

ADDENDUM #2

May 9, 2024

PROJECT: **Bailey Road Park Expansion – Phase 1
Cornelius, North Carolina**

Changes and Clarifications – General

1. N/A

Response to Bidder Questions

1. N/A

Changes and Clarifications to Drawings

1. N/A

Changes and Clarifications to the Specifications

1. Update to 31 20 00 Earth Moving to include reference to the Charlotte Mecklenburg BMP Design Manual for construction specifications and testing requirements for the construction of the proposed Sand Filter BMP embankment.
2. Update to 32 18 10 Pickleball and Tennis Court Paving and Surfacing. Submittals list revised to include an as-built topographic survey to be sent to Owner and Designer of Record upon completion of asphalt placement and prior to application of court surfacing system. Installer qualifications have been revised to also specify that installer must have prior related project experience and must be a registered builder member of the American Sports Builders Association (ASBA). Remaining references to taking core samples of asphalt have been removed. Density shall be determined by nuclear method or another non-destructive method with approval from Engineer. The minimum temperature requirement for the application of the court surfacing system has been increased from 50 degrees to 55 degrees.
3. Update to 32 31 14 Chain Link Fencing to resolve discrepancy between plans and specifications for 10' tall fence post diameter. Fence posts for 10' tall fence shall have an outside diameter of 4.5".

All other terms, conditions and descriptions remain the same. Contractor must acknowledge issuance of this addendum in their Single Prime General Contract Proposal. The bid closing date remains Thursday, May 30, 2024 at 3:00 PM.

Attachments:

1. **31 20 00 Earth Moving**
2. **32 18 10 Pickleball and Tennis Court Paving and Surfacing**
3. **32 31 14 Chain Link Fencing**

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05/09/2024

End of Addendum 2

SECTION 31 20 00 – EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions, Supplemental General Conditions, and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical report titled “Geotechnical Engineering Report: Bailey Road Park Tennis Courts” by Carolinas Geotechnical Group. dated May 5, 2023.
- C. North Carolina Department of Transportation (NCDOT) Standard Specifications for Roads and Structures dated January 2024.
- D. Charlotte-Mecklenburg BMP Design Manual – Chapter 4.0 Structural Storm Water Controls dated July 1, 2010.

1.2 SUMMARY

- A. Prior to beginning construction, the Geotechnical Engineer should evaluate the subgrade soils for suitability based on observations of proofrolling with a loaded dump truck or other method considered acceptable to the Geotechnical Engineer. Fill meeting the requirements herein shall then be placed to the grade shown.

1.3 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.
- D. Subbase Course: The layer placed between the subgrade and surface of a pavement or walk.
- E. Design Subgrade: Elevation of bearing for foundations, bottom of porous fill beneath slabs on grade (4" below bottom of slab), bottom of turn down slabs, and bottom most portion of stairs and ramps.
- F. Drainage Fill: Course of washed granular material supporting slab on grade placed to cut off upward capillary flow of pore water.

- G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Engineer. Unauthorized excavation, as well as remedial work directed by the Engineer, shall be at the Contractor's expense.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below ground surface.
- I. Utilities include on site underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.4 SUBMITTALS

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. Laboratory analysis (including grain size and plasticity analyses) of each soil material proposed for fill and backfill from on site and borrow sources.
 - 2. One Standard Proctor compaction test (moisture density relationship) in accordance with ASTM D698 for each soil material.
- C. Submit excavation support system design and details for trench excavation.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Perform earthwork complying with requirements of authorities having jurisdiction. These include, but are not limited to, Town of Cornelius, Mecklenburg County, North Carolina Department of Environmental Quality, and the State of North Carolina.
- B. Testing and Inspection Service: Owner shall employ a qualified independent geotechnical engineering testing agency to classify proposed on site and borrow soils to verify that soils comply with specified requirements and to perform required field and laboratory testing.

1.6 PROJECT CONDITIONS

- A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Engineer and then only after acceptable temporary utility services have been provided.
 - 1. Provide a minimum 10 day notice to the Owner and receive written notice to proceed before interrupting any utility.
- B. Demolish and completely remove from site existing underground utilities indicated to be removed. If utilities cannot be removed due to existing field conditions they shall be filled with flowable fill (minimum 200psi) and noted as “Abandoned” on as-built drawings. However, in all cases the contractor shall demolish all utilities within the footprint of any proposed structure

and within the area extending 5' from the proposed footprint. Coordinate with utility companies to shutoff services if lines are active.

