SITEWORK SPECIFICATIONS

SITEWORK PER ENGINEERING CONSULTANT DESIGN

SECTION 02050	DEMOLITION
SECTION 02100	SITE PREPARATION
SECTION 02200	EARTHWORK
SECTION 02227	AGGREGATE MATERIALS
SECTION 02245	SOIL STABILIZATION
SECTION 02270	SLOPE PROTECTION AND EROSION CONTROL
SECTION 02505	PAVING BASE COURSE
SECTION 02511	ASPHALT CONCRETE PAVING
SECTION 02520	PORTLAND CEMENT CONCRETE PAVING
SECTION 02525	CURBS AND SIDEWALKS
SECTION 02584	PAVEMENT MARKINGS
SECTION 02605	SEWER STRUCTURES
SECTION 02660	WATER DISTRIBUTION SYSTEMS
SECTION 02687	SITE GAS LINES
SECTION 02720	STORM SEWER SYSTEMS
SECTION 02730	SANITARY SEWER SYSTEMS
SECTION 02810	LANDSCAPE IRRIGATION
SECTION 02831	CHAIN LINK FENCES AND GATES
SECTION 02846	SIGNAGE
SECTION 02900	LANDSCAPING

REFERENCE DOCUMENTS

1. GEOTECHNICAL INVESTIGATION AND DESIGN SPECIFICATIONS PREPARED SPECIFICALLY FOR THIS PROJECT.
2. STATE DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS AND DRAWINGS, LATEST EDITION.
3. DEPARTMENT OF PUBLIC WORKS STANDARD DRAWINGS AND SPECIFICATIONS.

SECTION 02050 DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Demolition of designated site structures, retaining walls, and foundations and removal of materials from site.
B. Demolition and removal of pavements, curbs and gutters, drainage structures, utilities, signage, or landscaping.
C. Disconnecting and capping or removal of identified utilities.
D. Filling or removal of underground tanks, piping, and appurtenances.
E. Filling voids in subgrade created as a result of removals or demolition.
F. Hazardous material compliance.

1.02 RELATED SECTIONS
A. Section 02100 - Site Preparation
B. Section 02200 - Earthwork
C. Section 02227 - Aggregate Materials
D. Section 02270 - Slope Protection and Erosion Control
E. Storm Water Pollution Prevention Plan
F. Construction Drawings
G. Geotechnical Investigation.

1.03 REGULATORY REQUIREMENTS
A. Conform to applicable local code for demolition of structures, safety of adjacent structures, dust control, and runoff control.
B. Obtain required permits and licenses from appropriate authorities. Pay associated fees including disposal charges.
C. Notify affected utility companies before starting work and comply with their requirements.
D. Do not close or obstruct roadways, sidewalks, or fire hydrants without appropriate permits.
E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.
F. Test soils around buried tanks for contamination.

1.04 PROJECT RECORD DOCUMENTS
Accurately record actual locations of capped utilities and subsurface obstructions that will remain after demolition.

1.05 PROJECT CONDITIONS
A. Structures to be demolished will be discontinued in use and vacated prior to start of work.
B. Owner assumes no responsibility for condition of structures to be demolished.
C. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practicable. Variations within structures may occur by Owner's removal and salvage operations prior to start of demolition work.
D. Unless otherwise indicated in Contract Documents or specified by Owner items of salvageable value to Contractor shall be removed from site and structures. Storage or sale of removed items on site will not be permitted and shall not interfere with other work specified in Contract Documents.
E. Explosives shall not be brought to site or used without written consent of authorities having jurisdiction. Such written consent will not relieve Contractor of total responsibility for injury to persons or for damage to property due to blasting operations. Performance of required blasting shall comply with governing regulations.

PART 2 PRODUCTS

2.01 FILL MATERIALS
Aggregate materials as specified in Section 02227.

PART 3 EXECUTION

3.01 PREPARATION
A. Provide, erect, and maintain erosion control devices, temporary barriers, and security devices at locations indicated on Construction Drawings.
B. Protect existing landscaping materials, appurtenances, and structures which are not to be demolished. Repair damage caused by demolition operations at no cost to Owner.
C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as needed.
D. Mark location of utilities. Protect and maintain in safe and operable condition utilities that are to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and Owner.

3.02 DEMOLITION REQUIREMENTS
A. Conduct demolition to minimize interference with adjacent structures or pavements.
B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed.
C. Conduct operations with minimum of interference to public or private access. Maintain ingress and egress at all times.
D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.
E. Sprinkle work with water to minimize dust. Provide hoses and water connections for this purpose.
F. Comply with governing regulations pertaining to environmental protection.
G. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

3.03 DEMOLITION
A. Demolish buildings completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to Owner and authorities having jurisdiction.
B. Proceed with demolition in systematic manner, from top of structure to ground. Complete demolition work above each floor or tier before disturbing supporting members on lower levels.
C. Locate demolition equipment and remove materials so as to prevent excessive loading to supporting walls, floors, or framing.
D. Remove structural framing members and lower to ground by hoists, derricks, or other suitable methods.
E. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2 ft or more below proposed subgrade. Remove slabs-on-grade and below grade construction within 2 ft of proposed subgrade.

