Provide allowance for 6" of topsoil in non-paved areas. Topsoil must be left smooth, uniform, without debris, lumps, or rocks larger than 1" and ready to be fertilized and seeded.
- F. Stability: Replace damaged or displaced subsoil to same requirements as for specified fill.
- G. Remove large stones, boulders and debris from the site. Rough grading shall be finished by blading to reasonably smooth contours with uniform transitions and slopes.
- H. Place and maintain silt fence and other erosion control items to prevent silt from entering adjacent properties or ROW. Comply with erosion control requirements and permit.

3.04 SOIL REMOVAL

- A. In areas to receive new construction and where grades are changed, remove all organic soils (topsoil) and fill materials placed without adequate compaction. Store materials for reuse.
- B. Stockpiles: Use areas designated on site or as agreed to; pile depth not to exceed 8 feet; protect from erosion. Grade stockpile area to prevent standing water.

3.05 FINAL GRADING

- A. Before Final Grading:
 - 1. Verify subgrade backfilling has been inspected.
 - 2. Verify subgrade has been contoured and compacted.
 - 3. Verify utility excavation is complete, utilities are installed, tested, and are ready for use.
- B. Remove any subgrade debris, roots, branches, stones, in excess of 3 inch in size.
- C. Verify landscape locations and depths to receive topsoil.

3.06 TOLERANCES

- A. Top Surface of Subgrade areas: Plus or minus 0.08 foot from required elevation.
- B. Grading around pavements, between curbs, adjacent to sidewalks as final surfaces, slope to drain and plus or minus .05 foot.

3.07 TESTING

- A. Verify soil materials comply with Section 2.1 above.
- B. Spread soils in loose lifts not to exceed 6" in depth. Disk or dry soils to optimum moisture plus or minus 2% prior to applying compactive effort. Roll as required to obtain density. Adjust moisture content by adding water or dinking as needed to reach moisture required. No additional pay allowance will be made for moisture adjustment.
- C. Shape fills such that water does not pond.
- D. Additional lifts may not be made unless the density requirements are met on the in place lift.
- E. Density testing will be performed once areas have been cleared and ready to receive fills or specified surfaces, including sidewalks. Initially testing will be required until the required densities are achieved and a workable process is in place over a fill area.

3.08 CLEANING AND PROTECTION

- A. Leave site clean uniform, ready to receive future work or temporary seeding. Clean mud from the tire cleaning area and the access way periodically during the work.
- B. Rake and clean entire disturbed areas for seeding.

PART 4 - TESTING SCHEDULE

4.01 EARTHWORK

- A. Owner furnished testing at subgrade areas, and prior to final court subgrade acceptance if instability is exhibited.

END OF SECTION

**SECTION 31 25 00
EROSION AND SEDIMENT CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preparation of soils, collection and management of surface water and erosion.
- B. Implementation of Construction Storm Water Pollution Prevention Plan (SWPPP) in compliance with site permitting.
- C. Permanent Fertilizer, Seeding and Mulching.

1.02 RELATED SECTIONS

- A. Section 31 10 00 – Site Clearing
- B. Section 31 22 00 – Grading
- C. Section 31 2300 – Excavation and Fill
- D. Section 32 1216 – Asphalt Pavement
- E. Section 32 1313 – Concrete Pavement
- F. Section 33 46 16 – Sub-Drainage Piping

1.03 REFERENCES

- A. Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- B. Illinois Procedures and Standards for Urban Soil Erosion and Sedimentation Control
- C. City of Rock Island regulations.
- D. Storm Water Pollution Prevention Plan and Erosion Control Plan
- E. Erosion Control Testing Council (ECTC)

PART 2 PRODUCTS

2.01 MATERIALS

- A. Erosion Control Materials, Illinois Department of Transportation (IDOT): Standard Specifications for Road and Bridge Construction, Adopted January 1, 2012.
- B. Temporary Erosion Control Seeding: Table 4169.02-02, 65% Rye, 35% Oats.
- C. Permanent Seeding: Per City of Rockford Standards and Specifications.
- D. Silt Filter Fence: Section 4196.01,B. and I.M. 496.01.
- E. Netless Erosion Control Blanket: Futerra F4 Netless or Equivalent having the following characteristics:
 - 1. Mass per Unit Area: 5 oz/yd²
 - 2. Thickness: 0.2 in.
 - 3. Tensile Strength: 4.3 lb/ft
 - 4. % Ground Cover: 79%
 - 5. Flexural Rigidity: 0.006 oz-in
 - 6. Water Absorption: 395%
 - 7. Shear Stress: 1 lb/ft²
 - 8. Functional Longevity: ≤ 12 months

PART 3 EXECUTION

3.01 STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

- A. Erosion Control Plan Sheets: A general approach is included in the project plan sheets and SWPPP binder. A narrative is included on the plan sheets to provide a description for the work. This description is furnished to establish a level of effort needed to achieve permit compliance. It is understood and expected that actual conditions during construction will require ongoing adjustments to the Erosion Control Plan (ECP) and ultimately the Storm Water Pollution Prevention Plan (SWPPP) for this project.
- B. Responsibility: The City of Rockford, is the jurisdictional control for this project. All persons performing surface disturbing activities on the site to take responsibility for their actions by conforming with the plan as permitted, or by adjusting the plan to accommodate schedule and method changes. Persons performing work on site are required to log in to the plan, and log out when they have completed their activities. Changes to the plan are permitted, and various controls are shown in the ECP to allow flexibility of the plan without violating the permit.
- C. Plan Modifications: Changes to the ECP must be in compliance with the conditions of the prevailing permit. These changes, along with periodic inspection reports mandated by time and rainfall events during construction are subject to inspection by the City of Rockford and the IEPA / EPA. Failure to keep the appropriate records and failure to comply with the permit are reasons for enforcement action involving all parties.

3.02 INSTALLATION

- A. Per Manufacturer's Instructions.

3.03 SCHEDULE

- A. Refer to the Erosion Control drawings for project details and schedule for seeding, silt filter fence locations, and temporary drainage provisions.
- B. Refer to plans for details on for utilities.
- C. All materials are to be installed in accordance with the manufacturer's guidelines.
- D. Temporary Seeding: 100 lbs per acre application and reseeded at 7 day intervals on bare areas regardless of weather conditions.

3.04 SUBMITTALS

- A. All seed material is to be certified as meeting the above criteria prior to incorporation in the project.
- B. Erosion Control items require product certification for their intended use.

END OF SECTION



AMERICAN SPORTS BUILDERS ASSOCIATION ASPHALT GUIDELINES

This Guideline is intended to assist owners, contractors, design professionals, and hot mix asphalt suppliers in the design and installation of hot mix asphalt concrete to meet exacting sports construction standards. Because of the wide variation in climate, construction methods, site conditions and materials availability, the services of a qualified and experienced design professional should be obtained before use to ensure suitability for a specific project. The American Sports Builders Association does not represent that this Guideline is suitable for any specific project, disclaims any and all warranties with respect to this Guideline, and assumes no responsibility for the use of this Guideline with respect to any project.

Asphalt for Athletic Uses

Qualified Suppliers

Hot Mix Asphalt (HMA) shall be manufactured from a state approved / certified HMA manufacturing facility. Work consists of one or more courses of HMA constructed on a properly prepared foundation. The low-volume (aka athletic use) asphalt concrete consists of a mixture of dense (aka well) graded aggregate and specified type and grade of asphalt binder. The manufacturing facility shall be capable of producing HMA in accordance with the following requirements and all applicable local agency specifications on an ongoing and consistent basis.

Ensuring uniform material is produced and selecting the vendor for these asphalt projects will require timely submittal of documents and qualifications to the satisfaction of the Owner.

Contractor / material supplier shall demonstrate the existence of the following documents:

- Approved vendor certificate for the locality (state / county / city, et. al.) where work is being done,
- Quality Control manual for material production oversight and testing measures being performed both at the asphalt plant as well as on the job site, and
- List / Organizational Chart showing personnel responsible for use of equipment and actions of the crew on the grade while paving and compacting asphalt.

Calibrated equipment and qualified personnel must be always accessible during the construction of the HMA. The Contractor installing the HMA shall provide the necessary equipment, materials, and labor to complete the job acceptable to the Owner and in accordance with applicable contract documents. Variations in the size and amount of equipment will depend on the size of the area being paved.

