CADILLAC PATHWAY PARKING LOT
GRADING & PAVING

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SECTION 2100 SITE PREPARATION

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: The work under this Section includes, but is not necessarily limited to, clearing and grubbing the work area as necessary for proper and complete performance of the work, as indicated on the drawings and herein specified

1.02 QUALITY ASSURANCE

A. The contractor shall insure that only those trees that are obstructing the work area are removed. Trees beyond the work area shall be protected.

B. Tree removal shall be done using only workmen skilled in this type of work.

PART THREE - EXECUTION

3.01 EXAMINATION

A. The Contractor shall thoroughly inspect the premises prior to commencing work. The Contractor shall also determine the extent of work and the number and size of trees to be removed.

3.02 PROTECTION

A. The contractor shall protect all existing utilities indicated or made known. Call "MISS-DIG" or other service as needed to identify utility locations. Utility line markers placed by the Architect/Engineer and MISS DIG shall be protected by the contractor and replaced at his expense.

B. Extreme care should be taken to avoid damage to trees including seedlings and saplings. No damage is acceptable to existing trees (defined as breaking of the bark, broken tops or bending of trees from their natural position). All trees 3” diameter caliper or greater incurring bark damage during construction shall be addressed by the contractor by removing the damaged bark with a neat clean cut to a point on the tree trunk where the bark is undamaged. The repair shall be uniform in appearance and minimize the removal of any bark not damaged. All broken tree limbs shall be neatly trimmed at a branch joint or at the trunk of the tree. All damaged and exposed tree roots over ¼” in diameter shall be neatly trimmed prior to backfill placement.

C. Utility lines which have been identified on the plans or on-site and then are damaged or disturbed by the contractor shall be repaired or replaced at no expense to the state.

3.03 CLEARING AND GRUBBING

A. The contractor shall take care when removing trees to avoid damaging existing structures, roads, utilities, other trees, and state property.

B. Where trees indicated to be removed cannot be felled without danger to other trees, structures or property, they shall be cut down in sections.

C. Tree roots 1" in diameter and larger shall be removed to the trench depth required for the utility installation. In areas where pavement is to be constructed tree roots shall be removed to at least 12" below the existing ground surface or sub-grade of new graded surface, whichever is lower.

3.04 DISPOSAL OF VEGETATION AND OTHER MATERIALS

A. All brush, tree branches, roots, and tree stumps shall be removed and disposed of off site. Non-vegetative material shall be removed from state lands and disposed of in an approved landfill. Debris will not be allowed to accumulate on the job site.

B. Burning of combustible materials will not be permitted on site.

END OF SECTION

SECTION 02105 MOBILIZATION

PART ONE - GENERAL

1.01 Description

A. This item shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel equipment, supplies, and incidentals to the project site; for the establishment of the contractor's offices, buildings, and other facilities necessary to undertake the work on the project; and for other work operations which must be performed, or for expenses incurred, prior to beginning work on the various contract items on the project site.

1.02 B. Mobilization and demobilization portion of this Work will be paid for at the Contract Unit Price per Lump Sum.

Partial payment will be made in accordance with the Partial Payment Schedule indicated herein. The original contract amount is the total value of all contract items including the mobilization items.

Partial Payment Schedule

Percentage of Original Contract Amount	Percentage of Price for Mobilization Allowed
5	50
10	75
25	100

END OF SECTION

SECTION 02200 EARTHWORK

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: The work under this Section includes, but is not necessarily limited to, all areas associated with Earthwork, as indicated on the Drawings, specified herein, and as necessary for the proper and complete performance of this Work.

1.02 QUALITY ASSURANCE

A. Materials:
   1. All materials used as fill or sub-base shall be approved by the Architect/Engineer prior to placement.
   2. Determine gradation of material in accordance with ASTM C-136.
   3. Determine percent loss by washing in accordance with ASTM C-117.

B. Compaction:
   1. Fill material under building slabs and concrete flatwork shall be compacted to 95% of maximum unit density as determined using the Modified Proctor Method, ASTM D-1557.
   2. Architect/Engineer may approve other field determinations of maximum density, such as the Michigan Cone.
   3. Field determination of in place density shall be by the Nuclear Density Method, ASTM D-2922, or other approved method.

C. Except as modified by this Section, perform earthwork in accordance with Division 2 of the MDOT (2003 Ed.) Standard Specification.