3.04 FILLING BASEMENTS AND VOIDS
A. Completely fill below grade areas and voids resulting from demolition or removal of structures, underground fuel storage tanks, wells, cisterns, etc., using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.
B. Ensure that areas to be filled are free of standing water, frost, frozen or unsuitable material, trash, and debris prior to fill placement.
C. Place fill materials in accordance with Section 02200 unless subsequent excavation for new work is required.
D. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

3.05 DISPOSAL OF DEMOLISHED MATERIALS
A. Remove from site debris, rubbish, and other materials resulting from demolition operations.
B. No burning of any material, debris, or trash on-site or off-site will be allowed, except when allowed by appropriate governing authority and Owner. If allowed as stated above, burning shall be performed in manner prescribed by governing authority. Attend burning materials until fires have burned out or have been completely extinguished.
C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION 02050

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Clearing site of debris, grass, trees, and other plant life in preparation for site or building earthwork.
B. Protection of existing structures, trees, or vegetation indicated in Contract Documents to remain.
C. Stripping topsoil from areas that are to be incorporated into limits of project and where so indicated on Construction Drawings.

1.02 RELATED SECTIONS
A. Section 02050 - Demolition
B. Section 02200 - Earthwork
C. Section 02270 - Slope Protection and Erosion Control
D. Storm Water Pollution Prevention Plan
E. Construction Drawings
F. Geotechnical Investigation.

1.03 ENVIRONMENTAL REQUIREMENTS
A. Construct temporary erosion control systems as shown on Construction Drawings or as directed by "Storm Water Pollution Prevention Plan" (SWPPP) to protect adjacent properties and water resources from erosion and sedimentation.
B. In event that sitework on this project will disturb 5 or more acres, Contractor shall not begin construction without "National Pollution Discharge Elimination System" (NPDES) permit governing discharge of storm water from site for entire construction period. NPDES permit requires SWPPP to be in place during construction.
C. Contractor shall be totally responsible for conducting storm water management practices in accordance with NPDES permit and for enforcement action taken or imposed by Federal or State agencies, including cost of fines, construction delays, and remedial actions resulting from Contractor's failure to comply with provisions of NPDES permit.

1.04 PROJECT CONDITIONS
A. Conditions existing at time of inspection for bidding purposes will be maintained by Owner in so far as practical.
B. Variations to conditions or discrepancy in actual conditions as they apply to site preparation operations are to be brought to attention of Owner prior to commencement of sitework.

PART 2 PRODUCTS
Off-site materials shall be transported to project using well maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 EXECUTION

3.01 PREPARATION
Verify existing plant life that is to remain and clearing limits are clearly tagged, identified, or marked in such manner as to insure their safety throughout construction operations.

3.02 PROTECTION
A. Locate and identify existing utilities that are to remain and protect from damage.
B. Protect trees, plant growth, and features designated to remain as part of final landscaping.
C. Conduct operations with minimum interference to public or private accesses and facilities. Maintain ingress and egress at all times and clean or sweep roadways daily as required by SWPPP or governing authority. Dust control shall be provided with sprinkling systems or equipment provided by Contractor.
D. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
E. Provide traffic control as required, in accordance with the U.S. Department of Transportation's "Manual on Uniform Traffic Control Devices" and applicable state highway department requirements.

3.03 CLEARING
A. Clear areas required for access to site and execution of work.
B. Unless otherwise indicated on Construction Drawings, remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction. Removal includes digging out stumps and roots. Depressions caused by clearing and grubbing operations are to be filled to subgrade elevation to avoid ponding of water. Satisfactory fill material shall be placed in accordance with Section 02200.
C. Remove grass, trees, plant life, stumps, and other construction debris from site to dump site that is suitable for handling such material according to state laws and regulations.

3.04 TOPSOIL EXCAVATION
A. Topsoil shall consist of organic surficial soil found in depth of not less than 8-inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones and other objects over 2-in. in diameter, weeds, roots, and other objectionable material.
B. Cut heavy growths of grass from areas before stripping and remove cuttings with remainder of cleared vegetative material.
C. Strip topsoil from areas that are to be filled, excavated, landscaped, or re-graded to such depth that it prevents intermingling with underlying subsoil or questionable material.
D. Stockpile topsoil in storage piles in areas shown on Construction Drawings or where directed by Owner. Construct storage piles to freely drain surface water. Cover storage piles as required to prevent windblown dust. Dispose of unsuitable topsoil as specified for waste material, unless otherwise specified by Owner. Excess topsoil shall be removed from site by Contractor unless specifically noted otherwise on Construction Drawings.

END OF SECTION 02100

SECTION 02200 EARTHWORK

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Protection, modification, or installation of utilities as sitework progresses with particular attention to grade changes and necessary staging or phasing of work.
B. Cutting, filling, and grading to required lines, dimensions, contours, and elevations for proposed improvements.
C. Scarifying, compacting, drying, and removal of unsuitable material to ensure proper preparation of areas for fills or proposed improvements.

1.02 RELATED SECTIONS
A. Section 02050 - Demolition
B. Section 02100 - Site Preparation
F. Section 02227 - Aggregate Materials
H. Section 02245 - Soil Stabilization
I. Section 02270 - Slope Protection and Erosion Control
J. Section 02900 - Landscaping
K. Geotechnical Investigation.
L. Storm Water Pollution Prevention Plan
M. Architectural Plans and Specifications as they relate specifically to earthwork beneath buildings, where architectural requirements are more stringent than civil requirements.
N. Construction Drawings

