

## **SECTION 02 41 00**

### **DEMOLITION**

#### **PART 1 – GENERAL**

##### **1.1 SCOPE OF WORK**

- A. Protection of existing equipment and or athletic playing surfaces.
- B. Demolition, dismantling, salvage, and disposal of designated structures or materials as shown or indicated in the Contract Documents.
- C. Removing and/or stockpiling excess materials that can't be reused on-site as part of the work.
- D. Removal of hazardous materials is not part of this work. If hazardous materials are discovered, stop work only in the area of the materials and notify the Engineer immediately.
- E. See Section 02 41 13 Cold Planing for removal of existing asphalt.

##### **1.2 SUBMITTALS**

- A. Schedule: Detailed Work Plan that describes demolition, removal and disposal procedures, sequence, and schedule.

##### **1.3 REGULATORY REQUIREMENTS**

- A. Conform to all federal, state, and local codes and regulations applicable for demolition of structure, safety of adjacent structures, dust control, service utilities, discovered hazards, and removal and disposal of debris.
- B. Provide copy of written manifest to Owner as evidence of proper disposal.
- C. Notify Dig Safe prior to any excavation.

#### **PART 2 – PRODUCTS**

##### **2.1 BACKFILL**

- A. Provide suitable backfill, as specified under Section 31 00 00 Earthwork, to fill voids left by removal or abandonment of site features.
- B. Use suitable materials as base course fill and topsoil to the depth as specified under Section 31 00 00 Earthwork. Restore disturbed areas with similar materials blended to match the line and grades of adjacent surfaces.

## **PART 3 – EXECUTION**

### **3.1 GENERAL**

- A. Clearances and Permits: Obtain as required from authorities having jurisdiction.
- B. Salvage: Title to all materials and equipment to be demolished is vested in the Contractor unless noted otherwise and shall be removed from the site promptly. Unsalvageable materials shall be disposed of off-site. Materials and equipment designated for City of Lowell salvage or reuse shall be carefully removed and delivered to a storage site designated by the Owner.

### **3.2 PROTECTION**

- A. Protection of Existing Work: All necessary precautions shall be taken to ensure against damage to existing work that is to remain in place or is to remain the property of the City of Lowell. Damaged areas shall be repaired or replaced with new products to match existing surrounding surfaces. Shoring, bracing, and supports shall be provided as required and structural elements shall not be overloaded. Care shall be taken to prevent unscheduled interruptions to any utility service.
- B. Protection from Weather: All materials and equipment shall be protected from the weather at all times.
- C. Dust and Dirt Control: Dust and dirt resulting from demolition operations shall be controlled with water spray, temporary barriers, and enclosures to prevent spread into occupied buildings and to avoid creation of a nuisance to the surrounding area. Prevent water from creating hazardous or objectionable conditions such as ice, flooding, and pollution.
- D. Provide temporary barriers and fall protection, as needed, during the course of demolition activities.

### **3.3 PROHIBITIONS**

- A. Burning: Burning at the project site for the disposal of refuse and debris will not be permitted.
- B. Explosives: The use of explosives will not be permitted.

### **3.4 HAZARDOUS MATERIALS**

- A. Exercise extreme care and caution at all times when handling toxic or hazardous materials in order to prevent harm to personnel and property and to prevent environmental contamination.
- B. Rigidly adhere to all federal, state, and local regulations governing handling, transportation, and disposal of such materials.

3.5 CLEANUP

- A. Debris and rubbish shall not be allowed to accumulate in buildings or on-site. Clean site on a daily basis.
- B. Conform to all state and local regulations regarding hauling and disposal.

END OF SECTION

**SECTION 02 41 13**  
**BITUMINOUS CONCRETE EXCAVATION BY COLD PLANER**

**PART 1 – GENERAL**

1.1 SUMMARY OF WORK

- A. The removal of worn out track running surface and a portion of the bituminous concrete base in the designated areas.

**PART 2 – EQUIPMENT**

2.1 DESCRIPTION OF REQUIRED EQUIPMENT

- A. The Cold Planer must be equipped with an elevating device capable of loading planed material directly into dump trucks while operative. It shall have all necessary safety devices such as reflectors, headlights, taillights, flashing lights, and back up signals so as to operate safely in traffic during the day and/or night. The Cold Planer shall be designed and built for planing flexible pavements and possess the ability to plane cement concrete patches when encountered in bituminous pavement. It shall be self-propelled and have the means for planing without tearing or gouging the underlying surface.

**PART 3 – EXECUTION**

3.1 MINIMUM REQUIREMENTS

- A. Execution shall conform to Section 120.66 of the Massachusetts Highway Department “Standard Specifications for Highways and Bridges” 1998 edited.
- B. Variable lacing patterns shall be provided to permit a rough grooved or smooth surface as directed.
- C. The depth of cut will be determined by the existing depth of asphalt and recommended slope of the cross section. The minimum width of pavement planed in each pass shall be six feet, except in areas to be trimmed and edged. The machine shall be adjustable as to grade and depth and meet the standards set by the Air Quality Act for noise and air pollution.
- D. The milled or planed surface shall conform generally to the grade and cross slope required by the IAAF, NFHS, and MIAA. The surface shall not be torn, gouged, shoved, broken, or excessively grooved. It shall be free of imperfections in workmanship that would prevent resurfacing after this operation. Surface texture shall be as specified by the Engineer and excess material shall be removed so that the surface is acceptable to traffic if required.

**END OF SECTION**

02 41 13 BITUMINOUS CONCRETE EXCAVATION BY COLD PLANER

**SECTION 02 79 40**  
**RUNNING TRACK RESILIENT SURFACING (RED)**

**PART 1 – GENERAL**

1.1 DESCRIPTION

Furnish and install Plexitrac<sup>®</sup> Accelerator Running Track resilient surfacing as manufactured by California Products Corporation on the accepted asphalt pavement, or equal.