- C. Excavation support system design and details for trench excavation, shall be sealed and signed by a professional engineer licensed in the State of North Carolina, copy of design shall be filed with ENGINEER.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

- A. General: Provide approved borrow soil materials from off site when sufficient approved soil materials are not available from excavations. Contractor is responsible for locating appropriate off-site borrow areas.
- B. Satisfactory Soil Materials:
 - 1. Engineered Fill: Compacted structural fill should consist of material classified as CL, ML, SC, SM, or GW, per ASTM D 2487 and shall have a maximum liquid limit (LL) of 50 and a maximum plasticity index (PI) of 30. High plasticity soils such as CH and MH should not be used as engineered fill. The maximum particle size should not exceed 4 inches. Fill should be free of debris, waste, frozen materials, vegetation, and any other deleterious matter. Off-site borrow materials should have a CBR value no less than 6 percent or as otherwise noted in the field by the Owner's Geotechnical Engineer.
- C. Unsatisfactory Soils: Soil Classification Groups including but not limited to CH and MH according to ASTM D 2487 or a combination of these groups.
 - 1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- D. Subbase Material: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.
- E. Base Course: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.
- F. Engineered Fill: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.
- G. Bedding Course: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.
- H. Drainage Course: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.
- I. Filter Material: Shall be in accordance with NCDOT Standard Specifications for Roads and Structures dated January 2024.

- J. BMP Embankment: Fill materials shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010 or as otherwise recommended by the Owner's Geotechnical Engineer based on field conditions.
- K. Sand: ASTM C 33; fine aggregate, natural, or manufactured sand.
- L. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 GEOTEXTILE FABRIC

- A. Geotextile Fabric installed between sand and stone in sand filter shall be as follows:
 - 1. Weight: 4.0 oz/sy as per ASTM D-5261.
 - 2. Grab Tensile Strength: 120 lbs as per ASTM D-4632-86.
 - 3. Grab Tensile Elongation: 50% as per ASTM D-4632-86.
 - 4. Trapezoid Tear Strength: 50 lbs as per ASTM D-4533-85.
 - 5. CBR Puncture Strength: 310 lbs as per ASTM D-6241.
 - 6. Apparent Opening Size: 70 U.S. Std. Sieve as per ASTM D-4751-87.
 - 7. Permittivity: 1.7 sec(-1) as per ASTM D-4491-85.
 - 8. Water Flow Rate: 135 gal/min/sf as per ASTM D-4491-85.
 - 9. Ultraviolet Stability: 70% as per ASTM D-4355-84.
- B. Geotextile Fabric installed underneath riprap aprons and riprap channels shall be as follows:
 - 1. Grab Tensile Strength: 200 lbs as per ASTM D-4632-86.
 - 2. Grab Tensile Elongation: 15% as per ASTM D-4632-86.
 - 3. Trapezoid Tear Strength: 75 lbs as per ASTM D-4533-85.
 - 4. CBR Puncture Strength: 700 lbs as per ASTM D-6241.
 - 5. Apparent Opening Size: 40 U.S. Std. Sieve as per ASTM D-4751-87.
 - 6. Permittivity: 0.05 sec(-1) as per ASTM D-4491-85.
 - 7. Water Flow Rate: 4 gal/min/sf as per ASTM D-4491-85.
 - 8. Ultraviolet Stability: 70% as per ASTM D-4355-84.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.
- B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.
- C. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.
- D. Prior to proceeding with construction, all topsoil and other deleterious, non-soil materials shall be stripped from proposed construction area. Stripping shall extend at least 5 feet horizontally beyond building limits, and stripping of unsatisfactory soils shall be as identified by the Geotechnical Engineer.
- E. Subgrades which are to support slabs, pavements, or compacted fill shall be proofrolled with a 20 to 30 ton fully loaded truck or other pneumatic-tired vehicle of similar size and weight to identify areas of localized soft soil or unsuitable soil. Any soft or unsuitable material encountered during proofrolling shall be removed and replaced with engineered fill. The Geotechnical Engineer shall observe all proofrolling operations.
 - 1. The proofrolling procedures should consist of complete passes of the exposed area, with half of the passes being in a direction perpendicular to the preceding ones.

3.2 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
- C. Dewatering disposal shall be in accordance with Erosion and Sediment Control permit.

3.3 EXCAVATION

- A. Explosives: Do not use explosives.

3.4 EXCAVATION FOR STRUCTURES

- A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 0.10 foot. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Mechanical or Electrical Appurtenances: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 0.10 foot. Do not disturb bottom of excavations intended for bearing surface.

3.5 APPROVAL OF SUBGRADE

- A. Notify Engineer when excavations have reached required subgrade.
- B. When Engineer determines that unforeseen unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
- C. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Engineer.

3.6 UNAUTHORIZED EXCAVATION

- A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill or flowable fill may be used to bring elevations to proper position.

3.7 STORAGE OF SOIL MATERIALS

- A. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind blown dust.