1.03 RELATED SECTIONS

A. Section 02230 – Soil Erosion and Sedimentation Control

PART TWO - PRODUCTS

2.01 MATERIALS

A. Backfill and/or Embankment Material:
   1. For areas not requiring "granular backfill", backfill shall be of the job material, with the exception of materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders, 3" or larger, and other objectionable and non-packing earth shall be excluded from the backfill and disposed of.

B. Sand:
   1. Where sand base is called for under building slabs, provide material meeting requirements for Class 2NS sand, as specified in MDOT (2003 Ed.) Standard Specifications, Section 902.02.

C. Stone
   1. Where MDOT 6A coarse stone is called for as backfill, it shall meet the requirements as specified in (2003 Ed.) Standard Specifications, Section 902.

D. Geotextile for Underdrain:
   1. Where geotextile is called for as underdrain (separation) material, provide material as specified in MDOT (2003 Ed.) Standard Specifications, Section 902.02.

PART THREE - EXECUTION

3.01 EXAMINATION

A. General:
   1. Prior to all work of this section, become thoroughly familiar with the site, site conditions, and all portions of the work falling within this section.

B. Utilities:
   1. Before starting the earthwork, the Contractor shall locate all existing utilities by contacting "MISS DIG" and/or other authorities. The utilities to remain shall be protected at all times. All abandoned utilities, which interfere with the new work, shall be removed. Plug and/or cap abandoned utilities as required.

3.02 INSTALLATION

A. General Excavating:

   1. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workers and the public. Topsoil shall be separately removed and stockpiled for reuse.

   2. All excavation, except where necessary to tunnel, bore or jack under roads, tree roots and other obstructions within the limits on the plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.

   3. Foreign materials or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct excavation, shall be removed. Such material found at the bottom of the excavation shall be removed and the foundation restored with approved materials. The cost to remove and replace the materials shall be borne by the Contractor.

   4. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall, be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing walls and to completed or partially completed structures. The Contractor shall be responsible for all damage caused by him due to inadequate or improper protection.

B. Unauthorized excavation:

   1. Unauthorized excavation consists of removal of materials beyond indicated sub-grade elevations or dimensions without specific instruction from the Architect/Engineer.
   2. Fill unauthorized excavations by extending the indicated bottom elevation of the footing or base to the excavation bottom, without altering the required top elevation.

3. When acceptable to the Architect/Engineer, lean concrete fill (min. 1500 psi) may be used to bring the bottom elevation to proper position.
4. Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations, unless otherwise directed by the Architect/Engineer.

C. Backfilling at Building Foundations, Floor Slabs and Walks:

1. Place backfill and fill materials in layers not more than 8" in loose depth and compact to 95% Modified Proctor density.
2. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.
3. Compact each layer to required percentage of maximum density for area.
4. Do not place backfill or fill material on surfaces that are muddy, frozen, or containing frost or ice.
5. Place backfill and fill materials evenly adjacent to structures, to required elevations.
6. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

D. Disposal of Excavated Material:
1. Excavated material not used for backfilling must be leveled, graded or disposed of as directed by the Architect/Engineer.

E. Grading:
1. General:
   a. Uniformly grade the areas within limits of grading under this Section, including adjacent transition areas.
   b. Smooth the finished surfaces within specified tolerance.
   c. Compact with uniform levels or slopes between points where elevations are shown on the Drawings, or between such points and existing grades.
   d. Where a change of slope is indicated on the Drawings, construct a rolled transition section having a minimum radius of approximately 8'-0", unless adjacent construction will not permit such a transition, or if such a transition defeats positive control of drainage.
   e. Winter grading shall be in accordance with MDOT (2003 Ed.) Standard Specifications, Section 205.03.I.3.
2. Grading Outside Building Lines:
   a. Grade areas adjacent to buildings to achieve drainage away from the structures, and to prevent ponding.

F. Spreading Topsoil:

1. Before spreading topsoil, establish finish grades. Re-grade sub-grade as necessary to a true, smooth slope. Re-grade to the required depth below lawn areas and eliminate depressions and ridges. Spread topsoil smoothly and evenly to meet finish grades. Where no grades are shown, areas shall have a smooth and continual grade between existing or fixed controls and elevations shown on the drawings. Sub-grade shall be inspected and approved by the Architect/Engineer before the placing of topsoil.