1.2 RELATED SECTIONS

A. Related work

SECTION 02 41 13 COLD PLANING

SECTION 31 00 00 EARTHWORK

SECTION 32 12 00 FLEXIBLE PAVEMENT

B. References

- i. National Asphalt Pavement Association (NAPA)
- ii. USA Track & Field (USATF)
- iii. National Federation of State High School Associations (NFHS)
- iv. National Interscholastic Athletic Administrators Association (NIAAA)
- v. International Association of Athletics Federation (IAAF)
- vi. American Sports Builders Association (ASBA)

1.3 QUALITY ASSURANCE

- A. Asphalt surface shall be Class I, type I-1 as specified in Sections 460 and M3.11.0 of the Massachusetts Department of Public Works “Standard Specification for Highways and Bridges”, 1988 edition as amended. It shall also comply with the guidelines of the ASBA and NAPA for surface planarity and density.
- B. All liquid materials shall be from a single source and manufactured for the purpose of resilient track construction.
- C. The contractor shall record the batch number of each product used on the site and maintain it throughout the warranty period.
- D. The contractor shall provide the owner an estimate of the volume of each liquid product and the weight of the rubber granule to be used on-site.
- E. The installer shall be an Authorized Applicator of the specified surface system.
- F. The manufacturer’s representative will be available to help resolve material issues.

1.4 SUBMITTALS

- A. Manufacturer’s specifications for components and system.
- B. Representative sample of the system to be installed with appropriate labeling for identification.

- C. Current material safety data sheets (MSDSs) for the liquid components.
- D. Current Authorized Applicator certificate from the surface system manufacturer.
- E. A certificate from the manufacturer of the binders and coatings stating that the materials have been produced specifically for the use in sports surfacing construction.
- F. A complete list of materials intended to be used in the construction of the running track system. All liquid quantities will be prior to dilution.
- G. A test report stating that the ½” system has been tested to IAAF standards for force reduction and modified vertical deformation. Force reduction shall be 35-50%. Modified vertical deformation shall be 0.6-1.8 mm.
- H. Reference list from the installer of at least 5 projects of similar scope done the past three years.
- I. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples, and literature to demonstrate that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1,000 hours and IAAF test information for the system to be installed.

#### 1.5 MATERIAL HANDLING AND STORAGE

- A. Store material in accordance with manufacturer’s specifications and MSDSs.
- B. Deliver products to the site in original, unopened containers with labels attached.
- C. All surfacing materials shall be non-flammable.

#### 1.6 GUARANTEE

- A. The installer and the materials manufacturer shall supply a warranty covering labor and materials respectively. The warranty period shall be for five (5) years.

#### 1.7 INSTALLER QUALIFICATIONS

- A. Installers shall be regularly engaged in the construction and surfacing of running tracks.
- B. Installer shall be an authorized applicator of the specified system.

#### 1.8 MANUFACTURER QUALIFICATION

- A. Material supplier shall certify that the materials provided are manufactured specifically for construction and surfacing of running tracks.
- B. System manufacturer shall be a US owned company that has been continuously engaged in the business of track surfacing materials for at least 10 years.
- C. System manufacturer shall have a designated representative available for site inspection.

**PART 2 – PRODUCT**

2.1 GENERAL

**Note:** It is the intent of the Owner to install a track surface system with the understanding that with the exception of the rubber additive, all the components of the system will be supplied by one manufacturer. Substituting individual components by various manufacturers will not be permitted.

- A. Manufacturer – California Products Corporation, Andover, MA / [www.plexitrac.com](http://www.plexitrac.com), or equal.
- B. Product substitution: If other than the product specified, the contractor shall submit at least 7 days prior to the bid date a complete type written list of proposed substitutions with sufficient data, drawings, samples, and literature to demonstrate that the proposed substitution is of equal quality and utility to that originally specified. Information must include a QUV test of at least 1,000 hours and IAAF test information for the system to be installed.
- C. Any materials used must be an emulsion/water based product. Any products which require solvents such as MEK, Butyl Cellusolve, or Acetone for clean up or mixing are not acceptable.
- D. Materials must have a VOC less than 150g/lit. for binder products. Top coats shall have a VOC of less than 100g/lit. measured by EPA method 24.
- E. Materials may not have a flash point of less than 200°F.

2.2 MATERIALS

- |                     |   |
|---------------------|---|
| Court Patch Binder- | Shall comply with Specification 10.14 of California Products Corporation, or equal. 100% Acrylic resin blended with Portland cement and silica sand |
|                     | 1) Percent solids by weight (minimum) 46%   |
|                     | 2) Weight 8.7-8.9 lbs./gallon   |
| CP-4125-            | Latex emulsion Primer. SBR emulsion   |
|                     | 1) Percent solids by weight (minimum) 50%   |
|                     | 2) Weight 8.35 lbs./gallon  |
| Plexitrac Binder-   | Shall comply with Specification 10.73 of California Products Corporation, or equal.   |
|                     | High Viscosity Polyresin Blend  |
|                     | 1) Percent solids by weight (minimum) 44.7%   |
|                     | 2) Weight 8.47 lbs./gallon  |
| Plexicolor Pigment- | Water-borne dispersed pigment for enhanced color  |

- Plexitrac Coating- Shall comply with Specification 10.70 of California Products Corporation, or equal.
- Highly Pigment Polyresin Top Coat
- 1) Percent solids by weight (minimum) 47.4%  
2) Weight 8.45 lbs./gallon
- California Line Paint- Shall comply with Specification 10.4 of California Products Corporation, or equal.
- 100% Acrylic Resin containing no alkyds or vinyl co-polymer constituents
- 1) Percent solids by weight (minimum) 53.1%  
2) Weight 11.6 lbs./gallon
- Rubber Granules- Specifically gradated 1-3MM SBR and/or EPDM particles for job mixing with the Plexitrac Binder, or equal.
- Water- The water to be used in the mixture must be fresh and potable.