3.8 BACKFILL

- A. Backfill excavations promptly, but not before completing the following:
 1. Acceptance of construction below finish grade including, where applicable, damp-proofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for record documents.
 3. Testing, inspecting, and approval of underground utilities.
 4. Concrete form-work removal.
 5. Removal of trash and debris from excavation.
 6. Removal of temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.9 SUBSURFACE DRAINAGE BACKFILL

- A. Subsurface Drain: Place a layer of filter fabric around perimeter of drainage trench or at footing, as indicated. Place a 6 inch compacted course of filtering material on filter fabric to support drainage pipe. After installing and testing, encase drainage pipe in a minimum of 6 inches of compacted filtering material and wrap in filter fabric, overlapping edges at least 6 inches.
- B. Drainage Backfill: Place and compact drainage backfill of filtering material over subsurface drain, in width indicated, to within 18 inches of final subgrade. Overlay drainage backfill with one layer of filter fabric, overlapping edges at least 6 inches.
- C. Fill: Place and compact fill material over drainage backfill to final subgrade.

3.10 FILL

- A. Preparation: Remove vegetation, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
 - 1. Plow, strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
- B. When subgrade or existing ground surface to receive fill has a density less than that required for fill, break up ground surface to 8 inches, pulverize, moisture condition, or aerate soil and recompact to required density.
- C. Place fill material in layers to required elevations for each location listed below.
 - 1. Under grass, use General Site Fill.
 - 2. Under walks and pavements, use aggregate base to the required depth and, General Site Fill.
 - 3. Under steps and ramps, aggregate base.
 - 4. Under building slabs, use porous fill to the required depth, and General Site Fill.
 - 5. Under footings and foundations, use Engineered Fill, aggregate base, or flowable fill.
 - 6. Behind below-grade walls, use Engineered Fill or porous fill.

3.11 MOISTURE CONTROL

- A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within 2 percent of optimum moisture content.
 - 1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

2. Remove and replace, or scarify and air dry satisfactory soil material that is too wet to compact to specified density.
 - a. Stockpile or spread and dry removed wet satisfactory soil material.
 - b. If excavation must remain open overnight or rainfall becomes imminent while the bearing soils are exposed, place a 1 to 3 inch thick “mud mat” of lean concrete on the bearing soils before the placement of reinforcing steel.
 - c. Costs associated with removing and replacing previously approved backfill due to being too wet shall be borne by the CONTRACTOR.

3.12 COMPACTION

- A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand operated tampers.
- B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.
- C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698.
 1. Under structures, building slabs, steps, and pavements, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 98 percent.
 2. Under paved tennis and pickleball courts, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 100 percent.
 3. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 98 percent.
 4. Under lawn or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 90 percent.
 5. For utility trenches, compact each layer of initial and final backfill soil material at 95 percent.

3.13 GRADING

- A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between existing adjacent grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

- B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - 1. Lawn or Unpaved Areas: Plus or minus 0.10 foot.
 - 2. Walks: Plus or minus 0.10 foot.
- C. Grading Inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10 foot straightedge.

3.14 POROUS FILL

- A. Under slabs on grade, place porous fill course on prepared subgrade.
 - 1. Compact porous fill to required cross sections and thickness.

3.15 BMP EMBANKMENT

- A. Subgrade Preparation: Shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010 or as otherwise recommended by the Owner's Geotechnical Engineer based on field conditions.
- B. Seepage Key Placement: Shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010 or as otherwise recommended by the Owner's Geotechnical Engineer based on field conditions.
- C. Embankment Fill Placement: Shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010 or as otherwise recommended by the Owner's Geotechnical Engineer based on field conditions.
- D. Outlet Pipe Fill Placement: Shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010 or as otherwise recommended by the Owner's Geotechnical Engineer based on field conditions.

3.16 FIELD QUALITY CONTROL

- A. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
 - 1. Perform field in place density tests according to ASTM D 6938, (nuclear method) provided that calibration curves are periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 6938.
 - a. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Engineer.

2. Footing Subgrade: The Geotechnical Engineer shall observe all subgrades and determine suitability to support design loads.
3. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in place density test for every 2,500 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
4. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
5. BMP Embankment: Testing shall be in accordance with Charlotte-Mecklenburg BMP Design Manual Section 4.0.6 dated July 1, 2010.

- B. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.17 PROTECTITON

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 1. Scarify or remove and replace material to depth directed by the Engineer; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.
- D. Costs associated with restoration or replacement of backfill which has not been protected shall be borne by the CONTRACTOR.

3.18 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and topsoil and dispose of on-site at locations indicated. Waste material, including unsatisfactory soil, trash, and debris, shall be legally disposed of off the Owner's property. Contractor is responsible for all costs associated with disposal and for all erosion and sediment control measures at off-site disposal areas.

END OF SECTION 31 20 00

SECTION 32 18 10 – PICKLEBALL AND TENNIS COURT PAVING AND SURFACING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Geotechnical report titled “Geotechnical Engineering Report: Bailey Road Park Tennis Courts” by Carolinas Geotechnical Group. dated May 5, 2023.
- C. American Sport Builders Association (ASBA) Asphalt Guidelines.

1.2 SUMMARY

- A. Related Sections include the following:
 - 1. Division 31, of the Technical Specifications, Section “Earth Moving” for requirements on subgrade preparation requirements for pickleball and tennis courts.

1.3 DEFINITIONS

- A. 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.
- B. 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.
- C. Base Course – The lower courses of the pavement structure below the surface 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.
- D. 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).