2. During the spreading operation, the topsoil shall be raked, and all stones in excess of 1-inch in diameter and all rubbish shall be removed. Do not spread topsoil while either topsoil or sub-grade is in an excessively dry, frozen, or muddy condition. Place topsoil only when it can be followed within a reasonable time by seeding operations. The topsoil shall be uniformly distributed within a minimum thickness of 3 inches, or as indicated on the plans.

3. Surplus topsoil not required to fulfill the requirements of the contract shall be overspread on lawn areas as directed by the Architect/Engineer.

G. Restoration:

1. Surface restoration and final cleanup of all items removed or damaged by the Contractor shall include, but not be limited to:

   a. Concrete Walks or Slabs - Shall be cut at contraction or expansion joints and replaced with air-entrained, 3500 psi concrete, meeting MDOT Grade 35S of the same thickness and finish as that which was removed.

   b. Bituminous Surfaces - Shall be cut back to straight-line joints. Replace with a 6" layer of compacted MDOT 22-A aggregate and a 2" layer of MDOT No. 1100-T Bituminous Mixture.

   c. Graveled Surfaces - Shall be replaced with a 6" layer of MDOT 22-A compacted aggregate.

   d. Lawn Areas - Shall be replaced with four inches of topsoil and seeded with a roadside seed mixture. It shall then be fertilized and mulched as specified in Section 02900 – Landscaping.

END OF SECTION

SECTION 02230 SOIL EROSION AND SEDIMENTATION CONTROL

PART ONE - GENERAL

1.01 DESCRIPTION

A. The contractor shall be responsible to provide soil erosion and sedimentation control measures as required in the approved Soil Erosion and Sedimentation Control (SESC) Plan and in conformance with state law.

1.02 SOIL EROSION AND SEDIMENTATION CONTROL

A. The contractor shall take all precautions necessary to prevent soil erosion in areas that are disturbed by construction. The Contractor is required to ensure that all sedimentation is contained within the construction site and shall prevent any sediment from entering sewers or water courses.

B. The Contractor shall comply with the soil erosion and sedimentation control requirements of Act No. 451 of the Public Acts of 1994, Natural Resource and Environmental Protection Act, Part 91 of the Michigan Compiled Laws.

1.03 STORMWATER DISCHARGE

A. General

1. The contractor shall not begin any work until notified by the Owner that the stormwater discharge permit has been obtained for the project. A stormwater discharge permit is required for all projects that disturb more than 5 acres of soil or are within 500 feet of a lake or stream.

1.04 MONITORING AND ENFORCEMENT

1. Regular inspections and monitoring will be conducted by the Owner. The Contractor shall correct any deficiencies noted by the Owner, Local Enforcement Agency or the MDEQ within 24 hours of receiving written notice that corrections are necessary. If the Contractor failed to make the corrections within the allotted time, the Owner shall have the right to do the work and deduct all costs from the amounts due to the Contractor under this Contract.

1.05 SUBMITTALS

A. Prior to construction the Contractor shall submit a Final SESC Plan to the SESC program coordinator within the MDNR Office of Property Management for approval and Authorization to Proceed With Earth Change.

B. The Final SESC Plan shall include the following items:

1. The SESC plan included in the contract documents or modifications to the SESC plan as required by specific construction means and methods. All modifications shall adhere to the provisions of this section. There will be no additional compensation for modifications to the plan.

2. Schedule of installation, maintenance and removal of SESC measures.

a. Contractor shall submit a detailed schedule of installation, maintenance and removal dates for all required SESC measures. A schedule form is included at the end of this section.

3. Maintenance procedures for Temporary SESC Measures.

4. Maintenance Procedures for Permanent SESC measures.
   a. Contractor will be responsible to maintain these measures until they are permanently established and the soil is stabilized.

1.06 RELATED SPECIFICATIONS

A. Section 02900 …… TOPSOIL SURFACE and SEEDING

PART TWO - MATERIALS

2.01 GENERAL

A. All materials required for the SESC measures shall be as specified by the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, and by Section 916, and Section 917 of the MDOT Standard Specifications for Construction, 1996 Edition.

B. Seed Mulch shall be as specified in Section 02900

PART THREE - EXECUTION

3.01 INSTALLATION AND MAINTENANCE OF CONTROLS

A. General

1. All SESC measures shown on the plans shall be installed and maintained in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, unless otherwise specified or approved by the Engineer.
2. All required SESC measures shall be in place as required by the approved SESC plan prior to construction.
3. Daily inspections shall be made by the contractor to determine effectiveness of erosion and sedimentation measures, and any necessary repairs shall be performed without delay.
4. Permanent soil erosion control measures over disturbed land area shall be completed within 5 working days after final grading or final earth change has been completed.