It is imperative that all documents list a “Person-in-Charge” who is responsible for the oversight of the previously listed activities. This individual will be the point of contact for the Owner and shall work with the Owner to ensure timely project completion and specification compliance. This individual shall be knowledgeable in all aspects of asphalt design, production, and



installation and shall be an employee of the Contractor installing the asphalt, even if the HMA is being produced and supplied by a separate vendor.

This individual shall be knowledgeable in all aspects of asphalt mix design, production, and installation and shall be an employee of the company holding the contract with the Owner, even if the HMA is being produced and supplied by a separate vendor. This person shall have authority to take corrective actions needed to make the athletic asphalt fit for use.

For the asphalt installation as well as aggregate base, it is best practice for the owner and or owners' representatives to review and approve all data and reports prior to the application of athletic surface materials. This includes design submittal, construction observation, and quality control and assurance sampling and testing.

Definitions

1. **Surface Course** – The low volume surface / wearing course shall be installed uniformly, to all finished lines and grades, smooth, durable, impervious thus protecting lower layers, and stable. Workmanship of the finished surface course shall be of the highest industry standards (NAPA, AI, ASBA, and NHI references) and applicable to sports surfaces prior to acceptance by the Owner. The surface course shall be built with a fine-graded, ½” maximum aggregate particle size (Nominal Maximum Aggregate Size of ¾”) or smaller. Surface course shall be installed to a minimum average 1-½” compacted thickness; ensure that no thickness of less than 1- ¼” compacted thickness is placed.
2. **Leveling Course** – The course and location of the recreational area that requires placement of a variable thickness of HMA to ‘true up’ the area prior to placement of the surface course. This course has a Maximum Aggregate Size (MAS) no greater than that of the surface course.
3. **Base Course** – The lower courses of the pavement structure below the surface and leveling course with a MAS of between ¾” and 1”. Base courses shall not be allowed to remain without the surface course placed over an extended period and as approved by the engineer. The base shall be kept clean and must be completely dry before proceeding. If the minimum thicknesses shown above cannot be met, then install surface mixture as base course.
4. **Tacking / Priming** – The process of applying one coat of emulsified asphalt to all horizontal and vertical surfaces of either an existing pavement for an overlay or between lifts while building an improved or new structure (tacking), or upon the aggregate base (priming).



HMA Mixture NMAS	NCAT Fine Graded HMA Compacted Thickness, minimum
3/8" (9.5 mm)	(3) x 3/8" = 1- 1/8" (1-1/2" preferred)
1/2" (12.5 mm)	(3) x 1/2" = 1- 1/2" (2" preferred)
3/4" (19.0 mm)	(3) x 3/4" = 2- 1/4" (3" preferred)

Materials

- Tack Coat and Prime Coat: AASHTO M140 or M208 (Reference the Asphalt Institute MS-19 for Handling, Storage and Application criteria: typically, 0.05 gal / sy to 0.15 gal / sy (0.02 gal / sy to 0.05 gal / sy residual AC) depending on the existing surface condition; see Surface Preparation section and current AI and NAPA publications).
 - Tack Coat: SS-1, SS-1h, CSS-1 or CSS-1h diluted with an equal amount of water, or agency acceptable product.
 - Prime Coat: Prime Coat materials of MS-2, CMS-2, or HFMS-2s.

- Hot Mix Asphalt (Low Volume):
 - Aggregates, mineral filler, and asphalt binder shall meet or exceed the requirements of local specifications for asphalt pavements placed under this contract for qualities and types. The coarse aggregate shall be sound, angular crushed stone, crushed gravel, or crushed air-cooled blast furnace slag (not steel). The fine aggregate shall be well graded, moderately sharp to sharp (angular) sands. No aggregates known to cause rust spots or pop-outs (steel slag, iron pyrite, and / or dust balls) are allowed in the asphalt. No recycled concrete is allowed in any of the asphalt mixtures.
 - All HMA mix designs shall be performed in accordance with the Asphalt Institute Manual Series #2 (MS-2), current edition. The HMA mix designs developed shall meet the requirements of one of the following for compactive effort in the laboratory:
 1. Marshall, 50-Blow,
 2. Superpave, 50-Gyration, or
 3. Hveem, Low Volume Mix.
 4. Alternate **Low Volume** Asphalt Mix Designs may be allowed with the Engineers approval prior to time of bidding.

- HMA Mix Designs shall be performed by qualified personnel with proven past experience and successes in the mix design and quality control of asphalt production. Resumes of the signing “individual-in-charge” may be required by the Owner and shall be supplied if requested. The design shall meet the following requirements and be less than 24-months old. However, the mix design method used shall be the Contractors option, as stated previously, based on various methods which currently exist around the nation. A completed design shall be signed by a professional engineer and require submittal of documentation as detailed within this specification. This is required by the Owner for the producer to



demonstrate knowledge of asphalt mix design and production criterion needed to supply athletic asphalt.

- Bidding documents shall include the Contractors proposed Asphalt Mixture Design sheets. (Ref. Mix Design Submittal Checklist sheet at the end of this document.) Designs will be for HMA to be placed for each of the uses anticipated on each project; patching, base, leveling, and / or surface course. Different asphalt suppliers shall require different design submittals. In addition to mix designs, submit Asphalt Placement Work Plan, indicating paving pass widths, paving directions, site access, and timing / coordination of athletic equipment installation (tennis net posts, vault boxes, fencing, etc.) Bid document except the asphalt mix design shall be submitted within 10 days of project award; asphalt mix design cover sheet which summarizes all materials and optimum asphalt content is required with project bidding.
- All submitted HMA mix designs shall have a completed Mix Design Submittal Checklist [Reference last page of these guidelines] and contain at a minimum the following information:
 - All Aggregate Gradations and Quality Measurements
 - Plot (0.45 power graph) of Final Aggregate Blend
 - Bulk (dry) Specific Gravity of All Aggregates and Final Blend (G_{sb}) including worksheets for natural (virgin) as well as reclaimed asphalt pavement (RAP).
 - Statement of Asphalt Binder (PG) being used in Asphalt Mixture
 - Optimum % Asphalt Binder (P_b)
 - Mix Air Voids at Optimum (V_a)
 - Bulk Specific Gravity of Mix at Optimum (G_{mb})
 - Theoretical Maximum Specific Gravity at Optimum (G_{mm})
 - Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA)
 - Dust to total AC Ratio
 - All Design Data and associated Design Curves

Mix Design Method Requirements

Measures	Superpave	Marshall	Hveem
Stability, lbs.	n/a	1,200 min.	30 min.
Flow, 0.01 in.	n/a	8 to 16	n/a
Swell, in.	n/a	n/a	0.030 max.
Air Voids @ optimum AC with 2-hr. aging (cure-time).	3.5%	3.5%	3.5%
VMA based on NMAS			
#4 (4.75 mm)	16.0 min.	16.0 min.	16.0 min.
3/8" (9.5 mm)	15.0 min.	15.0 min.	15.0 min.
1/2" (12.5 mm)	14.0 min.	14.0 min.	14.0 min.



Measures	Superpave	Marshall	Hveem
¾" (19.0 mm)	13.0 min.	13.0 min.	13.0 min.
VFA	73 to 80	73 to 80	73 to 80
Dust to effective AC (design & production)	0.7 to 1.3	0.7 to 1.3	0.7 to 1.3
Tensile Strength Ratio	80% min.	80% min.	80% min.

In addition, all design methods and measures listed above shall meet the following criterion for design and throughout production.