The installer will provide to the Owner/Architect a proforma materials list prior to the installation of the volume of materials to be used on the project. The proforma will include the following:

- a) Specified thickness 1/2" in.
- b) Pounds of Rubber 10.5 lb. sq./y SBR 5.0 lb. sq./y Colored EPDM
- c) Gallons of CP-4125 (Undiluted) .04 gal/sq.yd.
- d) Gallons of Colored Plexitrac (ore equal) binder (Undiluted) 1 gal. per 18 lbs. SBR / 1 gal. per 24 lbs. EPDM Minimum
- e) Gallons of Colored Plexitrac (or equal) coating (Undiluted) .1 gal. / sq.yd.

The installer will furnish the Owner/Architect with a proof of delivery that the correct volume of product has been provided. The installer will also verify that the same manufacturer has supplied all binders and coatings.

### **PART 3 – EXECUTION**

#### **3.1 WEATHER LIMITATIONS**

- A. Ambient and surface temperatures must be 50°F and rising.
- B. Installation should not be conducted during rainfall or when rainfall is imminent.
- C. Do not apply when surface temperature is in excess of 140°F.

### 3.2 SURFACE PREPARATION

- A. New asphalt shall be allowed to cure for a minimum of 14 days prior to the application of any surfacing materials.
- B. The surface must be thoroughly cleaned of all loose dirt and debris.
- C. Prior to the application of resilient surface materials, the entire surface shall be flooded and checked for depressions or irregularities in the asphalt. Any puddle area covering a nickel shall be marked and repaired. After patching, the asphalt surface shall not vary more than 1/4" in 10 feet, measured in any direction. Any depressions 1/4" or greater, shall be leveled using approved patch materials. Slopes shall meet the guidelines of the ASBA and NFHS.

### 3.3 RESILIENT SURFACE INSTALLATION

- A. After curing and preparation, the asphalt shall be primed/tack coated with CP-4125, or equal, at the rate of .04 gal/sy. by means of a dual diaphragm pump and spray unit. Do not allow material to puddle on the asphalt surface.
- B. Apply dry 1-3 MM Black SBR to the tack coated surface by mechanical spreader or by hand. Avoid leaving dry rubber granules more than one layer thick.
- C. Apply Plexitrac Binder, or equal, at the rate of one gallon per 18 lbs. of Black SBR granule by means of a dual diaphragm pump and spray unit. Care should be taken to uniformly spray the granule so they are fully encapsulated.
- D. Apply additional layers of Black SBR granule and Plexitrac Binder, or equal, until the specified thickness and weight of Black rubber has been applied. Each dry layer should be raked by hand to insure uniformity of thickness and density. In no case should a rubber layer be greater than 2.5 lbs./square yard prior to Plexitrac Binder, or equal, application.
- E. Apply dry 1-3 MM Colored EPDM granule at the rate not more than 2.5 lbs./sy. Not less than two layers shall be applied.
- F. Apply Plexitrac Binder, or equal, at the rate of one gallon for 24 lbs. of 1-3 MM Colored EPDM granule. Plexitrac pigment shall be added to each 55 gallon drum of Plexitrac Binder, or equal, for added UV stability.
- G. Prior to application of Plexitrac Coating, or equal, and line marking, the surface shall be tested for the required depth using SMG FT-3 Floor Tester depth gauge. The running track oval shall be tested in no less than 100 locations. The tests shall be performed at the center of both the outer and inner lane, as well as the center of the oval. At least 80% of the readings must meet the required depth, if not, additional layers of rubber and binder will be applied until the proper depth has been achieved.
- H. Apply Plexitrac Coating, or equal, at the total rate of 0.1 gallon per square yard. Product shall be applied in two applications by a dual diaphragm pump spray unit. One application shall be applied clockwise, the other counter clockwise.

### 3.4 MARKING AND MEASUREMENTS

- A. Wait 48 hours after surface completion before applying line marking. The installer shall:
- i. Locate and establish all radius points.
  - ii. Establish and set all necessary control points.
  - iii. Layout all lines and markings to tolerances set forth by ASBA and governing body requirements.
  - iv. Prepare all necessary drawings.
  - v. Provide all computations and measurements in organized form.
  - vi. Establish all locations on the curves using a Transit or Theodolite capable of reading direct to 20 seconds.
  - vii. Identify all markings, where appropriate, by painting the identification directly onto the track surface in 4" letters just below or in front of each mark in the right hand portion of the lane.
  - viii. Paint all of the large, 3' high, lane numbers in two colors, utilizing shadowed backgrounds.
  - ix. All lines shall receive sufficient paint to assure complete opacity and uniformity of color.
  - x. Paints shall be used directly from original containers and shall be thinned only when hot temperatures dictate thinning for smooth applications.
  - xi. Amount of paint used shall be as recommended by the manufacturer.
  - xii. The paint used shall be a 100% acrylic latex line paint, Plexicolor Line paint, or equal, made especially for the painting of lines on sports surfaces
  - xiii. All measurements shall be made by competent, experienced, and fully qualified personnel.
  - xiv. Upon completion of the track markings, a licensed professional engineer or registered land surveyor shall furnish an acceptable letter of or certificate of, accuracy to the Owner attesting to the accuracy of the track markings and measurements. This will also include copies of the computations, calculations, and drawings that were used to obtain this accuracy. The Engineer or Surveyor should affix their stamp to the drawing and the certificate.
  - xv. The markings shall include all events and marks required or recommended by the NFHS, the NCAA, or the IAAF dependent on the end use of the facility.