1.03 REFERENCE STANDARDS
A. American Society for Testing and Materials (ASTM) latest edition.
D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN.m/m3))
D 1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 KN.m/m3))
D 2167 Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 2487 Classification of Soils for Engineering Purposes
D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
T 88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE
A. An independent testing laboratory, selected and paid by Owner, shall be retained to perform construction testing on site based on recommendations in the Geotechnical Investigation Report.
B. If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.
C. In areas to receive pavement, California Bearing Ratio (CBR) test shall be performed for each type of material that is imported from off-site.
D. Following tests shall be performed as part of construction testing requirements on each type of on-site or imported soil material used as compacted fill.
1. Moisture and Density Relationship: ASTM D 698 (or ASTM D 1557)
2. Mechanical Analysis: AASHTO T 88
3. Plasticity Index: ASTM D 4318
E. Field density tests for in-place materials shall be performed as part of construction testing requirements according to one of following standards:
1. Sand-Cone Method: ASTM D 1556
2. Balloon Method: ASTM D 2167
3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)
F. The independent testing laboratory shall prepare test reports that indicate test location, elevation data, and test results. Owner, CEC, and Contractor shall be provided with copies of reports within 96 hours of time that test was performed. In event that test performed fails to meet Specifications, Owner and Contractor shall be notified immediately by the independent testing laboratory.
G. Costs related to retesting due to failures shall be paid for by Contractor at no additional expense to Owner. Owner reserves right to employ an independent testing laboratory and to direct testing that is deemed necessary. Contractor shall provide free access to site for testing activities.

PART 2 PRODUCTS

2.01 MATERIALS
A. Excavated and re-used material for subsoil fill as specified herein.
B. Aggregate fill as specified in Section 02227.
C. Imported fill material approved by Owner and specified in the Geotechnical Investigation Report.
E. Acceptable stabilization fabrics and geogrids as specified.
F. Filter and drainage fabrics as specified.

2.02 EQUIPMENT
Off-site materials shall be transported to project using well maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger improvements by rutting, overloading, or pumping.

PART 3 EXECUTION

THE GEOTECHNICAL INVESTIGATION REPORT IS NOTED ABOVE. THIS REPORT CONTAINS PROJECT SPECIFIC INFORMATION ON SOIL AND GROUNDWATER CONDITIONS, AND CONTAINS DESIGN SPECIFICATIONS FOR SITE PREPARATION, EARTHWORK CONSTRUCTION, BUILDING FOUNDATIONS, AND PAVEMENTS SPECIFIC TO THIS SITE DEVELOPMENT. THE CONTRACTOR SHOULD REFER TO THIS REPORT FOR DETAILED DESIGN INFORMATION CONCERNING THESE ITEMS.

3.01 PREPARATION
A. Identify required lines, levels, contours, and datum.
B. Locate and identify existing utilities that are to remain and protect from damage.
C. Notify utility companies to remove or relocate utilities that are in conflict with proposed improvements.
D. Protect plant life, lawns, fences, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed it shall be referenced by licensed land surveyor and replaced, as necessary, by same.
F. Remove from site, material encountered in grading operations that, in opinion of Owner, is unsuitable or undesirable for backfilling, subgrade, or foundation purposes. Dispose of in manner satisfactory to Owner. Backfill areas with layers of suitable material and compact as specified herein.
G. Prior to placing fill in low areas, such as previously existing creeks, ponds, or lakes, perform following procedures:
1. Drain water out by gravity with ditch having flow line lower than lowest elevation in low area. If drainage cannot be performed by gravity ditch, use adequate pump to obtain same results.
2. After drainage of low area is complete, remove muck, mud, debris, and other unsuitable material by using acceptable equipment and methods that will keep natural soils underlying low area dry and undisturbed.
3. If proposed for fill, muck, mud, and other materials removed from low areas shall be dried on-site by spreading in thin layers for observation by Owner. Material shall be inspected and, if found to be suitable for use as fill material, shall be incorporated into lowest elevation of site filling operation, but not under building subgrade or within 10'-0" of perimeter of building subgrade or paving subgrade. If, after observation by Owner, material is found to be unsuitable, unsuitable material shall be removed from site.

3.02 EXCAVATION FOR FILLING AND GRADING
A. Classification of Excavation: By submitting bid, Contractor acknowledges that site has been investigated to determine type, quantity, quality, and character of excavation work to be performed. Excavation shall be considered unclassified excavation, except as indicated Contract Documents.
B. When performing grading operations during periods of wet weather, provide adequate drainage and ground water management to control moisture of soils.
C. Shore, brace, and drain excavations as necessary to maintain excavation as safe, secure, and free of water at all times.

3.03 FILLING AND SUBGRADE PREPARATION
A. Fill areas to contours and elevations shown on Construction Drawings with unfrozen materials.
B. Place fill in accordance with the design specification contained within the Geotechnical Investigation Report.
C. Material imported from off-site shall have CBR value equal to or above pavement design subgrade CBR value indicated on Construction Drawings.

3.04 MAINTENANCE OF SUBGRADE
A. Finished subgrades shall be verified to ensure proper elevation and conditions for construction above subgrade.
B. Protect subgrade from excessive wheel loading during construction, including concrete trucks, dump trucks, and other construction equipment.
C. Remove areas of finished subgrade found to have insufficient compaction density to depth necessary and replace in manner that will comply with compaction requirements by use of material equal to or better than best subgrade material on site. Surface of subgrade after compaction shall be hard, uniform, smooth, stable, and true to grade and cross-section.

3.05 BORROW SITES
Upon completion of borrow operations, clean up borrow areas as indicated on Construction Drawings in neat and reasonable manner to satisfaction of property owner, Owner, and CEC.

3.07 FINISH GRADING
A. Grade areas where finish grade elevations or contours are indicated on Construction Drawings, other than paved areas and buildings, including excavated areas, filled and transition areas, and landscaped areas. Graded areas shall be uniform and smooth, free from rock, debris, or irregular surface changes. Finished subgrade surface shall not be more than 0.10-ft above or below established finished subgrade elevation. Ground surfaces shall vary uniformly between indicated elevations. Finish ditches shall be graded to allow for proper drainage without ponding and in manner that will minimize erosion potential. For topsoil application, refer to Section 02900.
B. Correct settled and eroded areas within 1 year after date of completion at no additional expense to Owner. Bring grades to proper elevation. Replant or replace trees, shrubs, grasses, or other vegetation that appears dead, dying, or disturbed by construction activities. Refer to Section 02270 for slope protection and erosion control.