- Base mixes shall have a minimum of 45% passing the #4 sieve,
- Surface and leveling mixes shall have a minimum of 45% passing the #8 sieve,
- Coarse Aggregate fraction shall have a minimum of 85% / 75% crushed faces,
- Fine Aggregate Angularity (AASHTO T-304, Method A), shall be $\geq 40\%$ with no more than 20% natural sand allowed,
- Mix Designs shall include a breakdown factor, increase to minus #200, introduced during the design stage to mimic production values,
- VMA is based on the aggregate bulk (dry) specific gravity, G_{sb} , as determined by AASHTO T-84 and T-85,
- Performance Graded (PG) binder shall meet typical agency specification for new construction low volume roadways, [Reference LTPPBind, current edition; 98% reliability.]
- Reclaimed Asphalt Pavement (RAP):
 - a. No RAP is allowed in the HMA Binder / Base and Leveling Courses.
 - b. No RAP may be used for the HMA Surface Course due to potential blemishes forming from unknown aggregate qualities.
- Reclaimed Asphalt Shingles (RAS) are not allowed in athletic facilities asphalt,
- Current Quality Control testing of the mixture, aggregates, and RAP proposed to be used on the project shall be submitted to the Owner prior to acceptance of the proposed mix design.
- Testing -



- Testing required to validate or control the mix supplied is the Paving Contractor's responsibility and will be included in the bid cost for providing these HMA items. Daily maximum theoretical specific gravity (G_{mm}) values must be made available to the Contractor's density technician for verifying in-place density within four hours of start of production. Asphalt content, gradation, and bulk specific gravity (G_{mb}) testing shall be performed on the first day of installation for each product used, then done a minimum of once every 400 tons of HMA supplied or every third day for low tonnages that when added together successively do not equal 400 tons. Acceptable average measures are made by use of a correlated nuclear density gauge, a correlated Pavement Quality Indicator or PaveTracker (non-nuclear) or by cutting (4) cores per lift, per day and testing per AASHTO T-166, Method C. Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.
- The average sub-lot (daily or 400 tons; whichever is less) in-place density measure for surface course mixtures shall be 94.0% of G_{mm} with no value less than 92.5% of G_{mm} . Base and leveling installation of asphalt shall meet local DOT specifications for in-place density measures or average of 92.0% of G_{mm} , whichever is greater. Surface course longitudinal joints shall be measured directly upon the joint, centered upon by core or density gauge, and shall meet the mat density requirements. Base and leveling course longitudinal joint density measures shall achieve between 95% - 102% of maximum achievable individually, with an average of 98% on any given day.
- Process Control testing shall be in accordance with state standards for frequency and methods where the work being performed is done with a minimum of testing meeting the above QC requirements.
- Process Control Voids and minus #200 gradation shall target mix design with no test outside plus / minus 1.0% and VMA shall target the asphalt mix design value or greater, with no test value less than minimum allowed minus 0.3%.
- Print outs of ingredients used shall be supplied for each run of asphalt; data logger or computer screen shot. Print outs shall be supplied daily with the final load of asphalt ticket.

Recommended Means & Methods

Equipment

- Tack / Prime Coat Distributor Truck must have an insulated tank, heating system, and a calibrated distributor capable of maintaining a uniform application of emulsified asphalt under pressure throughout the area to be paved. This requires a pump in good working order, full circulating spray bars, and free flowing nozzles. Small, isolated areas may be tacked with a wand.
- Trucks shall have smooth, clean, and tight metal beds that do not have mixture sticking to the truck bed and from which the entire quantity of HMA can be discharged smoothly into the spreading equipment. Trucks shall have a tarp and insulation as needed to protect the asphalt mixture from wind, rain, and cold temperatures. Trucks for hauling asphalt mixture shall be in good, safe working condition.



- Paving Equipment must be capable of placing, spreading and finishing courses of HMA to the specified thicknesses. HMA shall be free of marks, segregation and be placed to the required uniform elevation with a smooth texture not showing tearing, shoving, or gouging. Auger extensions are required while pavers are extended beyond the basic screed width. Paving Equipment shall be self-propelled and capable of maintaining the line and grade shown on the plans with suitable electronic equipment. The screed shall be straight and true with no bow and utilizing a vibratory screed. Hand work shall be minimized to ensure the best possible finished surface. It is recommended that paving equipment be equipped with sonar pods or no contact skis for sports asphalt construction. Additionally, it should be equipped with automatic slope control to maintain required tolerances. Finally, paving equipment should have fully functional screed heaters and joint preheaters.
- Rollers shall conform to the manufacturer's specifications for all ballasting. At least one vibratory roller shall be required for each project with two rollers required as a minimum. (Three rollers shall be required when tonnage is greater than 300 tons / day.) Rollers shall be of good condition and capable of compacting the HMA to the minimum in-place density required by this specification.

Surface Preparation

1. Repair pavement failures and perform crack repair according to specification requirements prior to HMA installation.
2. Cold-milling and/or grinding may be necessary to ensure that the asphalt edges at concrete abutments such as approaches, sidewalks, curbing, and drainage basins have smooth transitions.
3. After site review, detail whether wedge milling is necessary to assure positive drainage and transition. Install leveling course, if required, on the project per the site details and quantities shown on the plan sheets.
4. Existing surfaces to receive HMA must be clean prior to the installation of any portion of the work. Clean the surface on which the asphalt concrete is to be placed, and keep it free of accumulations of materials that would contaminate the mixture, prevent bonding, or interfere with spreading operations. Methods used may include but not be limited to the use of a sweeper that can wet and vacuum the area free of dirt and debris, clay, and dust, or any other foreign material.
5. Any oil or grease spots shall be scraped and treated to prevent bleeding through the tack coat. Bad oil spills may require removal with a wire brush or other suitable tool. Maintain clean pavements prior to applying emulsified tack coat. When approved sub-grade or pavement courses previously constructed under the Contract become loosened, rutted, or otherwise defective, the Contractor must correct the deficiency according to the contract item or items involved before the spreading of a subsequent pavement course.

6. If subsequent lifts are laid beyond 24 or 48 hours, apply tack coat at the diluted rate of 0.05 gal / sy (0.02 gal / sy residual AC) over newly constructed asphalt leveling or base mixes, 0.10 gal / sy (0.04 gal / sy residual AC) over existing asphalt pavements and 0.15 gal / sy (0.05 gal / sy residual AC) over milled surfaces. The higher rate shall be used on dry and brittle surfaces. All vertical edges abutting proposed asphalt surfaces shall receive a tack coat. Excessive asphalt applications, drooling, or pooling shall be swept with a broom to ensure proper bonding of the HMA. Install the HMA after the asphalt emulsion has 'broken'; i.e. turned from a brown to a black color, indicating water has evaporated. If pick up occurs, wait until emulsion cures.
7. Apply prime coat at the diluted rate of 0.30 gal / sy over newly placed aggregate base course prior to the installation of the base asphalt.
8. Install tack / prime coat during appropriate weather conditions and protect the tack / prime coat from traffic so as not to wear and track. Allow the tack / prime coat to 'break', i.e. turn from brown to black prior to installation of the HMA.
9. Perform work in appropriate weather conditions that are dry with no rain, snow, or other forms of precipitation falling or imminent (anticipated during installation of the HMA).

Pavement Placement

10. Install HMA which shall generally arrive on the project between 270 – 300° Fahrenheit (see producer recommendation) asphalt in accordance with above weather conditions and with a temperature of 50° F. and rising for all asphalt lifts.
11. Establish an acceptable rolling pattern with the assistance of a density technician on the first day of construction. Record temperatures, equipment, rolling pattern, and in-place density results throughout the project.
12. Surface course longitudinal joints shall be smooth and true; no deviation from level and true as required of the mat will be allowed. Detail and submit to the Owner a paving plan on the site plan sheet prior to placement of asphalt.
13. The entire athletic surface course shall be paved on the same day. The timing and process should be discussed with and approved by the Owner before proceeding with the work. If a cold seam will occur, it must be agreed to with the Owner in advance such as: occur near or at a planned saw and seal joint or under the fence line.
14. Rolling shall start as soon as the HMA can be compacted without displacement. Rolling shall continue until the HMA is thoroughly compacted and all roller marks have disappeared. Compact the HMA to a minimum in-place density of 94.0% of the Theoretical Maximum Specific Gravity, G_{mm} . [Reference density pay factor table.]
15. Smoothness shall meet the requirements of no greater than ¼" in 10 ft. for base and leveling courses and ⅛" in 10 ft. for surface course. [Reference ASBA manual.]



16. Thickness of the overall mat shall be within ¼” (surface course, no minus) of the specified plan thickness at all locations. However, the yield for the day and for the entire site shall meet calculated theoretical based on 94% of G_{mm} supplied from the Contractors mix design and daily test values.
17. Paving Joints [Install / build control joints per the Architectural Drawings.]
 - Minimize construction, longitudinal, and transverse joints left open for an extended period.
 - Construct longitudinal joints by paving in a hot fashion with a temperature of not less than 220oF to ensure maximum performance.
 - Compact all joints to provide for a neat, uniform and tightly bonded joint that will meet both surface tolerances and density requirements.
 - Cut straight and true (vertical) construction or transverse joints if the material has cooled to less than 220oF prior to the placement of the next pass to ensure the best performing joint possible.
 - Off-set joints a minimum of 6” between lifts of asphalt.
18. Allow positive drainage off of the athletic facility and towards drainage outlets. Any ponding of water is not acceptable and shall require correction or replacement at the Contractor’s expense and as directed by the Engineer. Please reference the ASBA Tennis Construction & Maintenance Manual or ASBA Running Tracks Construction & Maintenance Manual for ponding tolerances. Flood pavement areas as directed by the Owner and in the presence of the Architect / Engineer and surfacing contractor to determine positive drainage acceptability.
19. Protect the HMA until such time that coating can be placed upon the properly compacted asphalt, particularly during other construction activities between asphalt installation and athletic surface installation.
20. If excessive segregation is occurring during placement operations, the Contractor will investigate the cause(s) and make appropriate changes to the satisfaction of the Owner. [Reference AI MS-22.]
21. Excessive leveling and smoothness correction required to be performed by the surfacing contractor shall be the responsibility of the paving contractor.