1.4 SUBMITTALS

- A. Contractor shall submit the following to the Owner and Designer of Record prior to the ordering of materials:

1. Asphalt Mixture Design
 2. Asphalt Mix Design Submittal Checklist containing at a minimum the following information:
 - a. All Aggregate Gradations and Quality Measurements
 - b. Plot (0.45 power graph) of Final Aggregate Blend
 - c. Bulk (dry) Specific Gravity of All Aggregates and Final Blend (G_{sb}) including worksheets for natural (virgin) as well as reclaimed asphalt pavement (RAP).
 - d. Statement of Asphalt Binder (PG) being used in Asphalt Mixture
 - e. Optimum % Asphalt Binder (P_b)
 - f. Mix Air Voids at Optimum (V_a)
 - g. Bulk Specific Gravity of Mix at Optimum (G_{mb})
 - h. Theoretical Maximum Specific Gravity at Optimum (G_{mm})
 - i. Voids in the Mineral Aggregate (VMA) and Voids Filled with Asphalt (VFA)
 - j. Dust to total AC Ratio
 - k. All Design Data and associated Design Curves
 3. Asphalt Placement Work Plan: This plan shall indicate paving pass widths, paving directions, site access, and timing / coordination of athletic equipment installation (tennis net posts, vault boxes, fencing, etc.).
 4. Surfacing system product data shall be submitted to the Owner and Designer of Record for review and approval. Include technical data and tested physical and performance properties.
 5. Provide a colored court striping plan detailing lines and layout to the Owner and Designer of Record for review and approval.
 6. Qualification Data: For qualified manufacturer and Installer.
 7. Material Certificates: For each paving material, from manufacturer.
 8. 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.
- B. Contractor shall submit the following to the Owner and Designer of Record upon completion of asphalt placement and prior to application of the court surfacing system:
1. Material test reports for each paving material installed.

2. Notarized Certificate of Compliance for all products used on the project.
3. 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.
4. Contractor shall complete a topographic survey once the final lift of asphalt has been placed for the court surface. Survey shall be completed on a 10’ x 10’ grid and submitted to the Designer of Record in an AutoCAD format to ensure that elevation tolerances have been achieved. Contractor shall not commence placement of court surfacing system until topographic survey has been reviewed and approved by the Designer of Record.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Hot Mix Asphalt (HMA) shall be manufactured from a state approved / certified HMA manufacturing facility. 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.
1. Manufacturer shall provide Quality Control manual for material production oversight and testing measures being performed at the asphalt plant.
 2. 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.
- B. Installer Qualifications:
1. Installer shall provide the following documents to the Owner:
 - a. Approved vendor certificate for the locality (state / county / city, et. al.) where work is being done,
 - b. Testing measures to be performed on the job site, and
 - c. List / Organizational Chart showing personnel responsible for use of equipment and actions of the crew on the grade while paving and compacting asphalt.
 2. Installer shall designate a “Person-in-Charge” who is responsible for oversight of the installation and quality assurance of HMA. 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 mix design, production, and installation and shall be an employee of the General

Contractor holding the contract with the Owner, even if the HMA is being produced, supplied, and installed by separate vendor(s).

3. Installer shall provide calibrated equipment and qualified personnel must always be accessible during the construction of the HMA 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.
4. Installer's project experience must include a minimum of ten (10) outdoor asphalt paved pickleball or tennis court installations within the last five (5) years and within 150 miles of the project site. Provide a written description of each facility including name, address, date installed, and phone number of Owner's Representative.
5. Installer shall be a currently registered member with the American Sports Builders Association (ASBA) and shall be registered as a builder by ASBA.

C. Testing:

1. 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 (Gmm) 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 (Gmb) 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 or a correlated Pavement Quality Indicator or PaveTracker (non-nuclear). Additional testing shall be performed on any given day once 400 tons of asphalt is placed on that day.
2. The average sub-lot (daily or 400 tons; whichever is less) in-place density measure for surface course mixtures shall be 94.0% of Gmm with no value less than 92.5% of Gmm. Base and leveling installation of asphalt shall meet local DOT specifications for in-place density measures or average of 92.0% of Gmm, 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.
3. 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.
4. 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%.
5. 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.

D. Testing Agency Qualifications: Qualified according to ASTM D 3666 for testing indicated.

E. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to hot-mix asphalt paving including, but not limited to, the following:
 - a. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
 - b. Review condition of subgrade and preparatory work.
 - c. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
 - d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver court surfacing system materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
- B. Store court surfacing system materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 1. Prime Coat: Minimum surface temperature of 60 deg F.
 2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
 3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.
- B. Acrylic Surface: Minimum surface and air temperature of 55 deg F and rising at time of application and for at least 24 hours after application.

PART 2 - PRODUCTS

2.1 AGGREGATES

- A. General: Use materials and gradations that have performed satisfactorily in previous installations.
- B. Base Mixes: Shall have a minimum of 45% passing the #4 sieve.