END OF SECTION [illegible]

SECTION 02227 AGGREGATE MATERIALS

PART 1 GENERAL

1.01 SECTION INCLUDES
Aggregate materials for use as specified in other Sections.

1.02 RELATED SECTIONS
A. Section 02050 - Demolition
B. Section 02100 - Site Preparation
C. Section 02200 - Earthwork
D. Section 02245 - Soil Stabilization
E. Section 02270 - Slope Protection and Erosion Control
F. Construction Drawings

1.03 REFERENCE STANDARDS
A. American Society for Testing and Materials (ASTM) latest edition.
D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN.m/m3))
D 1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 Kn.m/m3))
D 2167 Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 2487 Classification of Soils for Engineering Purposes
D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
T 88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE
Tests and analysis of aggregate materials will be performed in accordance with ASTM and AASHTO procedures specified herein.

1.05 SUBMITTALS
A. Submit 100-lb sample of each aggregate or mixture that is to be incorporated into project in air-tight containers to the independent testing laboratory or submit gradation and certification of aggregate material that is to be incorporated into project to the independent testing laboratory for review.
B. Submit name of each material supplier and specific type and source of each material. Any change in source requires approval of Owner.

PART 2 PRODUCTS

2.01 MATERIALS
Construction and materials shall meet or exceed requirements of this section and state highway department specifications section referred to or noted on Construction Drawings which pertain to paving base course design, materials, preparation, and execution. Materials shall be as indicated on Construction Drawings and shall comply with state highway department specifications regarding source, quality, gradation, liquid limit, plasticity index, and mix proportioning.

2.02 EQUIPMENT
Off-site materials shall be transported to project using well maintained and operating vehicles. Once on site, transporting vehicles shall stay on designated haul roads and shall at no time endanger any improvements by rutting, overloading, or pumping.

PART 3 EXECUTION

3.01 STOCKPILING
Stockpile on-site at locations indicated by Owner in such manner that there will be no standing water or mixing with other materials.

3.02 BORROW SITES
Upon completion of borrow operations, clean up borrow areas as indicated on Construction Drawings in neat and reasonable manner to satisfaction of property owner and Owner.

END OF SECTION 02227

SECTION 02245 SOIL STABILIZATION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Excavation, treatment, and backfilling of subgrade for lime stabilization.
B. Excavation, treatment, and backfilling of subgrade for cement stabilization.
C. Excavation, treatment, and backfilling of subgrade for fly ash stabilization.
D. Installation of Geotextile Fabric for stabilization of subgrade.

1.02 RELATED SECTIONS
A. Section 02200 - Earthwork
B. Section 02227 - Aggregate Materials
C. Geotechnical Investigation.
D. Construction Drawings

1.03 REFERENCE STANDARDS
A. American Society for Testing Materials (ASTM) latest edition
C 150 Portland Cement
C 618 Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete
C 977 Quicklime and Hydrated Lime for Soil Stabilization
D 1633 Compressive Strength of Molded Soil-Cement Cylinders
B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
M 216 Lime for Soil Stabilization
C. National Lime Association (NLA)
Bulletin 326 Lime Stabilization Construction Manual

1.04 ENVIRONMENTAL REQUIREMENTS
Do not install mixed materials in wind in excess of 10 mph or when temperature is below 40 degrees Fahrenheit.

1.05 QUALITY ASSURANCE
Perform work in accordance with state and local standards in conjunction with requirements specified herein.

1.06 SUBMITTALS
A. Submit 100-lb sample of each material to be used at the site in air-tight containers to the independent testing laboratory or submit gradation and certification of material that is to be used to the independent testing laboratory for review.
B. Submit name of each materials supplier and specific type and source of each material. Change in source requires approval of Owner.
C. Submit mix design and materials mix ratio that will achieve specified requirements of state and local agencies for soil stabilization.

PART 2 PRODUCTS

2.01 MATERIALS
A. Hydrated Lime
B. Portland Cement
C. Fly Ash
D. Coarse Aggregate
E. Fine Aggregate
F. Subsoil: Existing to be Reused
G. Geotextile Fabric for Stabilization
1. Mirafi 500X or 600X
2. Phillips 66 Supac 6WS
3. Dupont Typar 3401 and 3601
4. Trevira S1114 and S1120
5. Tensar SS-1 and SS-2
6. Exxon GTF-200 or 350
H. Geogrid for stabilization
1. Tensar BX-1100

2.02 EQUIPMENT
Perform operations using suitable, well maintained equipment capable of excavating subsoil, mixing and placing materials, wetting, consolidating, and compacting of material.

PART 3 EXECUTION

3.01 PREPARATION
A. Obtain approval from the independent testing laboratory of mix design before proceeding with placement.
B. Do not start stabilization without weather and soil conditions being favorable for successful application of proposed material.
C. Proofroll subgrade to identify areas in need of stabilization.

3.02 EXCAVATION
A. Excavate subsoil to depth sufficient to accommodate soil stabilization.
B. Remove lumped subsoil, boulders, and rock that interfere with achieving uniform subsoil conditions.