Work Timeliness

HMA Full-depth pavements / Overlays (a/k/a Resurfacing): The repairs, HMA overlay, and coating shall be accomplished in such a manner as not to unduly delay the progress of the project. Every attempt should be made to complete the surface course placement process in one continuous placement with no cold joints. The timing and process should be discussed with the Owner before proceeding with the work.



March 31, 2022

Site Specific Identification, Contractor shall:

- Remove all waste materials from the site and dispose of according to local ordinances.
- Complete all work in compliance with the American Sports Builders Association (ASBA) requirements or as modified here, whichever is more restrictive.
- Notify Owner when work is complete.
- Supply Owner with Notarized Certificate of Compliance for all products used on the project.
- Supply Owner with yield calculations for all products used on the project. (for example, placement of 1,300 sq. yds. of Hot Mix Asphalt, 1-³/₄" compacted thickness will require 128 tons when the unit weight = 150 pcf.)

References:

Asphalt Institute, Lexington, KY [MS-2, Asphalt Mix Design and MS-22, Asphalt Construction.]
National Asphalt Pavement Association, Lantham, MD. [Athletic Asphalt.]
National Center for Asphalt Technology [HMA Materials, Mixture Design, and Construction.]
American Sports Builders Association [Construction and Maintenance Manual.]

Mix Design Submittal Checklist

Project: _____

Date: _____

Supplier: _____

Mix Design: _____ Surface / Leveling / Base _____

Included Missing N/A Required Information

			Required Information
			Contractor to select mix design method: (design shaft be less than 24 months old)
			50-Blow Marshall
			50-Gyration Superpave
			Hveem, Low Volume
			Other. Engineers Approval Req'd Before Bidding
			Proper Authorizing Signature for Mix Design
			All Aggregate Types. Gradations & % Crush
			FAA >= 40%. Maximum of 20% Natural Sand
			Plot (0.45 Power Graph) of Final Aggregate Blend
			Bulk (Dry) Specific Gravity of All Aggregates and Final Blend (Gsb). Include All Worksheets
			Optimum Binder Content (Pb)
			Mix Voids at Optimum (Va)
			VMA at Optimum
			Bulk Specific Gravity of Mix at Optimum (Gmb)
			Theoretical Maximum Specific Gravity at Optimum (Gmm)
			Dust to Total AC Ratio
			All Design Data and Associated Design Curves
			Recent Quality Control Production Charts
			Other Information per Specifications

Comments: _____

**SECTION 32 13 13
CONCRETE PAVEMENT**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-structural concrete flatwork and/or sidewalks
- B. Compacted granular base.
- C. Backfilling form lines with appropriate material.
- D. Miscellaneous Concrete, fence and foundations.

1.02 RELATED SECTIONS

- A. Section 11 68 23.33 – Tennis Equipment
- B. Section 31 23 00 – Excavation and Fill
- C. Section 31 25 00 – Erosion and Sediment Control
- D. Section 32 12 16 – Asphalt Pavement
- E. Section 32 31 00 – Fences and Gates
- F. Section 33 46 16 – Sub-Drainage Piping

1.03 REFERENCES

- A. Illinois Department of Transportation (IDOT): Standard Specification for Highway and Bridge Construction, Series 2012.

1.04 PROJECT CONDITION

- A. Verify that subgrade elevations meet tolerances in Section 31 23 00 Excavation and Fill
- B. Provide sufficient paving operations to meet project schedule and requirements.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All products must meet or exceed the requirements of the Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- B. Portland Cement Concrete Pavements and Sidewalks as per the Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- C. Miscellaneous Concrete shall conform to the Illinois Department of Transportation (IDOT); Standard Specifications for Highway and Bridge construction, Series 2012.
- D. Aggregate Base: Illinois CA-6 as per Section 1004 (quality) of the Illinois Department of Transportation (IDOT) Standard Specifications for Highway and Bridge construction, Series 2012. Recycled concrete is acceptable providing it meets gradation and quality requirements. Use per drawings.
- E. Drainable Base or free draining Aggregate: Drainable base shall be clean crushed limestone to be free draining and having an air void content by volume $\geq 35\%$. Acceptable aggregate: Illinois CA-7. Use per drawings
- F. Provide from an Illinois DOT certified source, P.C. concrete meeting all of the following characteristics:
 - Compressive Strength at 28 days: 4,000 psi.
 - Slump: 4 inches maximum.
 - Air Entrainment: 5 - 8 percent.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify gradients and elevations of base.
- B. Verify compacted sub-grade is dry and ready to support paving and imposed loads.
- C. Verify that all utilities within the work area have been installed, tested, and are ready to be paved over.

3.02 PREPARATION

- A. Scarify sub-grade surface to a depth of 6 inches in all areas compacted by construction activities prior to placing fill.
- B. Cut out soft areas of sub-grade not capable of compaction in place. Backfill with general fill.
- C. Compact sub-grade to density equal to or greater than the requirements for subsequent fill material.
- D. Moisten substrate to minimize absorption of water from fresh concrete.

3.03 BASE CONSTRUCTION

- A. Fill areas to contours and elevations using unfrozen materials.
- B. Place aggregate fill materials in continuous layers not exceeding 8" on top of geotechnical fabric (if specified).
- C. Compact aggregates in 8" deep lifts maximum, within 0 to +4% above optimum moisture content, and compact each lift by approved methods to not less than 95% of the maximum density given by ASTM D698 (Standard Proctor Density). Keep compacted lifts relatively smooth and level
- D. Maintain optimum moisture content of fill materials to attain required compaction density.

3.04 FORMING

- A. Place and secure forms to correct location, dimension, and profile.
- B. Place joint filler in joints, vertical in position, in straight lines. Secure to formwork.
- C. Place joint filler between paving components and other appurtenances.

3.05 PLACING CONCRETE

- A. Mixing and handling of fresh concrete, including transit time, shall be as per Section 420 of the Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- B. Place Portland Cement Concrete in accordance with Section 420 of the Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- C. Special scoring, architectural joint treatment, color, or special surface treatments as specified.

3.06 FINISHING

- A. Paving shall be finished according to the Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- B. Sidewalks: Standard, Light broom, radiused and trowel joint edges. Joint pattern shall be uniform and not exceeding the sidewalk width unless specified elsewhere.
- C. Curbs and Gutters: Broom finish.

3.07 TOLERANCES

- A. Flatness: Maximum variation of one-quarter inch in ten feet as measured with a ten-foot straight edge.
- B. Compacted Scheduled Thickness (sub-grades): Within one-quarter inch of design thickness.
- C. Variation from True Elevation: One half inch.

3.08 JOINTS

- A. Sidewalk joint spacing will be 5' or equal to the width of the walk unless specified elsewhere.

END OF SECTION

SECTION 32 13 14
POST-TENSIONED CONCRETE TENNIS COURT

PART 1 – GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Post-tensioned Concrete Tennis Court.
- B. Related Sections:
 - 1. Division 31 "Earth Moving"
 - 2. Division 32 "Concrete Paving".
 - 3. Division 32 "Court Surfacing"

1.02 SUBMITTALS

- A. See Division 01 for submittal procedures.
- B. Product Data: For each type of product indicated include construction details, material descriptions, dimensions of components and finishes.
- C. Shop Drawings: Detail fabrication and erection of each component indicated. Include plans, elevations, sections and details. Show anchorage and accessory items.
- D. Samples for Verification: For each type of product or exposed finish, prepared as Samples of size indicated below:
- E. Other Action Submittals:
 - 1. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 2. As-Built Survey of Court Surface.
- F. Qualification Data: refer to Division 1.
- G. Material Certificates: For the following, from manufacturer:
 - 1. Cementitious materials.
 - 2. Steel reinforcement and reinforcement accessories.
 - 3. Admixtures.
 - 4. Curing compounds.
 - 5. Applied finish materials.
 - 6. Bonding agent or epoxy adhesive.
 - 7. Joint fillers.
 - 8. Tensioning cables.
 - 9. Fiber Mesh.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A firm experienced in producing post-tensioned concrete slabs similar to those indicated for this Project and with a record of successful performance, as well as sufficient production capacity to produce required work.
 - 1. The work shall be done in a thorough, workmanlike manner by experienced contractors and shall conform to the standards of the American Sports Builders Association for tennis court construction.
 - 2. All steel tendon installation, concrete work and stressing of tendons shall be done by selected contractor. This provision intent is to provide continuity and one source responsibility for the integrity of the post-tensioned slabs.