C. Surface and Leveling Mixes:

1. Shall have a minimum of 45% passing the #8 sieve.
2. Maximum particle size shall be ½” or less.

D. Coarse Aggregate: shall be hard, durable particles, or fragments of limestone or granite stone. Materials that break up when alternately frozen and thawed, or wetted and dried, should not be used. All fragments should contain at least one face resulting from fracture.

1. Coarse Aggregate Fraction: Shall have a minimum of 85% / 75% crushed faces.

E. Fine Aggregate: Angularity (AASHTO T-304, Method A), shall be \geq 40% with no more than 20% natural sand allowed.

2.2 ASPHALT MATERIALS

A. 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.

1. Tack Coat: SS-1, SS-1h, CSS-1 or CSS-1h diluted with an equal amount of water, or agency acceptable product.
2. Prime Coat: Prime Coat materials of MS-2, CMS-2, or HFMS-2s.

B. Hot Mix Asphalt (Low Volume):

1. 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.
2. 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:
 - a. Marshall, 50-Blow,
 - b. Superpave, 50-Gyrations, or
 - c. Hveem, Low Volume Mix.
 - d. Alternate **Low Volume** Asphalt Mix Designs may be allowed with the Engineers approval prior to time of bidding.

- C. Asphalt Binder: Performance Graded (PG) binder shall be PG 64-22 per the requirements of the NCDOT Asphalt QMS Manual 2022 edition and AASHTO M 320.
- D. Water: Potable.
- E. Reclaimed Asphalt Pavement (RAP):
 - 1. The use of asphalt mixtures with RAP is not recommended in the surface course of asphalt due to their potential negative impact on pavement longevity and staining of acrylic surfaces.
 - 2. May be used up to 20% in the HMA Binder / Base and Leveling Courses.
 - 3. Typically, 0% for HMA Surface Course due to potential blemishes forming from unknown (varying?) aggregate qualities, however, may be used up to 15% in the HMA Surface Course only if approved by the architect / engineer of record.
 - 4. Requires a signed and notarized letter stating that no pyrite, steel slag, or aggregates known to rust or deteriorate are within the RAP being utilized is required.
 - 5. Requires the Gsb of the RAP to be determined and used in VMA calculations, not the Gse. The RAP Gsb shall be determined after running the RAP Gmm and then from calculating the RAP Gse minus 0.1 for high absorptive aggregates and RAP Gse minus 0.05 for low absorptive aggregates.
 - 6. Requires that all RAP shall be crushed and screened over a 5/8" screen deck or smaller for Binder / Base and Leveling Courses and 1/2" screen deck for surface mixtures; no exceptions.
- F. Reclaimed Asphalt Shingles (RAS): Not allowed for use in pickleball and tennis court asphalt per the requirements of the ASBA Asphalt Guidelines.

2.3 AUXILIARY MATERIALS

- A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
- B. Sand: ASTM D 1073, Grade Nos. 2 or 3.
- C. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.

2.4 SURFACING SYSTEM MATERIALS

- A. Acrylic Filler: Product shall contain or shall be mixed on-site with 50-60 mesh silica sand and water in accordance with manufacturer recommendations.
- B. Acrylic Surface: Color(s) shall be per the approved striping plan. Product shall contain or shall be mixed on-site with 80-100 mesh silica sand and water in accordance with manufacturer recommendations.

- C. Marking Paint: Textured Acrylic paint as recommended by the manufacturer of the color coating system. Color shall be per the approved striping plan.
 - 1. The speed of the playing lines shall match the speed of the adjacent playing surface.
 - 2. Oil, alkyd, or solvent-based paint is unsuitable for court lines and should not be used.

PART 3 - EXECUTION

3.1 EQUIPMENT

- A. 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.
- B. 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.
- C. 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.
- D. 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.

3.2 EXAMINATION

- A. Verify that subgrade is dry and in suitable condition to begin paving. Subgrade shall be prepared in accordance with the requirements of section 31 20 00 Earth Moving of the project specifications.
- B. Proofroll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proofroll wet or saturated subgrades.
 - 1. Completely proofroll subgrade in one direction. Limit vehicle speed to 3 mph.

2. Proofroll with a loaded 10-wheel, tandem-axle dump truck weighing between 20 to 30 tons. The proofrolling procedures should consist of complete passes of the exposed area, with half of the passes being in a direction perpendicular to the proceeding ones.
3. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by Engineer, and replace with compacted backfill or fill as directed.

C. Proceed with paving only after unsatisfactory conditions have been corrected.

3.3 SURFACE PREPARATION

- A. Repair pavement failures and perform crack repair according to specification requirements prior to HMA installation.
- B. 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.
- C. 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.
- D. 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.
- E. 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.
- F. 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.
- G. If shown on the plans, 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.
- H. 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.

- I. 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).