3.03 SOIL TREATMENT AND BACKFILLING
A. Lime Stabilized Subgrade: Where indicated on Construction Drawings, treat prepared subgrade with 5 percent hydrated lime by weight in accordance with state highway department specifications. Compact to not less than 95 percent of optimum density as determined by ASTM D 698.
B. Cement Stabilized Subgrade: Where indicated on Construction Drawings, treat prepared subgrade with [illegible] percent cement in accordance with state highway department specifications. Compact to not less than 95 percent of optimum density as determined by ASTM D 698.
C. Fly Ash Stabilized Subgrade: Where indicated on Construction Drawings, treat prepared subgrade with fly ash in accordance with state highway department specifications. Compact to not less than 95 percent of optimum density as determined by ASTM D 698.
D. Maintain optimum moisture of mix materials to attain required stabilization and compaction.
E. Finish subgrade surface in accordance with Section 02200.

3.04 GEOTEXTILE FABRIC
A. Place fabric in those areas that are shown on Construction Drawings or in those areas that need additional stabilization prior to placement of base course.
B. Place fabric specified on Construction Drawings and in Specifications in accordance with manufacturer's recommendations.

END OF SECTION 02245

SECTION 02270 SLOPE PROTECTION AND EROSION CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Installation of temporary and permanent erosion control systems.
B. Installation of temporary and permanent slope protection systems.

1.02 RELATED SECTIONS
A. Section 02100 - Site Preparation
B. Section 02200 - Earthwork
C. Section 02900 - Landscaping
D. Storm Water Pollution Prevention Plan
E. Construction Drawings
F. Geotechnical Investigation.

1.03 ENVIRONMENTAL REQUIREMENTS
Protect adjacent properties and water resources from erosion and sediment damage throughout life of contract.

PART 2 PRODUCTS

2.01 MATERIALS
A. Quick growing grasses such as wheat, rye, or oats in accordance with Section 02900.
B. Hay or straw bales as specified on Construction Drawings.
C. Fencing for siltation control as specified on Construction Drawings.
D. Curlex blankets by American Excelsior Company or approved equal.
E. Bale stakes for each bale shall be minimum of 4-ft in length and shall be either 2 #2 rebars, 2 steel pickets, or 2 2-in. x 2-in. hardwood stakes driven 1'-6" into ground.
F. Temporary mulches such as loose hay, straw, netting, wood cellulose, or agricultural silage.
G. Fence stakes shall be minimum of 5-ft in length and be either metal stakes or 2-in. x 2-in. hardwood stakes driven 1'-6" into ground.
H. Rip-Rap in accordance with Section 02200.

PART 3 EXECUTION

3.01 PREPARATION
A. Review Construction Drawings and Storm Water Pollution Prevention Plan.
B. Deficiencies or changes on Construction Drawings or Storm Water Pollution Prevention Plan as it is applied to current conditions will be brought to the attention of Owner for remedial action.

3.02 EROSION CONTROL AND SLOPE PROTECTION IMPLEMENTATION
A. Place erosion control systems in accordance with Construction Drawings and Storm Water Pollution Prevention Plan.
B. Owner has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and embankment operations and to direct Contractor to provide immediate permanent or temporary pollution control measures. Contractor will be required to incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls. Cut slopes shall be permanently seeded and mulched as excavation proceeds to extent considered desirable and practical.
C. Temporary erosion control systems installed by Contractor shall be maintained as directed by Owner to control siltation during life of contract. Contractor must respond to maintenance or additional work ordered by Owner within 48 hours.
D. Additional material and work required and authorized by Owner which is beyond extent of Construction Drawings and Storm Water Pollution Prevention Plan shall be paid for by Owner.
E. Slopes that erode easily shall be temporary seeded as work progresses with wheat, rye, or oats application in accordance with Section 02900.

END OF SECTION 02270

SECTION 02505 PAVING BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Construction of granular base for asphaltic concrete and portland cement concrete paving.
B. Construction of sand/shell base for asphaltic concrete and portland cement concrete paving.
C. Construction of full depth asphalt base for asphaltic concrete paving.
D. Construction of hot-mix sand asphalt base for asphaltic concrete paving.
E. Construction of soil cement stabilized base for asphaltic concrete and portland cement concrete paving.

1.02 RELATED SECTIONS
A. Section 02100 - Site Preparation
B. Section 02200 - Earthwork
C. Section 02227 - Aggregate Materials
D. Section 02245 - Soil Stabilization
E. Section 02511 - Asphaltic Concrete Paving
F. Section 02520 - Portland Cement Concrete Paving
G. Section 02525 - Curbs and Sidewalks
H. Section 02900 - Landscaping
I. State Highway Department Standard Specifications
J. Construction Drawings
K. Geotechnical Investigation.

1.03 REFERENCES
A. American Society for Testing and Materials (ASTM) latest edition
D 698 Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN.m/m3))
D 1556 Density and Unit Weight of Soil in Place by the Sand-Cone Method
D 1557 Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3 (2,700 Kn.m/m3))
D 2167 Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D 2216 Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures
D 2487 Classification of Soils for Engineering Purposes
D 2922 Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
D 3017 Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)
D 4318 Liquid Limit, Plastic Limit, and Plasticity Index of Soils
B. American Association of State Highway and Transportation Officials (AASHTO) latest edition
T 88 Particle Size Analysis of Soils