### 3.5 PROTECTION

- A. During construction the owner is responsible for limiting access of non-construction personnel to the site.
- B. The owner shall coordinate any irrigation of fields with the installation contractor.
- C. The installer shall protect curbs, fences, and other structures from overspray.

### 3.6 CLEAN UP

- A. Remove all containers, surplus, and debris and dispose of in accordance with local, state, and federal regulation.
- B. Remove all spills and overruns.
- C. Leave site in a clean and orderly condition.

**END OF SECTION**

**SECTION 31 00 00**

**EARTHWORK**

**PART 1 – GENERAL**

1.1 SCOPE

- A. All earthwork and related items including, but not limited to:
  - i. The removal and stockpiling of topsoil and subsoil;
  - ii. Trenching, excavating, and backfilling under athletic surfaces;
  - iii. Backfilling and compacting under landscaped areas;
  - iv. Backfilling and compacting under all pavements;
  - v. Excavation, footing subgrade preparation, and backfilling for pole vault trough;
  - vi. Rock excavation;
  - vii. Saw cutting and removal of pavement and concrete; and
  - viii. Provide and maintain grading stakes for control of rough and finish grades.
- B. Clearing and Grubbing:
  - i. Clearing, grubbing, cutting, removal, and disposal of all vegetation and debris from areas within the Limit of Work, where noted on the plans or as designated by the Engineer, if any.
  - ii. Also include the preservation from injury or defacement of all vegetation and objects designated or directed to remain.
- C. Shoring, Sheeting, and Bracing.
- D. Providing, placing, and compacting fill materials and/or removal of excess or unsuitable material.

1.2 CLASSES OF EXCAVATION

- A. Unclassified Excavation: Removal of materials regardless of the nature of the material encountered, the moisture content thereof, and the type of equipment required for excavating; and the disposal of excavated materials not required or suitable for backfill and embankment.
- B. Earth Excavation:
  - i. Extended Running Track: Removal of earth material associated with the construction of new track facilities.
- C. Rock Excavation:
  - i. Class A Rock Excavation: Removal of any of the materials listed in paragraph 3 below when encountered within the limits of the track and D Zones; and disposal of excavated material not required or suitable for embankment and backfill.
  - ii. Class B Rock Excavation: Removal of any of the materials listed in paragraph 3 below when encountered within the limits of the trench excavation and disposal of excavated material not required or suitable for embankment and backfill.
  - iii. Materials: Removal of the following materials is classified as rock excavation:

- a. Solid rock which cannot be excavated without blasting, use of rippers, or breaking with hand power tools such as jackhammers for removal.
  - b. Boulders, 1/2 cubic yard or more for Class B rock excavation and one cubic yard or more for Class A rock excavation, that require blasting for removal.
- D. Borrow Excavation: Obtaining and transporting to the job site suitable materials for the backfill, embankment, and subgrade, where sufficient suitable backfill is not available from excavation.
- E. Trench Excavation: Class A Trench Excavation: Removal and satisfactory disposal of materials for the construction for all structures and track & field installations. Class A trench excavation does not include the removal of materials classified as salvaged topsoil, rock, pulverized pavement, concrete or muck excavation.
- F. Saw Cutting Pavement – Establish new lines of curb and landscaping adjacent to the new work and saw cut existing pavement to receive new track and field surfaces.
- G. Salvaging Topsoil: Removal of suitable topsoil from excavated areas and stockpiling at the locations directed on site.
- H. Fine Grading and Compacting: Grading, shaping and compacting of excavations, backfill and original ground upon which pavement, surfacing, base, sub-base, or structures are to be placed.

### 1.3 REGULATORY REQUIREMENTS

- A. Comply with all regulations and laws of the authorities having jurisdiction. Provide all labor, materials, equipment, and services required for compliance.
- B. Only Class 1 and Class 2 lasers are permitted.
- C. Comply with all safety provisions required by OSHA and Commonwealth of Massachusetts.
- D. Comply with provisions of the “Manual for Accident Prevention in Construction” of the Associated General Contractors of America.
- E. Do not close or obstruct any public road or right of way without proper permits; obtain and pay for police detail if required for work in the public way.

## 1.4 QUALITY ASSURANCE

### A. STANDARDS

The following references shall be used as Standards for the work:

- i. MHD Specifications: The Commonwealth of Massachusetts, Highway Department, Standard Specifications for Highways and Bridges.
- ii. "Erosion and Sedimentation Control Guidelines": Massachusetts Department of Environmental Protection (MassDEP), Division of Water Supply.
- iii. The following American Society for Testing and Materials (ASTM) standards area applicable to the work of this section:
  - Moisture Density Relationship: ASTM D1557 (Modified Proctor)
  - Relative Density: ASTM D2049.
  - In-Place Density: ASTM D6938.
  - Liquid Limit: ASTM D423.
  - Plastic Limit & Plasticity Index: ASTM D424.
  - Percentage of Wear: ASTM C131 or C535 as applicable.
  - Sieve Analysis: ASTM D422.
  - Percent Passing No. 200 Sieve: ASTM D1140
- iv. Testing and Inspections: The suitability of the material will be determined by the testing standards identified in paragraph 3 above. Sampling, testing and approval of materials shall be by an independent geotechnical testing firm retained by the City of Lowell as described below. Allow a minimum of two weeks for notification and approval of material source.
- v. Tolerances:
  - a. Construct finish surfaces to plus or minus 1/2 inch of the elevations unless otherwise indicted.
  - b. Maintain moisture content of fill material as it is being placed within plus or minus 2% of the optimum moisture content of the material as determined by the laboratory tests specified.