3.4 PAVEMENT PLACEMENT

- A. 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.
- B. 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.
- C. 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.
- D. 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.
 1. 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.
- E. 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, Gmm. Complete compaction before mix temperature cools to 185 deg F.
 1. Compact hot-mix paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers.
 2. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
 3. Intermediate Rolling: Begin intermediate rolling with nine-wheel rubber-tired roller immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - a. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm. Density: Acceptable compaction should be defined as a test section density within the range of 98% to 102% of the maximum density determined on a density control strip. In addition, no one test should be below 92% of maximum (Rice) specific gravity.

4. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
 5. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
- F. Smoothness shall meet the requirements of no greater than 1/4" in 10 ft. for base and leveling courses and 1/8" in 10 ft. for surface course. [Reference ASBA manual.]
- G. Thickness of the overall mat shall be within 1/4" (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 Gmm supplied from the Contractors mix joidesign and daily test values.
- H. Paving Joints
1. Minimize construction, longitudinal, and transverse joints left open for an extended period.
 2. Construct longitudinal joints by paving in a hot fashion with a temperature of not less than 220°F to ensure maximum performance.
 3. Compact all joints to provide for a neat, uniform and tightly bonded joint that will meet both surface tolerances and density requirements.
 4. Cut straight and true (vertical) construction or transverse joints if the material has cooled to less than 220°F prior to the placement of the next pass to ensure the best performing joint possible.
 5. Off-set joints a minimum of 6" between lifts of asphalt.
- I. 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.
- J. 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.
- K. 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.]
- L. Excessive leveling and smoothness correction required to be performed by the surfacing contractor shall be the responsibility of the paving contractor.

3.5 PATCHING

- A. Hot-Mix Asphalt Pavement: Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending 12 inches into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
- B. Patching: Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
- C. Patching: Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

3.6 SURFACING SYSTEM PLACEMENT

- A. Do not apply surfacing system until layout, colors, and products have been verified with Engineer.
- B. New asphalt pavement surfaces must cure 14 to 30 days prior to application of surfacing system.
- C. Thoroughly clean asphalt pavement to ensure all foreign materials are removed. Depending on conditions, methods such as sanding, blowing and scraping debris, washing loose material, or power washing may be used to ensure a clean surface.
- D. Flood the asphalt pavement surface with water and allow to drain to check for planarity.
 - 1. Low areas, or “birdbaths”, are defined as any areas where standing water more than 1/16” (1.58 mm) deep (commonly measured using a nickel) remains after drainage of the area has ceased or after one hour at 70 degrees F or above in sunlight.
 - 2. Identify whether birdbaths are caused by low areas or adjoining high areas prior to making any corrections.
 - 3. Correct high areas by scraping or grinding. Low areas shall be patched and leveled according to the recommendations of the color surface system manufacturer and prior to proceeding with coating.
- E. Apply a minimum of two (2) filler coats in accordance with recommendations and specifications provided by the colored surface supplier. Application rates shall be as recommended by manufacturer but shall not be less than 0.07 gallons per square yard over the entire surface.
 - 1. Filler coats shall not be placed when rain is imminent or when the minimum surface and air temperatures are below 55 degrees F for 24 hours before and after the application of each coat.
 - 2. Ensure adequate dry time is provided for each coat per manufacturer recommendations before applying the next coat.

3. Scrape and blow surface clean prior to installation of subsequent coats.
- F. Apply a minimum of two (2) surface coats in accordance with recommendations and specifications provided by the colored surface supplier. Application rates shall be as recommended by manufacturer but shall not be less than 0.05 gallons per square yard over the entire surface.
1. Surface coats shall not be placed when rain is imminent or when the minimum surface and air temperatures are below 55 degrees F for 24 hours before and after the application of each coat.
 2. Ensure adequate dry time is provided for each coat per manufacturer recommendations before applying the next coat.
 3. Scrape and blow surface clean prior to installation of subsequent coats.
- G. Begin striping of the court once the court surface has cured for at least 72 hours, or as otherwise directed by the manufacturer.
1. Use a taping machine and masking tape to delineate striping lines.
 2. Prior to painting, verify dimensions of delineated lines to ensure conformity with the approved striping plan.
 3. Paint lines with one (1) or two (2) coats of textured line paint in accordance with recommendations and specifications provided by the colored surface supplier.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: The Owner will engage a qualified testing agency to perform tests and inspections.
- B. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
- C. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances noted above.
- D. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979.
1. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 2. In-place density of compacted pavement shall be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
 - a. One test shall be performed for every 1000 sq. yd. or less of installed pavement, with no fewer than 3 tests performed.