B. Silt Fence
1. Install silt fence as shown in the approved SESC plan and in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002, unless otherwise shown on the plans or approved by the Engineer.

C. Dust Control
1. Dust shall be in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002.

D. Sweeping
1. All paved surfaces shall be swept as necessary to keep them free of sediment and vehicle tracking.

E. Seeding and Mulching

1. Seeding and mulching shall be in accordance with Section 02900 – Restoration.

F. Cellular Confinement
1. Cellular confinement shall be in accordance with the MDMB Soil Erosion and Sedimentation Control Guidebook 2002.

3.02 COMPLETION

A. The contract will not be considered complete until the Engineer has certified the following items.
1. All disturbed soil is permanently stabilized.
2. All sewers, ditches, catch basins, and manholes and roadways are cleaned and cleared of sediment. Unless the contractor can document positively to what extent these items are silted prior to construction, no credit will be given for cleaning these items.
3. All temporary SESC measures have been removed and the areas are restored and stabilized.

SOIL EROSION AND SEDIMENTATION CONTROL MEASURES INSTALLATION, MAINTENANCE AND REMOVAL SCHEDULE

SESC MEASURE	INSTALLATION DATE	REMOVAL DATE	MAINTENANCE FREQUENCY

END OF SECTION

SECTION 02232 AGGREGATE BASE COURSE

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: The work under this Section includes, but is not necessarily limited to, all labor, materials, and equipment necessary to construct an aggregate base coarse of the required depth as indicated on the drawings and specified herein.

1.02 QUALITY ASSURANCE

A. Subgrade:

1. The subgrade shall be inspected and approved by the engineer prior to placing aggregate.

B. Materials:

1. All materials used for aggregate base shall be approved by the Architect/Engineer, prior to placement.

C. Compaction:

1. Field determination of in place density shall be by the Nuclear Density Method, ASTM D-2922, or other approved method.

PART TWO - PRODUCTS

2.01 MATERIALS

A. Aggregate Base Material:

1. Shall be 22A aggregate as specified in MDOT (2003 Ed.) Standard Specifications, Section 302.02.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

A. Aggregate Base Coarse

1. Aggregate base course shall be constructed as specified in MDOT (2003 Ed.) Standard Specifications, Section 302.03.B.

END OF SECTION

SECTION 02235 AGGREGATE SHOULDERS

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: The work under this Section includes, but is not necessarily limited to, all labor, materials, and equipment necessary to construct one foot wide aggregate shoulders of the required depth as indicated on the drawings and specified herein.

PART TWO - PRODUCTS

2.01 MATERIALS

A. Shoulder Material:

1. Shall be 22A aggregate as specified in MDOT (2003 Ed.) Standard Specifications, Section 902.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

A. Aggregate shoulders shall be constructed as specified in MDOT (2003 Ed.) Standard Specifications, Section 307.

END OF SECTION

SECTION 02512 HMA SURFACE

PART ONE - GENERAL

1.01 DESCRIPTION

A. This work shall include all labor materials and equipment necessary to construct a surface of hot plant-mixed bituminous material upon an aggregate base to the lines and grades shown on the drawings and specified herein.

1.02 SUBMITTALS

A. Comply with pertinent provisions of Division One.

B. Contractor shall submit to the Architect/Engineer a mix design for the specified bituminous mixture for approval.

1.03 QUALITY ASSURANCE

A. General

1. The contractor shall provide suitable equipment for the paving work. Equipment shall be in good working condition and shall be operated by individuals who are properly trained and skilled for such equipment.

PART TWO - PRODUCTS

2.01 HMA MIXTURE

A. HMA Mixture No. 13A shall meet the requirements of the MDOT Standard Specification 501 (2003 edition).
B. Bituminous Mixture shall have a penetration grade of 120-150 unless otherwise shown on the plans.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

A. Construction methods and equipment requirements shall be in accordance with MDOT Standard Specification 502(2003 edition).

B. Application rates shall be as follows:

1. 165#/S.Y. on aggregate base.
2. 165#/S.Y. leveling course.

C. Rolling Procedures…No more than 25% of roller drum shall be allowed to extend beyond the edge of bituminous surface in order to prevent feathering and cracking of bituminous edges.