1.04 QUALITY ASSURANCE
A. An independent testing laboratory, selected and paid by Owner, shall be retained to perform construction testing of in-place base course for compliance with requirements for thickness, compaction, density, and tolerances. Paving base course tolerances shall be verified by rod and level readings on not more than 50-ft centers to be not more than 0.05-ft above design elevation which will allow for paving thicknesses as shown on Construction Drawings. Contractor shall provide instruments and suitable benchmark.
B. Following tests shall be performed on each type of material used as base course material:
1. Moisture and Density Relationship: ASTM D 698 (or ASTM D 1557)
2. Mechanical Analysis: AASHTO T 88
3. Plasticity Index: ASTM D 4318
4. Base material thickness: Perform 1 test for each 20,000 sq. ft of in-place base material area
5. Base material compaction: Perform 1 test in each lift for each 10,000 sq. ft of in-place base material area
6. Test each source of base material for compliance with state highway department specifications.
C. Field density tests for in-place materials shall be performed in accordance with one of following standards:
1. Sand-Cone Method: ASTM D 1556
2. Balloon Method: ASTM D 2167
3. Nuclear Method: ASTM D 2922 (Method B-Direct Transmission)
D. The independent testing laboratory shall prepare reports that indicate test location, elevation data, and test results. Owner and Contractor shall be provided with copies of reports within 96 hours of time test was performed. In event that test performed fails to meet Specifications, Owner and Contractor shall be notified immediately by the independent testing laboratory.
E. Costs related to retesting due to failures shall be paid for by Contractor at no additional expense to Owner. Owner reserves right to employ an independent testing laboratory and to direct testing that is deemed necessary. Contractor shall provide free access to site for testing activities.

PART 2 PRODUCTS

2.01 FILL MATERIALS
A. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

PART 3 EXECUTION

3.01 EXAMINATION
Contractor shall verify that subgrade has been inspected, tested, and gradients and elevations are correct, dry, and properly prepared in accordance with Section 02223.

3.02 CONSTRUCTION
A. Perform base course construction in manner that will drain surface properly and prevent runoff from adjacent areas from draining onto base course construction.
B. Compact base material to not less than 95 percent of optimum density, as determined by ASTM D 1557, unless otherwise indicated on Construction Drawings.
C. Granular Base: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 8-in., measured loose.
D. Sand/Shell Base: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 4-in., measured loose.
E. Asphalt Institute Type IV Mix for Full Depth Asphalt Base: Construct to thickness indicated on Construction Drawings in lifts or layers not exceeding 3-in., measured loose.
F. Asphalt Institute Type VI, VII, or VIII Mixes for Hot-mix Sand Asphalt Bases: Construct to thickness indicated on Construction Drawings. Apply in lifts or layers not exceeding 3-in., measured loose.
G. Soil Cement Stabilized Base: Construct to thickness and strength as indicated on Construction Drawings and in accordance with state highway department specifications. If not indicated on Construction Drawings, minimum compressive strength shall be 500 p.s.i., tested at 28 days.

END OF SECTION 02505

SECTION 02511 ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Preparation and placement of asphaltic concrete binder course.
B. Preparation and placement of asphaltic concrete surface course.

1.02 RELATED SECTIONS
A. Section 02223 - Excavation, Backfill, and Compaction for Pavement
B. Section 02505 - Paving Base Course
C. Section 02520 - Portland Cement Concrete Paving
D. Section 02525 - Curbs and Sidewalks
E. Section 02584 - Pavement Markings
F. State Highway Department Standard Specifications
G. Construction Drawings

1.03 REFERENCE STANDARDS
A. The Asphalt Institute (AI) latest edition
MS 2 Mix Design Methods for Asphaltic Concrete and Other Hot Mix Types
MS 3 Asphalt Plant Manual
MS 19 Basic Asphalt Emulsion Manual
B. US Army Corp of Engineers
UN-13 Hot Mix Asphalt Paving Handbook (CE MP-ET)
C. American Society of Testing and Materials (ASTM) latest edition
D 946 Penetration - Graded Asphalt Cement for use in Pavement Construction
D 1188 Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
D 1559 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
D 2726
D. American Association of State Highway and Transportation Officials (AASHTO) latest edition
M 117 Mineral Filler "Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing"
M 140 Tack Coat "Emulsified Asphalt"
M 208 Tack Coat "Cationic Emulsified Asphalt"
M 226 Viscosity Graded Asphalt Cement
Marshall Mix Design
E. [illegible]

1.04 QUALITY ASSURANCE
A. An independent testing laboratory, selected and paid by Owner, shall be retained to perform construction testing of in-place asphaltic concrete courses for compliance with requirements for thickness, compaction, and surface smoothness. Asphaltic surface and base courses shall be randomly cored at minimum rate of 1 core per 20,000 sq. ft of paving. However, no less than 3 cores in light duty areas and 3 cores in heavy duty areas shall be obtained. Coring holes shall be immediately filled with full-depth asphaltic concrete. Asphaltic concrete pavement samples shall be tested for conformance with mix design.
B. Establish and maintain required lines and elevations.
C. In-place compacted thickness shall not be less than thickness specified on Construction Drawings. Areas of deficient paving thickness shall receive tack coat and minimum 1-in. overlay; or shall be removed and replaced to proper thickness, at discretion of Owner, until specified thickness of course is met or exceeded at no additional expense to Owner.
D. Testing shall be performed on finished surface of each asphalt concrete course for smoothness, using 10'-0" straightedge applied parallel with, and at right angles to centerline of paved area. Results of tests shall be made available to Owner upon request. Surfaces will not be acceptable if the following 10-ft straightedge tolerances for smoothness are exceeded:
Base Course Surface: 1/4-in.
Wearing Course Surface: 3/16-in.
E. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.
F. Field density test for in-place materials shall be performed by examination of field cores in accordance with one of following standards:
1. AASHTO Test Method T 245 (Percent of Laboratory Density)
a. Temperature equal to temperature of paving machine with reheating.
b. Compactive blows (35.50 or 75) equal to mix design blows
c. Minimum density = 96% of laboratory density.
2. AASHTO Test Method T 209 (Percent of Theoretical Maximum Density)
a. Minimum density = 92% of Theoretical Maximum Density.
Rate of testing shall be 1 core per 20,000 sq. ft of pavement, with minimum of 3 cores from heavy duty areas and 3 cores from light duty areas. Cores shall be cut from areas representative of project.
Areas of insufficient compaction shall be delineated, removed, and replaced in compliance with Specifications at no additional expense to Owner.