### B. LAYOUT AND GRADES

- i. Provide, maintain, and/or re-establish grade stakes tied to benchmarks and survey monuments for construction control.
- ii. Establish and maintain all lines and grades as required to construct the work properly and certify the accuracy of the "as built" Record Drawings.
- iii. Establish finish grades by uniform slope between elevations shown on drawings. Spot elevations shall govern over proposed contours. Uniformly grade between proposed contours and existing grades unless otherwise noted.

### C. SUBMITTALS AND TESTING

- i. If required by the Owner, an independent geotechnical testing firm shall perform testing and inspection services during earthwork activities. The testing firm shall not be employed by nor paid by the Contractor, however additional testing and re-testing required because of nonconforming and/or substandard work shall be back-charged to the Contractor. Cooperate with and provide access to the work for testing personnel.
- ii. Backfill Materials: Submit samples to the independent geotechnical testing firm for each backfill material from each proposed source including on-site materials. A grain size analysis distribution curve and moisture/density relationship curve (performed in accordance with ASTM D422 and ASTM D1557, respectively)

will be prepared for review by the Engineer. Additional samples and analysis shall be submitted if a change in material occurs at the borrow source.

- iii. An independent geotechnical testing firm shall make such tests of materials and samples as necessary to insure materials and compaction requirements are achieved as indicated herein. Initial costs for such tests shall not be borne by the Contractor; however, additional testing and re-testing required because of nonconforming and/or substandard work shall be back-charged to the Contractor.
- iv. Certification of Class 1 and Class 2 laser equipment.

#### 1.5 EXAMINATION OF SITE CONDITIONS

- A. With regard to the character or extent of soil or any other subsurface condition and/or utilities, the Contractor shall thoroughly investigate the site and make his own determination of subsurface conditions which may affect methods or costs of construction.

#### 1.6 PROTECTION OF EXISTING CONDITIONS

- A. Notify Dig Safe prior to any excavation. Coordinate work with the City of Lowell Public Works Department, Engineering Department and Parks and Recreation Department, as required.
- B. Exercise extreme caution when verifying the location of underground utilities. Perform a ground penetrating radar survey of the entire site and record results on the Record Drawings.
- C. Locate and mark underground utilities to remain before beginning the work.
- D. Protect all existing utilities to remain in service; do not interrupt service except as specifically authorized in writing by authority having jurisdiction.
- E. Accurately locate the location and elevation of any active utilities exposed during construction. Record same on Record Drawings.
- F. Provide barricades, fences, lights, signs, and all other safety devices required for the protection of the public and workers.

#### 1.7 SUPPORT-OF-EXCAVATION AND UNDERPINNING

- A. The Contractor shall furnish, place, and maintain such sheeting, shoring, and bracing at locations necessary to support the sides of excavations to prevent danger to persons or damage to adjacent building, tunnels, pavements, facilities, or utilities to prevent injurious caving or erosion or the loss of ground; and to maintain pedestrian and vehicular traffic as required by the Contract Documents, the Contractor's sequence of construction, and as directed by the Engineer.
- B. The Contractor shall comply with all federal, state, and local safety regulations, and requirements.

## 1.8 GROUNDWATER AND STORMWATER CONTROL

- A. The Contractor shall provide, at his own expense, adequate filtered sumps and pumping and drainage facilities to maintain the excavated area sufficiently dry from groundwater and/or surface runoff so as not to adversely affect construction procedures nor cause excessive disturbance of underlying natural ground.
- B. The flows of all water resulting from pumping shall be managed so as not to cause erosion, siltation of drainage systems, or damage to adjacent property. Water from the trenches, excavations, and storm water management operations shall be disposed of in such a manner as to avoid public nuisance, injury to public health or the environment, damage to public or private property, or damage to the work completed or in progress.
- C. Any damage resulting from the failure of the dewatering operations of the Contractor, and any damage resulting from the failure of the Contractor to maintain all the areas of work in a suitable dry condition, shall be repaired by the Contractor, as directed by the Engineer, at no additional expense to the Owner. The Contractor's pumping and dewatering operations shall be carried out in such a manner as to prevent damage to the Contract work and so that no loss of ground will result from these operations. Precautions shall be taken to protect new work from flooding during storms or from other causes.
- D. The Contractor shall control the grading in the areas surrounding all excavations so that the surface of the ground will be properly sloped to prevent water from running into the excavated area. Where required, temporary ditches shall be provided to control drainage. Upon completion of the work and when directed, all areas shall be restored by the Contractor in a satisfactory manner and as directed.

## 1.9 RECORD DRAWINGS

- A. Submit Record Drawing showing the true "as built" conditions prepared on copies of the Contract documents. The Contractor shall supply a scanned copy for the record.
- B. Record Drawings shall neatly and legibly show all changes made during construction with respect to materials, layout, grading contours, and spot elevations, compared to the Contract Documents to the satisfaction of the Engineer.

## 1.10 MEASUREMENT AND PAYMENT

- A. Payment lines: The following payment lines shall be used for the purpose of Contract Price.
  - i. Utility Structures: One foot outside of the outer walls and six inches below the bottom of the structures.
  - ii. Utilities Trenches: Width of the outside diameter of the pipe plus two feet. Depth up to one foot below the bottom of the pipe. Banks of trenches shall be vertical.
  - iii. Paved areas: Twenty feet outside the new track and field surfaces two feet below the proposed finish grades.