D. Paving shall be done to a string line, if requested by the Engineer, with the Contractor required to provide the necessary string grade.

END OF SECTION

SECTION 02580 PAVEMENT MARKING

PART ONE - GENERAL

1.01 DESCRIPTION

A. This work shall consist of painting four inch wide parking stall stripes, handicapped parking symbols, text and traffic arrows at the locations shown on the plans and as specified herein.

PART TWO - PRODUCTS

2.01 PAINT

A. Acrylic emulsion, yellow, non-reflectorized.

B. Approved manufacturers.

1. No. 476 Zone Marking Paint by Repco Lite Paints, Inc., Holland, Michigan.

2. 442XX Interior/Exterior Alkyd Traffic Marking Paint by Devoe.

3. Pro-Mar Traffic Marking Paint (Alkyd) by Sherwin-Williams.

4. Hydrotherm Striping by Liquid Ceramics International Ltd., Albuquerque, NM.

PART THREE - EXECUTION

3.01 METHODS

A. Layouts for stripe alignment shall be approved by the Architect/Engineer before painting. Contractor shall notify engineer 72 hours prior to paint striping so that an inspection of the paint layout can be conducted before painting commences.

B. Painting shall be accomplished with mechanical sprayers in accordance with paint manufacturer's printed instructions, using all means necessary to protect the painted stripes until dry.

C. Deviation in the edges of the stripes in excess of ½ inch in 50 feet and ragged edges are not acceptable.

D. Paint stripes which do not meet these requirements shall be **corrected** by whatever means directed by the Architect/Engineer at **no expense to the Owner**.

END OF SECTION

SECTION 02846 SIGNAGE

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work Included: The work under this Section includes, but is not necessarily limited to, the furnishing and installation of handicapper parking signs, as indicated on the Drawings, herein specified, and as necessary for the proper and complete performance of this work.

PART TWO - PRODUCTS

2.01 MATERIALS

A. Signs:
1. Handicap parking sign, 12” x 18”, as manufactured by Seton Identification Products Model No. 35754, or approved equal.
2. “No Parking” sign, 12” x 18”, as manufactured by Seton Identification Products Model No. 16713, or approved equal.

B. Post:
1. Shall be green backed enameled steel U-channel post, 10’ long, with 3/8” holes spaced on 1” centers.

C. Fasteners:
1. Shall be 3/8” diameter oval head, zinc chromate steel carriage bolt with nut.

2.02 INSTALLATION:

A. Bottom of sign shall be mounted 6’-8” above finished grade

END OF SECTION

SECTION 02900 RESTORATION

PART ONE - GENERAL

1.01 DESCRIPTION

A. This work shall consist of furnishing all labor, equipment and materials required to prepare the soil foundation, place a 4-inch depth of topsoil on all disturbed areas, and to dormant seed the topsoiled areas.

B. Areas disturbed outside the construction limits shall be top soiled and seeded by the Contractor at no cost to the State.

PART TWO - MATERIALS

2.01 MATERIALS

A. Seed mixture consisting of Kentucky Blue Grass - 10%, Perennial Ryegrass – 20%, Hard Fescue – 30%, Creeping Red Fescue – 40%, shall be applied at a uniform rate of 220 pounds per acre.

B. Topsoil shall be a dark, organic, natural surface soil free of clay lumps, peat or muck, subsoil, noxious weeds or other foreign matter such as roots, sticks, rocks over 1/2 inch in diameter and not frozen or muddy. Material shall meet with the approval of the Architect/Engineer and be furnished from off state lands.

C. Mulching Materials shall meet MDOT Standard Specification (1990 Edit) section 8.21.11. Where erosion control blankets are called for on the plans or in this specification they shall be North American Green S75 or approved equal.

D. Fertilizer shall be evenly applied at a rate which will provide 240 pounds per acre of chemical fertilizer nutrients, in equal proportions, (10-10-10), of Nitrogen, Phosphoric Acid, and Potash.

PART THREE - EXECUTION

3.01 CONSTRUCTION METHODS

A. All areas disturbed by the contractor including but not limited to construction areas, stockpile areas, access roads, material and equipment storage areas shall be topsoiled and seeded.