1.05 SUBMITTALS
A. Before asphaltic concrete paving is constructed, submit actual design mix to Owner for review and approval. Design mix submittal shall follow format as indicated in Asphalt Institute Manual MS-2, Marshall Stability Method; and shall include type/name of mix, gradation analysis, grade of asphalt cement used, Marshall Stability in lb, flow, effective asphalt content in percent, and direct references to state highway department specifications sections for each material. Design shall be for mixture listed in current edition of state highway department specifications. Mix designs over 3 years old will not be accepted by Owner.
B. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

1.06 PROJECT CONDITIONS
A. Weather Limitations:
1. Apply prime and tack coats when ambient temperature is above 40 degrees Fahrenheit, and when temperature has been above 35 degrees Fahrenheit for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.
2. Construct asphaltic concrete paving when atmospheric temperature is above 40 degrees Fahrenheit.
B. Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 PRODUCTS

2.01 MATERIALS
A. Provide asphalt-aggregate mixture as recommended by local or state paving authorities to suit project conditions. Use locally available materials and gradations which meet state highway department specifications and exhibit satisfactory records of previous installations.
B. Asphalt Cement: Comply with AASHTO M 226; Table 2 AC-10, AC-20, or AC-30, viscosity grade, depending on local mean annual air temperature. See chart below.

Temperature Condition	Asphalt Grades
Cold, mean annual air temperature at 45 degrees Fahrenheit or lower	AC-10 85/100 pen.
Warm, mean annual air temperature between 45 degrees Fahrenheit and 75 degrees Fahrenheit	AC-20 60/70 pen.
Hot, mean annual air temperature at 75 degrees Fahrenheit or higher	AC-30

C. Prime Coat: Medium curing cut-back asphalt or asphalt penetrating prime coat consisting of either MC-30 or SS-1h.
D. Tack Coat: Emulsified asphalt AASHTO M 140 or AASHTO M 208. SS-1h, CSS-1, or CSS-1h, diluted with 1 part water to 1 part emulsified asphalt.
E. Mineral Filler: Rock or slag dust, hydraulic cement, or other inert material complying with AASHTO M 117, if recommended by state highway department specifications.
F. Asphalt-Aggregate Mixture: Unless otherwise noted on Construction Drawings, Design Mix shall have minimum stability based on 50-blow Marshall complying with ASTM D 1559 of 1000 lb with flow between 8 and 18. The Design Mix shall be within sieve analysis and bitumen ranges specified below unless approved otherwise by Owner prior to placement.

SIEVE ANALYSIS OF MIX

Square Sieve	Total Percent Passing	Percent Tolerance
3/4"	100%	7%
1/2"	90 - 100%	5%
#4	44 - 74%	4%
#8	26 - 58%	4%
#50	5 - 21%	2%
#200	2 - 10%	0%

Percent bitumen by weight of total mix: 5.0 - 8.5 percent
Air voids: 3 - 6 percent
Aggregate voids filled with asphalt cement: 70 - 82 percent
Allowable variance of bitumen by weight of total mix = 0.4 percent

2.02 EQUIPMENT
Maintain equipment in satisfactory operating condition and correct breakdowns in manner that will not delay or be detrimental to progress of paving operations.

PART 3 EXECUTION

3.01 PREPARATION
A. Proofroll prepared base material surface to check for unstable areas. Paving work shall begin only after unsuitable areas have been corrected and are ready to receive paving.
B. Remove loose material from compacted base material surface immediately before applying prime coat.

3.02 APPLICATIONS
A. Prime Coat:
1. Apply bituminous prime coat to base material surfaces where asphaltic concrete paving will be constructed.
2. Apply bituminous prime coat in accordance with APWA Section 2204 and state highway department specifications.
3. Apply at minimum rate of 0.25 gal per sq. yd over compacted base material. Apply to penetrate and seal, but not flood surface.
4. Take necessary precautions to protect adjacent areas from overspray.
5. Cure and dry as long as necessary to attain penetration of compacted base and evaporation of volatile substances.
B. Tack Coat:
1. Apply to contact surfaces of previously constructed asphaltic concrete base courses or portland cement concrete and surfaces abutting or projecting into asphaltic concrete or into asphaltic concrete pavement.
2. Apply tack coat to asphaltic concrete base course or sand asphalt base course. Apply emulsified asphalt tack coat between each lift or layer of full depth asphaltic concrete and sand asphalt bases and on surface of bases where asphaltic concrete paving will be constructed.
3. Apply emulsified asphalt tack coat in accordance with APWA Section 2204 and state highway department specifications.
4. Apply at minimum rate of 0.05 gal per sq. yd of surface.
5. Allow to dry until at proper condition to receive paving.

3.03 ASPHALTIC CONCRETE PLACEMENT
A. Place asphaltic concrete mixture on completed compacted subgrade surface, spread, and strike off. Place mixture at following minimum temperatures:
1. Ambient temperature between 40 degrees Fahrenheit and 50 degrees Fahrenheit, mixture temp. = 285 degrees Fahrenheit
2. Ambient temperature between 50 degrees Fahrenheit and 60 degrees Fahrenheit, mixture temp. = 280 degrees Fahrenheit
3. Ambient temperature higher than 60 degrees Fahrenheit, mixture temp. = 275 degrees Fahrenheit.
B. Whenever possible, pavement shall be spread by finishing machine; however, inaccessible or irregular areas may be placed by hand methods. Hot mixture shall be spread uniformly to required depth with hot shovels and rakes. After spreading, hot mixture shall be carefully smoothed to remove segregated coarse aggregate and rake marks. Rakes and lutes used for hand spreading shall be type designed for use on asphalt mixtures. Loads shall not be dumped faster that they can be properly spread. Workers shall not stand on loose mixture while spreading.
C. Paving Machine Placement: Apply successive lifts of asphaltic concrete in transverse directions with surface course placed parallel to flow of traffic. Place in typical strips not less than 10'-0" wide.
D. Joints: Make joints between old and new pavements, or between successive days' work in manner that will provide continuous bond between adjoining work. Construction joints shall have same texture, density, and smoothness as other sections of asphaltic concrete course. Clean contact surfaces of joints and apply tack coat.