## PART 2 – PRODUCTS

### 2.1 SOIL MATERIALS

- A. Topsoil: Reusable excavated and/or imported friable loam; free of subsoil, roots, grass, excessive amount of weeds, stone, and foreign matter.
- B. Subsoil: Imported and/or excavated material, graded free of lumps larger than 6 inches, rocks larger than 3 inches, and debris.
- C. Suitable On-Site Backfill: All other materials to be placed where Contract Documents call for “fill”, “backfill”, “filling” or “backfilling” to subgrade, shall be natural soil, well-graded and free from all organic, weak, compressible, and frozen materials, and shall contain no stone larger than four (4) inches in maximum dimension. It shall be of such nature and character that it can be dried and compacted and shall be free of all expansive materials (such as high plastic clays) and of materials subject to decay, decomposition, or dissolution, and shall conform to the following gradation:

| U.S. Sieve | % Passing by Weight |
|------------|---------------------|
| 4-inch     | 100                 |
| #4         | 20-75               |
| #40        | 0-25                |
| #200       | 0-5                 |

If, sufficient suitable fill material is not available from excavations under this Contract, to complete filling to subgrades as specified above, additional fill, as specified under this section shall be furnished by the Contractor from other sources at no additional cost.

### 2.2 FILL MATERIALS

- A. Type A - Gravel Borrow: Hard, durable stone and coarse sand free of loam, clay, surface coatings, friable material, and deleterious material. Graded within the following limits as specific for MHD M1.03.0, Type b:

| U.S. Sieve | % Passing by Weight |
|------------|---------------------|
| 3-inch     | 100                 |
| 1/2”       | 50-85               |
| #4         | 40-75               |
| #50        | 8-28                |
| #200       | 0-8                 |

- B. Type B - Crusher Run Stone: Hard durable angular stone and stone screenings derived from a stone quarry; free of loam, clay, surface coatings, shale, organic matter, and plastic materials. Graded within the following limits:

| U.S. Sieve | % Passing by Weight |
|------------|---------------------|
| 1"         | 100                 |
| 1/2"       | 50-100              |
| #4         | 25-40               |
| #16        | 18-30               |
| #40        | 10-15               |
| #200       | 0-10                |

- C. Type C - Crushed Gravel: Hard durable stone and coarse sand; free of loam, clay, surface coatings, shale, organic matter, and deleterious materials and run through a crushing plant. Graded within the following limits:

| U.S. Sieve | % Passing by Weight |
|------------|---------------------|
| 2"         | 95-100              |
| 1"         | 55-85               |
| #4         | 27-52               |
| #40        | 0-10                |

- D. Type D - Ordinary Borrow: Well graded, natural inorganic soil; reused and/or imported, free of rock larger than 6 inches size, organic material, frozen material, and debris; able to be placed and compacted to specified densities.

- E. Type E - Structural Fill: Inert, hard, durable sand and gravel, free from organic material, clay, surface coatings, and deleterious materials. Graded within the following limits:

| U.S. Sieve | % Passing by Weight                                    |
|------------|--|
| 3-inches   | 100  |
| 1.2-inch   | 50-100   |
| #4         | 30-85  |
| #10        | 20-75  |
| #60        | 5-35   |
| #200       | 0-10 below buildings<br>0-5 for free draining material |

- F. Type F – Sand Borrow: Sand borrow shall satisfy the requirements listed in MHD Specification Section M1.04.0.

- G. Type G – Select Backfill: Granular, well graded friable soil, free of rubbish, ice, snow, tree stumps, roots, clay and organic matter, and other deleterious or organic material. Graded within the following limits:

| U.S. Sieve | % Passing by Weight |
|------------|---------------------|
| #3         | 100                 |
| #10        | 30-95               |
| #40        | 10-70               |
| #200       | 0-10                |

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION AND PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Notify Engineer of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.
- C. Identify and flag known utility locations. Notify Dig Safe prior to any excavation. Notify utility company to remove and/or relocate utilities if required.
- D. Maintain and protect existing utilities to remain.

### **3.2 PROTECTION OF ADJACENT WORK**

- A. Grade excavation top perimeter to prevent surface water run-off into excavation or to adjacent properties.
- B. Protect trees and shrubs that are not to be cut, removed, destroyed or trimmed from harm and injury. All damage done to trees and shrubs by the Contractor's operation shall be appropriately pruned in accordance with accepted horticultural practice. Trees and shrubs damaged beyond repair in the judgment of the Engineer shall be replaced at the cost of the Contractor.
- C. Protect fencing bleachers and structures from being damaged or knocked out of plumb.
- D. Keep equipment and supply storage areas well away from the root zones of existing trees. This zone is determined to be equal to the outreach of the canopy of the trees. Minimize any activity in these areas to help insure the continued good health of the existing trees.

### **3.3 CLEARING & GRUBBING**

- A. Clearing shall consist of the removal of existing landscape features, natural lawn areas, bituminous swales, and curbs in the areas scheduled for construction.
- B. Grubbing shall consist of the removal and disposal of any stumps, roots larger than 3 inches in diameter, and matted roots from the designated construction areas.
- C. Burning of trees, brush, stumps, etc., is not permitted.
- D. Dispose of all material in accordance with all federal, state, and local regulations.
- E. Dispose of all stumps and vegetation material excavated from below grade (i.e., roots) in the Base stump dump as directed by the Engineer. Dispose of all other material off site.
- F. Backfill all voids with suitable on-site backfill or select backfill in controlled eight (8) inch maximum compacted lifts flush with proposed subgrade in adjacent areas.

### **3.4 TOPSOIL EXCAVATING**

31 00 00 EARTHWORK

- A. Do not excavate wet topsoil.
- B. Do not remove topsoil until tree cutting and stump removal has been completed, if any.
- C. Excavate topsoil and stockpile in area designated on site. Do not remove gravel drainage layer below the topsoil. Remove excess topsoil not being reused from site to a location designated by the Engineer.