B. The earthen areas to receive topsoil shall be at the required grade and properly trimmed. Topsoil shall be spread on the prepared areas to a depth of not less than 4”. After spreading, any large clods and lumps of topsoil shall be broken up and pulverized. Stones and rocks over 1” in diameter, roots, litter, and all other foreign matter shall be raked up and disposed of by the contractor. Place topsoil only when it can be followed within a reasonable time by seeding operations.

C. For areas to be seeded, chemical fertilizer shall be evenly applied on the prepared topsoil surface at a rate which will provide 240 pounds per acre of chemical fertilizer nutrients, in equal proportions of Nitrogen, Phosphoric Acid, and Potash, or as directed by the Architect/Engineer.

D. Fertilizer spread by drill or broadcast methods will be placed or worked into the soil to a depth of one to two inches.

E. The seed shall be sown by broadcast method following the application of the fertilizer and while the seed bed is in a friable condition. The seeding shall be floated and lightly compacted to incorporate the seed into the uppermost one-half inch of the soil.

F. Mulch shall consist of straw and shall be spread over the surface to a uniform thickness to allow sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, reduce rate of water evaporation, and prevent or reduce water or wind erosion. Straw mulch shall be anchored by crimping in place. Erosion control blankets shall be installed on all slopes which are 3 horizontal to 1 vertical or steeper.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART ONE - GENERAL

1.01 DESCRIPTION

A. Work included: The work under this Section consists of, but is not necessarily limited to, furnishing and placing concrete as shown on the drawings. Also included are required forms, reinforcing, finishing and curing as specified herein.

1.02 QUALITY ASSURANCE

A. Qualifications of workers and materials:
   1. Provide at least one person, who shall be present at all times, during execution of this portion of the work. They shall be thoroughly familiar with the type of materials being installed, the reference standards, and the requirements of this work, and shall direct all work performed under this Section.
   2. The concrete batch plant facilities must be certified and meet the requirements of the National Ready Mixed Concrete Association.

B. Testing and Inspection Services:
   1. The Contractor will engage a testing and inspection service to evaluate concrete delivered to and placed at the site. Perform materials evaluation and test concrete mixes in accordance with requirements of ACI 301.
   2. Perform sampling and testing during concrete placement, in accordance with the following ASTM specifications:
      a. C-172 - Method of Sampling Fresh Concrete.
      b. C-143 - Standard Method of Test for Slump of Portland Cement Concrete.
      c. C-173 - Air content, as determined by the Volumetric Method.
      d. C-39 - Method of Test for Compressive Strength of Molded Concrete Cylinders. Note: for each class of concrete, provide one set for each 50 cu. yds. or fraction thereof. Set shall include:
         1) one specimen tested at 7 days
         2) two specimens tested at 28 days
         3) one retained for later testing if required
         4) Test results will be reported in writing to the Architect/ Engineer, Contractor, and concrete producer, on the same day, tests are made.

C. Mix Proportion and Design:
   1. Prepare design mixes for each type and strength by either laboratory trial mix or field test data bases as follows:
      A. Proportion normal-weight concrete according to ACI 221.1 and ACI 301.
   2. Submit a written report to the Architect/Engineer for each proposed concrete mix at least 15 days prior to start of work. Do not begin concrete production until mixes have been reviewed and are acceptable to the Architect/Engineer.
   3. Mix designs may be adjusted when material characteristics, job conditions, weather, test results or other circumstances warrant. Do not use revised concrete mixes until submitted to and accepted by the Architect/Engineer.
   4. Use air-entraining admixture in all concrete exposed to freezing and thawing. Air-entrainment shall conform to MDOT (2003 Ed.) Standard Specifications, Section 903.03, and shall be measured at 4-6% by volume.
   5. Minimum concrete compressive strength at 28 days shall meet the following schedule:
      a. Footings, piers, columns, structural slabs: 3,000 psi.
      b. Slabs on grade: 4,000 psi.
      c. Exterior walks, curbs, retaining walls: 3,500 psi.

PART TWO - PRODUCTS

2.01 MATERIAL

A. Formwork:
   1. General:
      a. Forms shall be of sound and tight materials.
      b. Forms for all exposed parts of concrete shall be made of plywood or metal, or of structural backing with plywood or metal liners to produce a smooth surface on the concrete.
      c. Forms for unexposed parts may be of sound wood boarding, salvaged plywood, or of other approved material herein specified.
   2. Sealers:
      a. All form sealers shall be first quality of their respective kinds and subject to the approval of the Architect/Engineer.