- B. Pre-Installation Conference: Conduct conference at Project site to comply with requirements in Division 1. Review methods and procedures related to the following;
 - 1. Inspect and discuss condition of preparatory work, if any, performed by other trades.
 - 2. Review and finalize construction schedule and verify availability of materials, Erector's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review required testing, inspecting and certifying procedures.
 - 4. Review weather and forecasted weather conditions and procedures for unfavorable conditions.
- C. ACI Publications: Comply with ACI 318-08 unless otherwise indicated.

1.04 PROJECT CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.05 WARRANTY

- A. Contractor shall warrant work as provided by the General and Supplementary Conditions and Division 01 Specifications.

1.06 EXTENDED WARRANTY

- A. Special Warranty on court slab. Installers standard form in which installer agrees to repair court slab structures that show evidence of deterioration within the warranty period of 2 years.

PART 2 – PRODUCTS

2.01 COURT PAVING

- A. The contract work to be performed under this section consists of furnishing all required labor, materials, equipment, implements, parts and supplies necessary for, or appurtenant to, the construction of a five inch (5") thick post-tensioned concrete slab.
- B. Concrete shall meet requirements of section 321313.
- C. Tensioning Cables and Anchors;
 - 1. Post-tensioning strands and anchorages shall conform to the "PTI Guide Specifications for Post-tensioning Materials".
 - 2. The tensioning strands shall consist of one-half inch (1/2") diameter, 7-wire, stress relieved strands, having a guaranteed ultimate tensile strength of 270,000 PSI (270 Kips). Strands shall conform to ASTM-416. Cables shall be fabricated to proper length for each slab, coated with a permanent rust preventative lubricant and encased in sheathing. Any damage to sheathing shall be repaired with tape prior to concrete placement. A maximum of six inches (6") of exposed strands is permitted at the dead-end anchor.
 - 3. Any damaged cables shall be removed and replaced prior to concrete pour.
 - 4. Contractor shall submit shop drawings of cable layout, spacing and anchoring for approval prior to construction.
- D. Concrete Compressive Strength;
 - 1. The concrete shall have a compressive strength of not less than 4,000 PSI after twenty-eight (28) days. Ready-mixed concrete shall be mixed with fiber mesh and delivered according to ASTM c-94 specifications for ready-mixed concrete with fiber mesh with a four-inch (4") maximum slump. Mix design shall be submitted for approval prior to delivery to site.
- E. Forms shall meet requirements of section 321313.
- F. Fiber Mesh: Fibermesh 300 or approved equal. 3/4" synthetic fiber reinforcement at 1.5

lbs. / CY. Submit manufacturer catalog cut sheets for approval. Manufactured by Propex Concrete Systems Corp. 6025 Lee Highway 6, Suite 425, Chattanooga, TN 37422. (800) 621.1273 or www.fibermesh.com.

- G. Vapor Barrier – 10 MIL. Polyethylene sheets with 6” overlap at joints. Place directly below slab. Manufactured by Americover or approved equal. Submit product data for approval.

PART 3 – EXECUTION

3.01 EXAMINATION

- A. Examine exposed subgrades and Subbase Course surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
- B. Proof-roll prepared Subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - 1. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph.
 - 2. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons.
 - 3. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch according to requirements in Section 312000.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Remove loose material from compacted Subbase Course surface prior to placement of Base Course.
- B. Place and compact Base Course per Specification Section 31 20 00.
- C. Place Vapor Barrier.
- D. Install net posts and net tie down strap anchors.
- E. Coordinate with Specification Section 32 13 13 for Isolation Joints at perimeter of slab.

3.03 COURT PAVING

- A. Forming: Forms shall be accurately set to the lines and to plus or minus one-quarter inch ($\pm 1/8$ ”) of finished grades indicated on drawings and be securely staked to prevent settlement or movement during placement of concrete. Forms shall remain until concrete has taken final set.
- B. Tensioning Cables and Anchors:
 - 1. All cables shall be supported on chairs and loosely tied two inches (2”) high at all intersections (too tightly tied, tendon friction will increase when tensioning) to prevent vertical and horizontal movement during concrete placement. Strands shall be placed per approved shop drawings. Cable spacing shall be per approved shop drawings.
 - 2. The perimeter slab beam cross section is 12”x12”. The cables are anchored approximately 3” down from the surface of the slab. Two #4 rebar continuous longitudinally around the court beam directly inside the cable anchor on top of the cables. Overlapping should be a minimum of 30 diameters.
 - 3. After the forms are removed and the concrete has set to a minimum of 1,700 PSI, the “half stress” tensioning procedure may begin. Approximately one (1) week later, each tendon may be tensioned to a maximum of eighty percent (80%) ultimate breaking strength, and anchored a minimum of seventy percent (70%) ultimate breaking strength.
 - 4. The cable ends shall be cut off and cone holes grouted flush with edge of slab. Grout shall be non-shrink grout.

- C. Concrete Placement: A full court shall be placed in one (1) continuous operation without intervening joints of any kind. The five inch (5") thick slab will be placed with a fourteen and one half foot (14.5') mechanical laser screed capable of providing a surface to + 1/8" in 10' at a 0.83% slope.
 - 1. Finish surface shall not have a water-holding area greater than 1/8" deep (cover a nickel). This is to be determined by flooding the court with water, allowing it to drain for one hour on a 70-degree or warmer day.
 - 2. Concrete shall have a wood float or light broom finish. DO NOT STEEL TROWEL CONCRETE. DO NOT ALLOW ANY CURING AGENTS OR HARDENERS TO BE USED.
- D. Curing: Immediately after finishing, the concrete shall be kept moist by covering with polyethylene, by sprinkling, by ponding or by curing compound (must be compatible with acrylic tennis surfacing material).

3.04 TOLERANCES

- A. Overall Grade and Planarity – the tennis court surface must be located at the designed elevation and slope. The finished court shall not vary more than +/- 3/8" from designed elevation and grade. Contractor shall provide as built survey of court surface to Landscape Architect for approval to confirm this tolerance is met prior to application of court surfacing materials.
- B. Surface Smoothness – In order to drain properly and to be acceptable for play, the surface must be smooth and regular, lacking humps and dips. The surface shall not vary more than 1/4" in 10' when measured in any direction using a straightedge.
- C. Surface Irregularities – No deviation in the surface greater than 1/8" in 18" when measured in any direction using a straightedge.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when it is 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

- C. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
- D. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
- E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
- G. Concrete paving will be considered defective if it does not pass tests and inspections.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- I. Prepare test and inspection reports.

3.06 REPAIRS AND PROTECTION

- A. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by Architect.
- B. Drill test cores, where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with Portland cement concrete bonded to paving with epoxy adhesive.
- C. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
- D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION

SECTION 32 18 23
ASPHALT TENNIS COURT SURFACE COLOR COATING SYSTEM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Asphalt tennis court surface color coating system.
- B. All courts are to receive both standard singles and doubles markings. All per USTA guidelines, Court color to be red with grey outer areas.

1.02 RELATED REQUIREMENTS

- A. Section 11 68 23.33 – Tennis Equipment
- B. Section 32 12 16 – Asphalt Pavement
- C. Section 32 31 00 – Fences and Gates

1.03 REFERENCE STANDARDS

- A. American Sports Builders Association (ASBA).
- B. United States Tennis Association (USTA) Rules of Tennis.
- C. International Tennis Federation (ITF).