### 3.5 EXCAVATING AND BACKFILLING

- A. The excavation shall be shaped to line, grade, and cross-section as indicated on the construction documents. This operation shall include any required reshaping and wetting to obtain proper compaction. All surface irregularities shall be filled with suitable material or removed and such areas re-compacted until the surface is properly shaped and properly compacted. Tolerances for track and field surfaces must conform to the IAAF Design guidelines.
- B. Excavation shall not interfere with 45 degree bearing splay of any foundation. Where excavation must extend within this zone, underpinning designed by a Professional Engineer registered in the Commonwealth of Massachusetts must be provided.
- C. Correct unauthorized excavation at no extra cost to the City of Lowell.
- D. Temporarily stockpile excavated material in area designated on-site.
- E. All excess and unsuitable excavated soil shall be removed from the site and legally disposed off-site by the Contractor at no additional cost to the City of Lowell.
- F. All fills shall be placed in horizontal layers. Fill shall not be placed following the natural contours of the ground. Fill shall be placed starting in the lowest areas working up to finish grades in horizontal layers in the manner specified herein. Each layer of fill shall be benched into the existing slope in order to avoid the formation of a shear plane.
- G. Backfill Material: Unless otherwise specified or directed, material used for filling and backfilling shall meet the material requirements specified herein.
  - i. The material used for backfilling utility trench excavations shall be material removed from the excavations provided that the reuse of these materials result in the required trench compaction and meets the requirements specified for suitable on-site backfill.
- H. Backfill areas to contours and elevations shown on Contract Documents. Use unfrozen and unsaturated materials.
- I. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- J. Place and compact fill materials in continuous layers. Layers shall not exceed 6-inch loose thickness in areas accessible with small compactors (such as adjacent to footings and walls and within trenches).

- K. Maintain moisture content of backfill materials within plus or minus 2 percent of the optimum moisture content to attain required compaction density. Do not compact material which has excessive moisture.
- L. Employ a placement method so not to disturb previously placed and compacted layers or damage perimeter drainage, foundation dampproofing, foundation waterproofing, and protective cover, or utilities in trenches.
- M. Excavate Long Jump and Triple Jump Pits to the depths indicated on the contract drawings wide enough and long enough to receive the selected pit enclosure.
- N. Place crushed stone level to the depth shown on the contract drawings and cover with an approved filter fabric.
- O. After the pit enclosure has been secured according to the manufacturer's directions, backfill the pit with sand that conforms to the IAAF specifications.
- P. Excavate for the pole vault trough by hand to the dimensions required to receive the levelling form and trough. Follow the manufacturer's directions for installation and backfilling.

### 3.6 TRENCHING

- A. The contractor shall use a licensed and insured operator and secure the necessary Trench Excavation Permit for the work.
- B. Cut trenches sufficiently wide to enable installation of utilities/pipe and allow inspection.
- C. Hand trim excavation and leave free of loose matter.
- D. Support pipe and conduit during placement and compaction of bedding fill.
- E. Backfill trenches to required contours and elevations.
- F. Place and compact fill materials as for Backfilling.
- G. Provide steel road plates over trenches in street and sidewalk that need to remain open overnight.

### 3.7 SUBGRADE PREPARATION

- A. Cobbles and boulders shall be removed within 6-inches below the bottom of concrete or pavement.
- B. Proof Compaction: All exposed subgrades shall be proof-compacted as described herein.
  - i. The natural sand and gravel below the existing gravel drainage layer, footings and utilities shall be proof-compacted to a firm and unyielding condition by a dynamic vibratory compactor weighing at least 200 pounds and imparting a minimum of 4 kips of force to the subgrade.

- ii. The fill material below pavements shall be proof-compacted to a firm and unyielding conditions by at least 4 passes of a dynamic roller that imparts a minimum of 40 kips of force to the subgrade.
- iii. All soft or otherwise unsuitable material shall be removed and replaced with suitable material from excavation or borrow. The resulting area, and all other low sections, holes, or depressions shall be brought to the required grade with accepted material and the entire subgrade shaped to line, grade and cross-section and thoroughly compacted.

### 3.8 COMPACTION REQUIREMENTS

- A. Fill Under Non Playing Field Landscaped Areas: Suitable on-site backfill, to 4 inches below finish grade, compacted to 90 percent.
- B. Fill Under Asphalt and Concrete Paving: Type A - Gravel, to 6 inches below paving compacted to 95 percent.
- C. Utilities: Pipes in trenches for utilities shall be laid on a 6 inch layer of Type C or Type F borrow materials, hand trimmed to support the pipe for its full length and designed grade as specified on the Contract Drawings.

### 3.9 PLACING TOPSOIL

- A. Screen topsoil to remove 1/2 inch and larger stone, and roots, grass, weeds, debris, and foreign material.
- B. Place the mixed topsoil soil in areas where seeding is scheduled.
- C. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles, and contours of subgrade.
- D. Remove large stone, roots, grass, weeds, debris, and foreign material while spreading.
- E. Hand Tamp or Roll placed topsoil.
- F. Leave stockpile area and site clean and raked, ready to receive landscaping.
- G. Coordinate relocation and deposition of excess loam with the Town of Dracut.

END OF SECTION

**SECTION 32 12 00**  
**FLEXIBLE PAVING**

**PART 1 – GENERAL**

1.1 SUMMARY SCOPE:

Furnish and install the following, as shown on the plans and specified herein.

- A. Bituminous concrete roadway patching.
- B. Prime coat and tack coat
- C. Pavement markings.

1.2 REFERENCES

- A. The following related items are included herein and shall mean:
  - i. Commonwealth of Massachusetts, Massachusetts Highway Department Standard Specifications for Highways and Bridges, latest edition (MHD).
  - ii. American Society for Testing and Materials (ASTM).
  - iii. American Association of State Highway and Transportation Officials (AASHTO).