B. Concrete Reinforcement:
   1. All concrete reinforcement materials shall be new, free from rust, and comply with the following reference standards:
      a. Where steel bars are shown, they shall comply with specifications for "Deformed and Plain Billet-Steel Bars for Concrete Reinforcement", ASTM A 615, A 616, or A 617, Grade 60.
      b. Where welded wire fabric (W.W.F.) is shown or referred to, it shall comply with ASTM A 185.

C. Cement:
   1. Cement shall be Portland cement, type 1A, conforming to ASTM C-150.

D. Aggregate:

   1. General:
      a. All aggregate shall meet the requirements of ASTM C-33 and MDOT (1990 Ed.) Standard Specifications, Section 8.02.

   2. Coarse Aggregate:
      a. Coarse aggregate shall meet MDOT specifications for Class 6A or 6AA, and be composed of stone or crushed rock of hard durable pieces, well graded, and free from clay or organic substance. Maximum size not to exceed one-fifth of the minimum dimension of the concrete member in which placed and not to exceed three-fourths of clear spacing between reinforcing steel. Maximum size aggregate for floor slabs and sidewalks shall be 3/4 inch.
   3. Fine Aggregate:
      a. Fine aggregate shall meet MDOT specifications for Class 2NS, and be composed of hard natural sand, free of clay or other material, which will have a deleterious effect on the finished product.

E. Water:
   1. Water shall be clean and free from injurious amounts of foreign matter.

F. Miscellaneous Concrete Accessories:
   1. Expansion Joint Material:
      a. Fiber-type Federal Specification No. HHF-341F, Type III.
      b. Vinylex, zip-strip by Form Tech Concrete Forms, Inc. Ph. 248-344-8260.
   2. Joint Sealer:

a. Federal Specification SS-S200D, placed above expansion and control joint.

3. Under Slab Moisture Barrier:
   a. Acceptable Manufacturers:
      1) "Zero Perm" - Alumiseal Corp., Stamford, CT
      2) "Moistop" - Fortifiber Corp., Howard City, MI
      3) "T-65" - Griffolyn, Reef Industries, Inc., Houston, TX
4. Concrete curing compound/sealer/hardener:
   a. Acceptable manufacturers:
      1) “Super-Trete 110-VOC” – Cresset Chemical Co., Weston, OH
      2) “VOCOMP-25” – W.R. Meadows, Inc., Hampshire, IL
      3) “Cure-R” – L&M Construction Chemicals, Inc., Omaha, NE

PART THREE - EXECUTION

3.01 INSTALLATION

A. Formwork:

1. General:
   a. Construct all required forms to be substantial, sufficiently tight to prevent leakage of mortar, and able to withstand excessive deflection when filled with wet concrete.
   b. Layout:
      1) Form all required cast-in-place concrete to the shapes, sizes, lines, and dimensions indicated on the drawings.
      2) Make proper provisions for all openings, offsets, recesses, anchorage, blocking, and other features of the work as indicated on the drawings or required by the various sections of these Specifications.

B. Embedded Items:
   1. Set all required steel frames, angles, grilles, bolts, inserts, and other such items required to be anchored in the concrete before the concrete is placed.

C. Bracing:
   1. Properly brace and tie the forms together so as to maintain position and shape.

D. Steel Reinforcement:
   1. Position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, and hangers, as required. Where splices are required, lap bars a minimum of 18".

E. Placing Concrete:

1. General:
   a. Place concrete in compliance with practices and recommendations of the American Concrete Institute (ACI) and as herein specified.

2. Method:
   a. Convey concrete from mixer to place of final deposit by methods that will prevent separation and loss of materials.
   b. For chuting, pumping, and pneumatically conveying concrete, use only equipment of such size and design as to ensure a practically continuous flow of concrete at the delivery end without loss or separation of materials.

c. Deposit concrete as nearly as possible in its final position to avoid segregation due to rehandling and flowing.
d. Place concrete as dry as possible consistent with good workmanship, never exceeding the maximum recommended slump.
e. Never place concrete in water or allow water to come in contact with concrete until it has hardened sufficiently to not be damaged.

3. Rate of Placement:
   a. Place concrete at such a rate that concrete is at all times plastic and flows readily between bare bars.

4. Compaction:
   a. Thoroughly consolidate all concrete by suitable means during placement, working it around all embedded fixtures and into corners of forms.
   b. During placement, thoroughly compact the concrete by hand tamping and by mechanical vibration.
   c. Vibrating of forms will not be allowed.