1.04 SUBMITTALS

- A. Comply with Submittal Procedures.
- B. Product Data: Submit manufacturer's product data, including surface and crack preparation and application instructions.
- C. Samples: Submit manufacturer's color samples of color coating.
- D. Test Reports:
 - 1. Submit independent test results for solar reflectance index.
 - 2. Submit independent test results for 2000 Hour ASTM G154, accelerated weathering UV test, to demonstrate long-term durability and fade resistance.
 - 3. Submit independent test results for 2000 Hour, accelerated weathering ASTM G155 Xenon Arc test, to demonstrate long-term fade resistance and quality of pigment.
- E. Manufacturer's Certification: Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.
- F. Manufacturer's Project References: Submit manufacturer's list of successfully completed asphalt tennis court surface color coating system projects, including project name, location, and date of application.
- G. Applicator's Project References: Submit applicator's list of successfully completed asphalt tennis court surface color coating system projects, including project name, location, type and quantity of color coating system applied, and date of application.
- H. Warranty Documentation: Submit manufacturer's standard warranty.

1.05 QUALITY ASSURANCE

- A. Manufacturer's Qualifications
 - 1. Manufacturer regularly engaged, for past 5 years, in manufacture of asphalt tennis court surface color coating systems of similar type to that specified.
 - 2. United States owned company.
 - 3. Member: ASBA.
 - 4. Manufacturer has surfaces that are classified by the ITF's (International Tennis Federation) pace classification program.

- B. Applicator's Qualifications:
 - 1. Applicator regularly engaged, for past 3 years, in application of tennis court surface color coating systems of similar type to that specified.
 - 2. Employ persons trained for application of tennis court surface color coating systems.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Storage and Handling Requirements:
 - 1. Store and handle materials in accordance with manufacturer's instructions.
 - 2. Keep materials in manufacturer's original, unopened containers and packaging until application.
 - 3. Store materials in clean, dry area indoors.
 - 4. Store materials out of direct sunlight.
 - 5. Keep materials from freezing.
 - 6. Protect materials during storage, handling, and application to prevent contamination or damage.
 - 7. Close containers when not in use.

1.07 AMBIENT CONDITIONS

- A. Do not apply asphalt tennis court surface color coating system when air or surface temperatures are below 50 degrees F during application or within 24 hours after application.
- B. Do not apply asphalt tennis court surface color coating system when rain is expected during application or within 24 hours after application.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. SportMaster Sport Surfaces, PO Box 2277, 2520 South Campbell Street, Sandusky, Ohio 44870. Toll Free 800-326-1994. Fax 877-825-9226. Website www.sportmaster.net. E-mail info@sportmaster.net or equivalent.

2.02 MATERIALS

- A. Asphalt Tennis Court Surface Color Coating System: SportMaster Color Coating System or equivalent.
- B. Crack Sealant: SportMaster "Crack Magic" or equivalent.
 - 1. 100 percent acrylic emulsion elastomeric crack sealant.
 - 2. Seals cracks up to 1/2 inch wide in asphalt pavement.
 - 3. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.
 - 4. Non-Volatile Material: 61 percent, plus or minus 5 percent.
 - 5. Color: Neutral.
- C. Crack Filler: SportMaster "Acrylic Crack Patch" or equivalent.
 - 1. 100 percent acrylic emulsion trowel-grade crack filler.
 - 2. Fills cracks in asphalt pavement up to 1 inch wide.
 - 3. Chemical Characteristics, by Weight, Minimum:
 - a. Acrylic Emulsion: 10.0 percent.

- b. Hiding Pigment: 0.2 percent.
 - c. Mineral Inert Fillers: 78.0 percent.
 - d. Film Formers, Additives: 1.8 percent.
 - e. Water: 8.5 percent.
 - 4. Weight per Gallon at 77 Degrees F: 15.2 lbs., plus or minus 1.0 lbs.
 - 5. Non-Volatile Material: 80 percent, plus or minus 5 percent.
 - 6. Color: Neutral.
- D. Patch Binder: SportMaster "Acrylic Patch Binder" or equivalent.
 - 1. 100 percent acrylic emulsion liquid binder.
 - 2. Mix on-site with sand and cement.
 - 3. Levels and repairs low spots and depressions up to 3/4 inch deep in asphalt pavement.
 - 4. Fills Cracks in Asphalt up to 1" in width.
 - 5. Weight per Gallon at 77 Degrees F: 8.8 lbs., plus or minus 0.5 lbs.
- E. Filler Course: SportMaster "Acrylic Resurfacer" or equivalent.
 - 1. 100 percent acrylic emulsion resurfacer.
 - 2. Mix on-site with silica sand.
 - 3. Apply to asphalt surfaces or previously colored acrylic surfaces in preparation of color coating system.
 - 4. Chemical Characteristics, by Weight, Minimum:
 - a. Acrylic Emulsion: 44.0 percent.
 - b. Hiding Pigment: 2.0 percent.
 - c. Mineral Inert Fillers: 5.0 percent.
 - d. Film Formers, Additives: 0.2 percent.
 - e. Water: 45.0 percent.
 - 5. Weight per Gallon at 77 Degrees F: 8.5 lbs., plus or minus 0.5 lbs.
 - 6. Non-Volatile Material: 27.5 percent, plus or minus 5.0 percent.
 - 7. Color: Neutral Color preferred.
- F. Color Coating: SportMaster "ColorPlus System" or equivalent.
 - 1. 100 percent acrylic emulsion coating.
 - 2. Mix on-site with silica sand and water.
 - 3. Color coats tennis and multipurpose courts.
 - 4. Weight per Gallon at 77 Degrees F: 9.2 lbs., plus or minus 0.5 lbs.
- G. Line Markings Primer: SportMaster "Stripe-Rite" or equivalent.
 - 1. 100 percent acrylic emulsion primer, clear drying.
 - 2. Primes line markings and prevents bleed-under for sharp lines.
 - 3. Chemical Characteristics, by Weight, Nominal:
 - a. Acrylic Emulsion: 38.0 percent.
 - b. Hiding Pigment: 0.0 percent.
 - c. Mineral Inert Fillers: 7.0 percent.
 - d. Film Formers, Additives: 1.5 percent.

- e. Water: 50.0 percent.
- 4. Weight per Gallon at 77 Degrees F: 8.9 lbs., plus or minus 0.5 lbs.
- 5. Non-Volatile Material: 29 percent, plus or minus 5 percent.
- H. Line Paint: SportMaster "Textured Line Paint" or equivalent.
 - 1. Pigmented, 100 percent acrylic emulsion line paint.
 - 2. Line marking on asphalt tennis courts.
 - 3. Chemical Characteristics, by Weight, Nominal:
 - a. Acrylic Emulsion: 25.89 percent.
 - b. Pigment: 14.90 percent.
 - c. Mineral Inert Fillers: 13.12 percent.
 - d. Additives: 4.73 percent.
 - e. Water: 41.36 percent.
 - 4. Weight per Gallon at 77 Degrees F: 10.65 lbs., plus or minus 0.75 lbs.
 - 5. Non-Volatile Material: 45.17 percent, plus or minus 5 percent.
 - 6. Color: White.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine asphalt tennis court surfaces to receive color coating system.
- B. Verify asphalt tennis courts meet ASBA requirements.
- C. Notify Architect of conditions that would adversely affect application or subsequent use.
- D. Do not begin surface preparation or application until unacceptable conditions are corrected.

3.02 SURFACE PREPARATION

- A. Protection of In-Place Conditions: Protect adjacent surfaces and landscaping from contact with asphalt tennis court surface color coating system.
- B. Prepare surfaces in accordance with manufacturer's instructions.
- C. Cure new asphalt surfaces a minimum of 14 to 30 days before application of asphalt tennis court surface color coating system.
- D. Remove dirt, dust, debris, oil, grease, vegetation, loose materials, and other surface contaminants which could adversely affect application of asphalt tennis court surface color coating system. Pressure wash entire surface.
- E. Repair cracks, depressions, and surface defects in accordance with manufacturer's instructions before application of filler course and color coating.
- F. Level depressions 1/8 inch and deeper with patch binder in accordance with manufacturer's instructions.
- G. Apply 1 or 2 coats of filler course as required by surface roughness and porosity to provide smooth underlayment for application of color coating.
- H. Ensure surface repairs are flush and smooth to adjoining surfaces.

3.03 APPLICATION

- A. Apply asphalt tennis court surface color coating system in accordance with manufacturer's instructions at locations indicated on the Drawings.
- B. Mix materials in accordance with manufacturer's instructions.
- C. Apply Filler Course and Color Coating with a 50-60 durometer, soft rubber squeegee.

- D. Filler Course:
 - 1. Apply 2 coats on new asphalt or existing acrylic surfaces with extensive cracks or low spot repair.
 - 2. Apply 1 coat on existing acrylic surfaces with minimal repairs.
- E. Color Coating: Apply a minimum of 2 coats of color coating to prepared surfaces in accordance with manufacturer's instructions.
- F. Allow material drying times in accordance with manufacturer's instructions before applying other materials or opening completed surface to foot traffic.