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

3.8 DISPOSAL

- A. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - 1. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 18 10

SECTION 32 31 14 – CHAIN-LINK FENCING

PART 1 - GENERAL

1.1 SCOPE

- A. Work included in this Section
 - (1) PVC coated fence framework, fabric and accessories
 - (2) Excavation for post bases, concrete footings
 - (3) Manual gates and related hardware
 - (4) Temporary Protection of Work in progress

1.2 SYSTEM DESCRIPTION

- A. Fence Height and Layout: See Plans.
- B. Line Post Spacing: At intervals not exceeding 10 feet.
- C. Furnish and install “black” color PVC coated fence and gate system.
- D. This section shall include the furnishing of all labor, materials, equipment and transportation required for the installation of the chain link fence as shown on drawings or specified herein.
- E. Submit complete shop drawings for all tennis court chain link fencing, latches, post foundation dimensions and appurtenances to Owner's Representative prior to purchase and installation in accordance with the Conditions of the Contract.
- F. Provide product data on fabric, posts, accessories, fittings and hardware.
- G. Dimensions indicated for pipe sections are outside dimensions, exclusive of coatings.

1.3 REFERENCES

- A. ASTM F567 - Installation of Chain-Link Fence
- B. ASTM C94 - Ready-mixed Concrete
- C. ASTM F668 - Poly Vinyl Chloride (PVC) Coated Steel Chain Link Fence Fabric
- D. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual
- E. FS RR-F191 - Fencing, Wire and Post Metal (and Gates, Chain Link Fence Fabric, and Accessories).

1.4 QUALITY ASSURANCE

- A. Perform work in accordance with Chain Link Fence Manufacturers Institute.

1.5 QUALIFICATIONS

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

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 - PRODUCTS

2.1 CHAIN LINK FABRIC

- A. The chain link fabric shall be American made with No. 9 ga core size, PVC coated steel wires, 1 3/4" diamond woven mesh. PVC coating shall be Class 2b fused and adhered to metallic-coated steel wire. Furnish one-piece fabric widths.
- B. Top and bottom selvage shall be knuckled (no twist).
- C. Bottom of fence fabric shall be within 1/2" maximum above grade surface and not touching surface.
- D. All fittings and accessories shall be pressed steel or cast iron, PVC coated in accordance with RRF 191/4c.

2.2 FRAMING (STEEL) AND ACCESSORIES

- A. Manufacture framing from galvanized steel, PVC coated in accordance with RRF 191/3c grade A standard weight, one piece without joints.

2.3 LINE POSTS

- A. Line posts shall be PVC coated galvanized piping, galvanized both inside & outside. Line posts shall be sized per Section 2.13 below.
- B. The chain link fabric shall be tied to the line posts with No. 9 gauge PVC coated tie wires.
- C. Line post caps shall be PVC coated weather tight closure cap with loop to receive top rail.

2.4 TERMINAL, CORNER AND GATE POSTS

- A. Terminal corner and gate posts shall be PVC coated galvanized piping, galvanized both inside & outside. Terminal posts shall be sized per Section 2.13 below.
- B. Weather tight closure caps shall be PVC coated to be acorn type, one cap for each post.

2.5 TOP AND BOTTOM RAIL

- A. Top and Bottom rail shall meet the same specifications of quality as line and terminal posts. The top rail shall be minimum 1.625" O.D.

- B. Top and bottom rail pipe sections shall not be less than 18' long and shall be fitted with PVC coated couplings for connected lengths into a continuous run. The couplings shall be not less than 6" long, with 0.070 minimum wall thickness, and shall allow for expansion and contraction of the rail. Open seam outside sleeves shall be permitted only with a minimum wall thickness of 0.100". Top rail shall pass through the line post tops. Top rail shall be securely fastened to terminal posts with PVC coated pressed steel or malleable steel connections.
- C. The chain link fabric shall be tied to the top and bottom rails at intervals of eighteen inches (18") with No. 9 gauge PVC coated tie wire.

2.6 TERMINAL AND GATE POST FITTINGS

- A. Terminal and gate post fittings shall be PVC coated, galvanized, cold-rolled carbon steel of good commercial quality.
- B. No aluminum, cast iron, or pot metal fittings will be accepted as equal or substitutes.

2.7 TERMINAL AND GATE POST BRACES

- A. Provide manufacturer's standard adjustable brace at end and terminal section adjacent to gate posts, terminal sections at both sides or corners and pull posts. Use 1.625" O.D. pipe meeting the same specifications of quality as top rail. Truss rods shall be 0.375" diameter PVC coated steel rod with adjustable tightener.
- B. Braces on these sections shall be installed midway between top rail and grade, and extend from each terminal post at gate to the first adjacent line post. Braces shall be securely fastened to posts by PVC coated heavy pressed steel connections and also to be trussed from line post back to terminal post.

2.8 TENSION BARS

- A. Provide one-piece lengths for PVC coated tension bars equal to full height of fabric, with minimum cross-section of 1/4" X 3/4". Provide one tension bar for each gate and end post, and 2 for each corner and pull post, except where fabric is integrally woven into post. Space tension bar bands not over 15" o.c., to secure tension bars to end, corner, pull and gate posts.