F. Joints:
   1. Construction Joints:
      a. Construction joints in concrete shall be keyed together and the design reinforcement shall be properly extended through the joints.
   2. Movement (Control) Joints:
      a. Movement (control) joints shall be at least 1/4 the depth of the slab (1/5 the depth of the slab in passageway and mechanical room – to avoid in-floor heat tubing). See plans for locations.
      b. Where control joints are called for, they shall be sawn the morning after the concrete has been placed.

G. Adjoining Concrete and Bituminous Surfaces:
   1. Where new concrete flatwork adjoins an existing bituminous surface, the Contractor shall make a neat vertical saw cut along the full length of the bituminous material. The saw cut must be made to the full depth of the material.
   2. The concrete flatwork shall then be finished so that it is dead flush with the existing bituminous surface.
   3. It shall be the responsibility of the Contractor to dispose of the waste material in a manner acceptable to the Architect/Engineer.

H. Leveling and Finishing:

   1. General:
      a. Concrete slabs shall be brought to proper lines of level and pitch by screeding and floating in order to remove all humps and hollows to produce true even surfaces.
      b. Tamp slabs with suitable equipment to depress large aggregate and then push float as necessary.
      c. Slabs where concrete finish is exposed shall have a steel trowel finish. Interior or exterior surfaces that permit standing water will not be permitted.
      d. All exterior concrete flatwork shall be steel troweled and finished with a fine hair broom.
      e. Handicap ramp shall be finished with a coarse-hair broom or a corrugated bull float.

   2. Exterior Finishes:
      a. Surfaces Below Grade: Surfaces below grade or not exposed shall have rough form finish. After forms and ties are removed, tie holes and defects shall be

patched, fins exceeding 1/4" in height shall be chipped off or rubbed off. The remainder of wall surface may be left with the texture imparted by the forms.

3. Curing and protecting:
   a. Unless otherwise approved, cure concrete by keeping all exposed surfaces wet for a minimum of three days. Concrete shall be kept from freezing at all times.
   b. Unless equipment is utilized to protect concrete from freezing, no concrete shall be placed unless the temperature is above 40°F and rising.
   c. Enclosures and heating equipment to be used for protection of concrete construction during freezing weather shall be erected, tested and approved by the Architect/Engineer before proceeding with construction. Equipment and enclosures shall maintain a temperature of at least 50°F for a period of five days after concrete is placed.
   d. Calcium chloride used as an accelerator during cold weather shall not exceed 2% by weight.

END OF SECTION

SECTION 06130 TRAIL ACCESS CONTROL

PART ONE - GENERAL

1.01 WORK INCLUDED

A. Supply all materials, labor, and equipment necessary to provide timber rail barriers installed complete as specified herein and detailed in project drawings.

1.02 SUBMITTALS

A. Product Data

1. Supply all related certifications of wood preservative treatement and certification of the wood species and grade.

1.03 METHOD OF PAYMENT

A. Timber Rails - All work under this section is included in the contract lump sum price. No separate payments will be made fo theis work..

PART TWO - PRODUCTS

2.01 MATERIALS

A. Pressure treated timbers for rails: Shall meet the specifications for timber piles in the Michigan Department of Transportation Standard Specifications for Construction, Section 912, with the following modifictions:

1. Timbers for rails shall be 8-12” diameter round timbers, the maximum to minimum diameter ration shall not exceed 1:1.5.Bollard and footing shall be able to withstand a point design load of 3000# in any direction placed at 27 inches above ground.

B. Pressure treated posts: Shall meet the specifications for posts in the Michigan Department of Transportation Standard Specifications for Construction, Section 912.

C. Connection hardware shall hot dip galvanized as per the Michigan Department of Transportation Standard Specifications for Construction Section 908.15.B.

PART THREE - EXECUTION

3.01 INSTALLATION, GENERAL

A. Timber rail barriers shall be installed as shown and at locations provided on the plans, unless otherwise indicated by the Engineer. Contractor shall review layout with Engineer, prior to installation.

B. Bacfill around posts with excavated materials and compacted to 90% of the relative maximum density.

C. All cuts and drilled holes shall be treated with the treatment specified in the Michigan Department of Transportation Standard Specifications for Construction, Section 912.

D. Connecting hardware shall include bolts, nuts and two washers. Boltheads, bolts, and nuts shall not extend beyond the face of the timber posts.

END OF SECTION