3.04 LINE MARKINGS

- A. Lay out tennis court line markings in accordance with USTA Rules of Tennis.
- B. Apply line markings primer, after masking tape has been laid, to seal voids between masking tape and tennis court surface to prevent bleed-under when line paint is applied.
- C. Apply a minimum of 1 coat of line paint in accordance with manufacturer's instructions.

3.05 PROTECTION

- A. Allow a minimum of 24 hours curing time before opening tennis courts for play.
- B. Protect applied asphalt tennis court surface color coating system to ensure that, except for normal weathering, coating system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION

**SECTION 32 31 00
FENCES AND GATES**

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Description of Work
- B. Chain Link Fencing Installation
- C. Removal and Replacement of Existing Fences

1.02 DESCRIPTION OF WORK

- A. This section shall include the furnishing of materials, erection, and installation of new chain link fencing and gates, the relocation of existing fences and gates, and all incidental work necessary for completed fencing work as specified in the contract documents. Fence fabric shall be galvanized with bonded black vinyl coating per requirements.
- B. Fence posts are to be set in pre-established holes set into the aggregate subbase, and recovered by core drilling after the bituminous surface has been constructed, prior to the vinyl application.
- C. Fencing contractor shall power wash the asphalt surface after core drilling and concrete operations are finished prior to vinyl applications.

1.03 SUBMITTALS

- A. Submit catalog cuts/certifications of fence products showing materials meet specifications.
- B. Submit operation sequence to predrill and recover post holes.

1.04 RELATED SECTIONS

- A. Section 11 68 23.33 - Tennis Equipment
- B. Section 26 06 00 – Schedule for Electrical
- C. Section 31 10 00 – Site Clearing
- D. Section 31 23 00 – Excavation and Fill
- E. Section 31 25 00 – Erosion and Sediment Control
- F. Section 32 13 13 – Exterior Concrete
- G. Section 32 13 16 – Asphalt Pavement
- H. Section 33 41 00 – Utility Storm Drainage Piping
- I. Section 33 46 16 Sub-Drainage Piping

1.05 SPECIAL REQUIREMENTS

- A. Provide chain link fencing and gates as completed units constructed by a single source including necessary erection accessories, fittings, and fastenings.
- B. Similar parts with different shapes or protective coatings shall not be intermingled within the Project.
- C. Comply with the Voluntary Standard for Chain Link Fence Installation as per Chain Link Fence Manufacturer's Institute (CLFMI).

PART 2 - PRODUCTS

2.01 MATERIALS

- A. The Contractor shall provide all new fabric and framework with fittings, accessories, fasteners, wire, and gates to match, of the size and finish specified.
- B. Fabric

1. Contractor shall provide 9 ga. galvanized steel wire in accordance with ASTM A 817, Class 2, Type 2. Knuckle –Knuckle selvage.
 2. Product shall be 2 oz./sf. galvanized 9 gage wire fabric of the height specified, knuckle-barb selvage.
- C. Posts, Rails, And Braces: Either hot-rolled or cold-rolled posts, rails, and braces shall be used and be the lengths shown on the plans and/or details. The steel strip used in the manufacture of the pipe shall conform to ASTM A 1011.

Hot-Rolled Manufactured Posts, Rails, and Braces (Type I Pipe):

1. No used, rerolled or open seam material will be permitted in posts or rails.
2. Posts, rails, and braces shall be galvanized standard weight steel pipe meeting requirements of ASTM A 53 of the lengths shown on the plans and Standard Detail Plates.
3. Unless otherwise specified, the following nominal sizes for the respective uses are to be provided:

USE IN FENCE	HOT ROLLED (TYPE I PIPE) FENCE HEIGHT					
	48" & Under		Greater than 48" to 96"		Greater than 96"	
	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)
Line Post	2	2.74	2 1/2	3.65	3	5.79
*Terminal Post	2 1/2	3.65	3	5.79	4	9.11
Top/Intermediate/ Bottom Rail & Bracings	1 5/8	2.28	1 5/8	2.28	1 5/8	2.28
** Gate Post						
*Includes corner, angle, brace, and pull posts.						
**As shown on Standard Detail Plates.						

D. Cold-Rolled Manufactured Posts, Rails, and Braces (Type II - Pipe):

1. The pipe shall be manufactured by cold rolling electric resistance welding and shall be given corrosion protection by in-line application of hot-dip galvanized zinc, followed by a chromate conversion coating and electrostatically sprayed thermoplastic acrylic coating on the outside surface.
 - a. Hot-dipped zinc coating per ASTM B 6 high grade and special high grade. The weight of the hot-dipped zinc coating shall be 1.0 ounce/foot² ± 0.1. The weight of zinc coating shall be determined in accordance with ASTM A 90.
 - b. Chromate conversion coating: The chromate coating weight shall be 30 micro-grams/square inch ± 10 micro-grams/inch². The coating weight shall be determined by a quantitative method.
2. The inside surface shall be given corrosion protection by in-line application of a full zinc base organic coating after fabrication.
3. Unless otherwise specified, the following nominal sizes for the respective uses are to be provided:

USE IN FENCE	COLD ROLLED (TYPE II PIPE) FENCE HEIGHT					
	48" & Under		Greater than 48" to 96"		Greater than 96"	
	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)	Outside Diameter (inches)	Weight (lb/ft)

	COLD ROLLED (TYPE II PIPE) FENCE HEIGHT					
	48" & Under		Greater than 48" to 96"		Greater than 96"	
Line Post	2	2.28	2 1/2	3.11	3	4.64
*Terminal Post	2 1/2	3.11	3	4.64	4	6.56
Top/Intermediate/ Bottom* Rail & Bracings	1 5/8	1.84	1 5/8	1.84	1 5/8	1.84
*Includes corner, angle, brace, and pull posts.						

*Use Bottom rail on all fences.

2.02 FITTINGS

- A. All special fittings except aluminum fittings, shall have a galvanized coating applied by the hot-dip process of not less than 0.8 ounce per square foot.
- B. Braces shall be attached to posts by fittings that will hold both post and brace rigidly.
- C. Diagonal tension rods shall be 3/8 inch round steel rods with an appropriate commercial means for tightening.
- D. A locknut or other device shall be provided to hold the tightening device in place.
- E. A suitable sleeve or coupling device, recommended by the manufacturer, shall be provided to connect sections of top rail and shall provide for expansion and contraction.
- F. Posts shall be provided with a suitable cap which is secured. Stretcher bars not less than 3/8 inch diameter, or equivalent cross-section area, with suitable clamps shall be used for attaching fabric to corner, end, or gate posts.

2.03 BOTTOM TENSION WIRE (Not Applicable)

- A. No. 7 gauge hot-dipped galvanized wire or aluminum-coated steel wire shall be used on fences 48" and lower. Coatings shall meet requirements of 64-2.1, Fabric Material.
 - 1. Minimum weight of galvanized coating shall be 0.40 ounce per square foot of wire surface.
 - 2. Minimum weight of aluminum coating shall be 0.25 ounce per square foot.

2.04 FASTENERS

- A. Fasteners to attach the fabric to braces and rails shall be aluminum 9 gauge tie wires. Each end of the tie wire will be secured to the fabric with a double turn.

2.05 GATES

- A. The type and width of gates shall be as specified on the plans, details or special provisions.
- B. Gates shall be double swing or single swing as shown on the plans and be erected in conformance with ASTM F-900, Standard Specification for Industrial and Commercial Swing Gates.
 - 1. All gates shall have sufficient hardware and durability to withstand repeated cycles, fit to open and close without binding with allowance for hot and cold temperatures, and be lockable with a commercial grade heavy duty pad lock.
 - 2. Hinges shall be heavy duty steel and adjustable to provide smooth swing operation.
 - 3. Double swing gates shall have a drop rod or plunger bar that locks with the gate and prevents movement of the gate when closed. The receiving device in the roadway shall not extend above the roadway surface.
 - 4. Double gates shall have gate keepers that secure the gates when open. Gate keepers shall be a mechanical device attached to a galvanized steel pipe or beam 42" long and set in concrete.

2.06 CONCRETE

- A. All concrete used shall have a minimum compressive strength of 4,000 psi at 28 days.