2.9 GATES

- A. Gates shall be located and of sizes as shown on the Plans. Frames shall be constructed of PVC coated galvanized pipe having an outside diameter of 1.90" minimum with finish to match fabric and framework.
- B. Gate frames shall be welded or alternately, shall utilize corner fittings or heavy malleable iron or pressed steel securely riveted to the frames, providing security against removal or breakage connections. Provide horizontal and vertical members to ensure proper gate operation and attachment of fabric, hardware and accessories.
- C. Fabric matching the fence fabric shall be installed in the frame by means of tension (stretcher) bars and hook bolts. Frames having corner of fittings shall be equipped with adjustable truss rods having a diameter of three-eighths inch (3/8").

2.10 GATE HARDWARE

- A. Provide PVC coated hardware and accessories for each gate per manufacturer’s recommendation for size and type of gate.
- B. Hinges shall be PVC coated size and material to suit gate size, non-lift-off type, offset to permit 180 deg. gate opening. Provide 1-1/2 pair (3) of hinges for 40" height fence and two pair (4) of hinges for 6' and greater height, for each leaf. Under no conditions of use or abuse shall the hinges twist or turn under the action of the gate. Hinges, latches and catches shall be one of the manufacturer's standard designs as selected and approved by the Owner's Representative. Latch shall be PVC coated fork latch to permit operation from either side of gate.
- C. All gate hardware to be PVC coated.

2.11 TENSION WIRE

- A. Provide 7 ga., PVC coated steel, single strand tension wire (metal and finish to match fabric) and located at bottom of fabric. Tension wire shall be placed 1.5” above grade surface plus or minus 0.5”.

2.12 WIRE TIES

- A. Wire ties shall be 9 ga., PVC finish. For tying fabric to line posts, use wire ties spaced 12"o.c. For tying fabric to rails and braces, use wire ties spaced 18"o.c. For tying fabric to tension wire, use hog rings spaced 24"o.c. Manufacturer's standard procedure will be accepted if of equal strength and durability.

2.13 FENCE POST SIZE REQUIREMENTS

- A. Refer to Plans for location and sizes of fence required.

<u>Fence Height</u>	<u>Line Post</u>	<u>Corner Post</u>	<u>Terminal Post</u>	<u>Brace Rail</u>
4'	2.5" OD	3" OD	3" OD	1.625" OD
10'	4.5" OD	4.5" OD	4.5" OD	1.625" OD

- B. All posts shall meet industry standards for weight.

2.14 MATERIALS

- A. Concrete: ASTM C94; Portland Cement, 3,600 psi strength at 28 days, 4 inch slump; 3/4 inch normal sized coarse aggregate.

2.15 FINISHES

- A. Components and Fabric: Vinyl coating shall be class 2b PVC coating fused and adhered to metallic coated steel wire, “black” color as selected.
- B. Vinyl (PVC coated) components and accessories: “Black” color, ASTM F934.

PART 3 - EXECUTION

3.1 FENCE INSTALLATION

- A. Install chain link fence in accordance with ASTM F-567 following grades, lines and details approved by the Owner's Representative prior to installation, and written installation instructions of fencing manufacturer to provide secure, aligned installation. If not shown on drawings, excavate postholes to minimum depth and diameter as recommended by fence manufacturer. Fill all postholes with concrete and set posts plumb, in line, and at proper spacing. Slope top of concrete for water runoff. Allow concrete to set for 48 hours before stretching any fabric.
 - 1. No concrete footing is to be exposed. Install top of footing 2" min. below finished grade. Patch asphalt prior to installation of colorcoat surface.
- B. Post holes to be as shown on the plans and as approved by the Owner's Representative. 'Flare' bottom to create pyramidal shaped footing.
- C. Do not begin operations until grading, paving or other work that may interfere with or damage fencing is complete.
- D. Install line posts uniformly and not more than 10' feet apart. Terminal posts shall be set at ends and braced.
- E. Install fabric on play side of fence and anchor to framework so that fabric remains in tension after pulling force is released. Install bottom tension wire stretched taut between terminal posts.
- F. Install gates plumb, level and secure for full opening without interference. Install ground set items in concrete for anchorage as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.
- G. Use U-shaped tie wires, conforming to diameter of pipe to which attached, clasping pipe and fabric firmly with ends twisted at least 2 full turns. Bend wire to minimize hazard to persons or clothing.
- H. Install nuts for all bolts on side of fence opposite fabric side. "Peen" ends of bolts to prevent removal of nuts if requested by the Owner.

3.2 ERECTION TOLERANCES

- A. Maximum variation from plumb: 1/4 inch.
- B. Maximum offset from true position: 1 inch.

3.3 PROTECTION AND INSPECTIONS

- A. All material installed under this specification shall be subject to testing by Owner at his expense. Any material so inspected and found to be not in strict conformance with this specification shall be promptly removed and replaced by the Contractor at his expense.

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- B. The fence contractor accepts responsibility for any damage done to finished paving by fence installers. Any such damage shall be repaired at the fence contractor's expense.
- C. All fence shall appear new and unused upon inspection for acceptance.
- D. Provide flagging or barricades where necessary to alert construction traffic of the presence of the fencing.

END OF SECTION 32 31 14