1.3 SUBMITTALS

- A. Submit the following, in accordance with the provisions of the General Conditions:
  - 1. Design mix for bituminous concrete pavement.
  - 2. Manufacturer's specifications for Pavement marking materials.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with Sections 405 and 420 of the Standard Specifications.
- B. Mixing Plant: Conform to MHD Sections M3.11.04, M3.11.05, M3.11.06, and M3.11.07.
- C. Do not place asphalt when ambient or base surface temperature is less than 40 degrees F or base surface is wet or frozen.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in accordance with MHD Section 460.61.

Specific delivery routes have been established for the project and shall be strictly enforced.

**PART 2 – PRODUCTS**

2.1 PAVEMENT MATERIALS

- A. Bituminous concrete for parking area pavement and patching shall be Class I, Type I-1, furnished in accordance with MHD Section M3, except as may be modified herein.
- B. Bituminous concrete parking area pavement shall consist of two courses of bituminous concrete with a minimum finished pavement depth after rolling of 4.0 inches. Bituminous concrete material shall conform to Table A, Paragraph M3.11.03 of the Standard Specifications, except as amended herein.
- C. Binder course shall be 2.5 inches in thickness consisting of one lift of binder course bituminous concrete.

- D. Finished top course or top course overlay shall be 1.5 inches in thickness consisting of one course of Dense Mix bituminous concrete except that the maximum aggregate size shall be 3/8”.
- E. Prime coat and tack coat of bituminous material shall be applied in conformance with MHD Section 460.62. The contractor shall submit the manufacturer’s data sheet for both materials for approval prior to placement.

## 2.2 PAVEMENT MARKINGS

- A. Pavement marking materials for line painting shall conform to the requirements of Section M7 of the Massachusetts Standard Specifications for Highways and Bridges. Paint shall conform to Paragraph M7.01.10 and M7.01.11 for fast drying white traffic paint (P-225) and fast drying yellow traffic paint (P-226).

## 2.3 EQUIPMENT

- A. Equipment used for spreading, finishing, and compacting shall conform to MHD Section 460.63 and 460. 64.

## 2.4 MIXES

- A. Bituminous concrete pavement shall conform to MHD Section 460 Class I Bituminous Concrete Pavement Type I-1
- B. The job mix shall conform to MHD Section M3.

## 2.5 QUALITY CONTROL

- A. The Batch Plant used shall comply and conform to MHD M3.11.07
- B. Bituminous pavement shall be placed to the lines and grades shown on the construction drawings. The method used for testing surfaces shall conform to MHD Section 460.67.

# PART 3 – EXECUTION

## 3.1 INSTALLERS

- A. All equipment operators and material handlers shall be properly licensed for the equipment being used.
- B. All equipment operators and laborers shall participate in and be familiar with the approved health and safety plan for the project.
- C. All equipment operators and laborers shall wear the OSHA approved personal protection equipment required for each task.

## 3.2 EXAMINATION AND PREPARATION

- A. Verify gradients and elevations of base. Make any corrections necessary to gravel borrow and crusher run stone base materials furnished. Bring finish course materials to sections and elevations shown on the drawings.
- B. Where new flexible pavement meets existing pavement to remain, provide a clean saw cut through the entire depth of the pavement and apply a tack to the exposed edge prior to the placement of new pavement. Conform to the requirements of MHD Section 460.65.

- C. Verify compacted base is dry and ready to support paving and imposed loads. Place binder and top course bituminous concrete in conformance with application and depth requirements as specified herein. All depths referenced shall be compacted thicknesses. Bituminous concrete for binder course and top course shall be furnished and laid in accordance with MHD Section 460 and as directed by the details.
- D. No bituminous material shall be applied when the temperature is below 40 degrees F.
- E. The Engineer may require the Contractor to remove and replace, at the Contractor's expense, any defective mix not conforming to the specified job mix formula.
- F. If, at any time before the final acceptance of the work, any soft, imperfect places or spots shall develop in the surface, all such places shall be removed and replaced with new materials and then compacted until the edges at which the new work connects with the old become invisible.
- G. Finished surfaces shall be protected from pedestrian and vehicle traffic until adequately cured.
- H. Paved surfaces may be opened to traffic once the surface conforms to the requirements of MHD Section 460.68.

### 3.3 PAVEMENT MARKINGS

- A. Execution of pavement marking work including line painting and pavement graphics shall conform to the provisions of MHD Section 860. Use reflective paint only on areas designated on the drawings. Use white epoxy for parking stalls.
- B. The Contractor shall apply pavement markings in the configuration and color indicated on the drawings. Markings shall be applied only in seasonable weather and in accordance with good painting practices. The surface shall be dry and free of sand, grease, oil or other foreign substances prior to the application. The Contractor shall prepare the surface to accept the application as part of this item, with no additional compensation. Markings shall be solid and straight with even edges and no spillover.
- C. Bituminous pavements shall be in place for a minimum of 48 hours prior to the application of pavement markings.
- D. Pavement markings shall consist of the following and as noted on the drawings:
  - 1. White painted parking lines, 4 inches wide (see plan for lengths).
  - 2. Yellow painted pavement graphics for handicapped parking designations, as shown on the drawings.
  - 3. Blue and white for standard handicap stall symbol.
- E. If, for any reason, material is spilled or tracked on the pavement, or if any markings applied by the Contractor, in the Architect's judgment, fail to conform with the layout shown on the drawings, the Contractor shall remove such material by a method that is not injurious to the bituminous surface and is acceptable to the Architect, clean the bituminous surface, prepare the surface for a reapplication of markings, and reapply the markings as directed without additional compensation.

**END OF SECTION**