2.07 WINDSCREEN

- A. The exterior perimeter section of fencing, (6 courts) (the entire length of exterior perimeter fence shall have wind screen attached from the top to within 1 foot of the bottom (ten foot width). Refer to Section 32 12 16 Asphalt Pavement for Product requirements.

PART 3 - EXECUTION

3.01 CHAIN LINK FENCING INSTALLATION

- A. General:
 - 1. Construct fencing and gates at the location and height as shown on the plans and in accordance with the contract documents.
 - 2. Installation to conform to ASTM F 567.
 - 3. Construct all posts plumb in alignment, and with the top of fabric conforming to the proposed ground surface.
- B. Posts:
 - 1. Post Spacing: Place posts in the line of the fence with equal spacing not to exceed 10 feet on center.
 - 2. Post Setting:
 - a. Posts shall be set in a concrete foundation as specified on Standard Details.
 - b. All posts are to be set plumb and shall be set not less than 24 hours prior to stretching the fabric.
 - c. Top of footing to be 1 inch above grade and sloped to direct water away from posts. Footing to be uniform size full depth without flair at top of grade, to prevent frost heave.
 - d. Gate post foundation shall be as specified on the Standard Detail Plates.
 - e. All terminal, corner, angle, pull, and gate posts shall be set with the required brace-post assembly as shown on the Standard Detail Plates.
- C. Rails:
 - 1. Top Rail: The top rail shall pass through the base of the line post caps and form a continuous brace from end to end of each stretch of fence. The top rail shall be securely fastened to the terminal posts by pressed steel connectors.
 - 2. Intermediate Rail (When Specified): The intermediate rail (when specified) shall be securely fastened between all line posts and terminal posts with pressed steel fasteners.
- D. Braces:
 - 1. Braces shall be securely fastened to the post by means of malleable iron or pressed steel connections, then trussed from the line post back to the end, gate, or corner post.
 - 2. The diagonal tension rod (truss rod) shall be tightened to produce proper tension.
- E. Pull Posts:
 - 1. Pull posts shall be placed midway between end, angle, corner, and gate posts as necessary so that no section of fence longer than 300 feet shall be constructed with line posts only.

2. Pull post sizes shall conform to sizes defined as terminal posts.
- F. Fabric
1. Fabric shall be installed on the inside of the posts from the area being fenced.
 2. Pull fabric taut with bottom salvage a maximum of 1 inch above grade.
 3. Each end of each run of chain link fabric shall be tightened and secured by a stretcher bar inserted in the final link of the fabric.
 4. The length of the stretcher bar shall be the same as the width of the fabric. This bar and the tight fabric shall be secured to the end post by tension bands equally spaced not more than 15 inches apart.
 5. The chain link fabric shall be attached securely to the braces top rail, tension wire, and all intermediate posts at intervals of not more than 15 inches by wire ties or bands.
 6. The ground surface along the line of the fence shall be uniformly smoothed for a width of 2 feet so that the fabric will conform to the ground surface.
- G. Bottom Tension Wire (Not applicable):
1. Bottom tension wire shall be stretched taut from terminal post to terminal post and securely fastened to each intermediate post 1 inch above the lower edge of fabric.
 2. Tension wire shall be attached to the fence fabric with approved wire ties or clamps every 12 inches.
- H. Gates: Gates shall be erected as shown on the plans and the Standard Detail Plates.
- I. Electrical Grounds
1. Electrical grounds shall be constructed where a power line passes over the fence or at 500 foot intervals or at least one location, whichever is more restrictive.
 2. The ground shall be accomplished with a copper-clad rod 8 feet long and a minimum of 5/8 inch in diameter driven vertically until the top is 6 inches below the ground surface.
 3. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded.
 4. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction.

3.02 TEMPORARY FENCE (Not Required by Contract)

- A. Temporary fence is not required per the contract general conditions. At various locations it may be necessary to temporarily remove fences for access. These are to be replaced at the contractors expense when work is complete. If these are security fences, a temporary fence will be required during non-work hours.

3.03 CLEANUP

- A. Perform cleanup operations during installation of work and upon completion of work.
- B. Remove from site all excess materials, debris, and equipment.
- C. Hose down and/or broom clean all paved surfaces.
- D. Repair any damage resulting from fencing operations.

END OF SECTION

**SECTION 33 46 16
SUB-DRAINAGE PIPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Provide all materials and labor necessary to furnish and install new sub-drainage piping system and accessories as indicated on the drawings or in this Section.
- B. Provide connection points to main storm sewer.

1.02 REFERENCES

- A. Illinois Department of Transportation (IDOT): Standard Specifications for Highway and Bridge Construction, Series 2012.
- B. Trench bedding and backfill for drainage pipe, see Section 31 23 00 –Excavation and Fill.

1.03 RELATED SECTIONS

- A. Section 31 23 00 – Excavation and Fill
- B. Section 31 25 00 – Erosion and Sediment Control
- C. Section 32 13 13 – Exterior Concrete
- D. Section 32 31 00 – Fences and Gates
- E. Section 33 41 00 – Storm Utility Drainage Piping

1.04 SUBMITTALS

- A. Submit specification sheet for pipe materials and any special pipe fittings and connectors.
- B. Submit material certification with aggregate gradation and source.

PART 2 PRODUCTS

2.01 SUBDRAIN SYSTEM

- A. Subdrain system is comprised of various specified diameter perforated pipe. Pipe material shall be the following or equal material.
 - 1. Perforated, corrugated, polyvinylchloride (PVC) pipe with a smooth interior, diameter as specified, using matching fittings. Compliant with ASTM F 949.
 - 2. Perforated Corrugated Polyethylene (HDPE) pipe with a smooth interior, and diameter as specified, using matching connectors and fittings. Comply with ASTM F-2648 and F-477.

2.02 BACKFILL

- A. Bedding Materials: All bedding shall be Illinois CA-7 crushed limestone. Provide bedding beneath subdrain installation per typical section details.
- B. Backfill Materials: See details and Section 31 2300 Excavation and Backfill for aggregate filter layer requirements.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Excavate trench to uniform widths to achieve the bedding depth and trench width shown on the typical sections. Trench wall shall be sloped 45 degrees vertical from trench bottom to the drainage subgrade elevation. Trench construction must meet applicable OSHA safety standards. Trench bottom shall provide a smooth, firm, stable, and obstruction free foundation for the entire length of the pipe.
- B. Remove unsuitable materials from the trench, when deemed necessary by the Architect, and provide, furnish and install bedding material of an approved aggregate for proper bedding and support.

- C. Utility Trench Backfill for pipe placed under pavement: Place and compact material from the bottom of the pipe to the bottom of the proposed sub-grade of the finished pavement's aggregate base according to the appropriate paving specification.
- D. Surface stabilization, in accordance to the site ECP, shall be constructed once the installation has been completed.

3.02 GENERAL

- A. Install drain pipe beginning at the discharge point of the pipe run, place geotechnical fabric (if specified) and aggregate bedding prior to setting pipe in place. Construct with bell joint ends (as applicable) of pipe facing upstream. Install to grade, backfill and compact.
- B. Pipe installation and storm water inlets must be protected from infiltration of mud, silt and debris in accordance with the site Erosion Control Plan (ERC).
- C. Install pipe in proper alignment and continuous grade. Connect pipe to downstream receiving pipe, manhole, inlet or ditch as specified.
- D. Install gaskets or sealant in accordance with manufacturer's recommendations.
- E. Clean interior of pipe prior to installation and clean when complete to remove miscellaneous debris.
- F. Contractor shall remove and reinstall, at his expense, any piping and / or backfill not meeting the Architect's approval due to any of the following:
 - 1. Poor alignment.
 - 2. Failure of testing requirements.
 - 3. Improper backfill procedures.
 - 4. Pipe material defects.
- G. Contractor shall place piping in accordance with all federal, state and local requirements.
- H. Contractor shall provide and maintain the temporary surface over storm sewer trenches until such time final restoration or project construction is complete and ready for use in accordance with Section 31 23 00 Excavation.
- I. Contractor shall install any required manholes, inlets and castings to the elevations shown on the Site Grading Plan. Fill areas or Cut and Fill areas shall be compacted and tested at the direction of the Engineer prior to the installation of structures and pipe.
- J. Restoration of surfaces: per Section 31 25 00 - Erosion and Sediment Control.

3.03 SCHEDULE

- A. The following locations require PE or PVC, perforated pipe of the diameter shown.
 - 1. Porous surface areas as shown on plans.
 - 2. Subgrade drains at tennis courts.

END OF SECTION