3.04 ROLLING AND COMPACTION
A. Mixture, after being spread, shall be thoroughly compacted by rolling as soon as it will bear the weight of rollers without undue displacement. Number, weight, and types of rollers, and sequences of rolling operations shall be such that required density and surface are consistently attained while mixture is in workable condition.
B. Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.
C. Breakdown Rolling: Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling and repair displaced areas by loosening and filling with hot material.
D. Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.
E. Finish Rolling: Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.
F. Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphaltic concrete. Compact by rolling to maximum surface density and smoothness.
G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

END OF SECTION 02511

SECTION 02520 PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Preparation and placement of portland cement concrete parking areas.
B. Preparation and placement of portland cement concrete roads and entrances.

1.02 RELATED SECTIONS
A. Section 02100 - Site Preparation
B. Section 02227 - Aggregate Material
C. Section 02505 - Paving Base Course
E. Section 02525 - Curbs and Sidewalks
F. Section 02584 - Pavement Markings
G. Section 03300 - Cast-In-Place Concrete (See Architectural/Building Specifications)
H. State Highway Department Standard Specifications
I. Construction Drawings

1.03 REFERENCE STANDARDS
A. American Concrete Institute (ACI) latest edition
301 Specifications for Structural Concrete for Buildings
304R Guide for Measuring, Mixing, Transporting, and Placing Concrete
308 Standard Practice for Curing Concrete
B. American Standards for Testing and Materials (ASTM) latest edition
A 185 Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
A 497 Steel Welded Wire Fabric, Deformed, for Concrete Reinforcement
A 615 Deformed and Plain Billet-Steel for Concrete Reinforcement
C 33 Concrete Aggregates
C 94 Ready-Mixed Concrete
C 150 Portland Cement
C 260 Air-Entraining Admixtures for Concrete
C 309 Liquid Membrane-Forming Compounds for Curing Concrete
C 494 Chemical Admixtures for Concrete
D 1751 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
C. FS TT-C-800 - Curing Compound, Concrete, for New and Existing Surfaces

1.04 QUALITY ASSURANCE
A. The independent testing laboratory shall randomly core pavement at minimum rate of 1 core per 10,000 sq. ft of pavement, with a minimum of 3 cores from heavy duty areas and 3 cores from light duty areas. Core shall be tested for thickness and quality of aggregate distribution. Core holes shall be patched immediately with portland cement concrete and shall be finished to provide level surface as specified herein.
B. Establish and maintain required lines and elevations.
C. Check surface areas at intervals necessary to eliminate ponding areas. Remove and replace unacceptable paving as directed by Owner.

1.05 SUBMITTALS
A. Submit materials certificate to the independent testing laboratory which is signed by materials producer and Contractor, certifying that materials comply with, or exceed, requirements specified herein.

1.06 PROJECT CONDITIONS
Maintain access for vehicular and pedestrian traffic as required for other construction activities. Utilize temporary striping, flagmen, barricades, warning signs, and warning lights as required.

PART 2 PRODUCTS

2.01 MATERIALS
A. Forms: Steel, wood, or other suitable material of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use flexible spring steel forms or laminated boards to form radius bends as required. Coat forms with nonstaining type of coating that will not discolor or deface surface of concrete.
B. Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls, unless approved by Owner.
C. Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40.
D. Concrete Materials: Comply with requirements of Section 03300 for concrete materials, admixtures, bonding materials, curing materials, and others as required.
E. Joint Fillers: Resilient premolded bituminous impregnated fiberboard units complying with ASTM D 1751 FS HH-F-341, Type II, Class A.
F. Joint Sealants: Non-priming, pourable, self-leveling polyurethane. Acceptable sealants are Sonneborn "Sonolastic Paving Joint Sealant", Sonneborn "Sonomeric CT 1 Sealant", Sonneborn "Sonomeric CT 2 Sealant", Mameco "Vulkem 245", or Woodmont Products "Chem-Caulk".

2.02 MIX DESIGN AND TESTING
A. Concrete mix design and testing shall comply with requirements of Section 03300.
B. Design mix to produce normal weight concrete consisting of Portland cement, aggregate, water-reducing admixture, air-entraining admixture, and water to produce following properties:
1. Compressive Strength: 4,000 psi, minimum at 28 days, unless otherwise indicated on Construction Drawings.
2. Slump Range: 3 to 5-in. at time of placement
3. Air Entrainment: 3 to 5 percent

PART 3 EXECUTION

3.01 PREPARATION
A. Proofroll prepared base material surface to check for unstable areas. Paving work shall begin only after unsuitable areas have been corrected and are ready to receive paving.
B. Remove loose material from compacted base material surface to produce firm, smooth surface immediately before placing concrete.

3.02 INSTALLATION
A. Form Construction
1. Set forms to required grades and lines, rigidly braced and secured.
2. Install sufficient quantity of forms to allow continuance of work and so that forms remain in place minimum of 24 hours after concrete placement.
3. Check completed formwork for grade and alignment to following tolerances:
Top of forms not more than 1/8-in. in 10'-0"
Vertical face on longitudinal axis, not more than 1/4-in. in 10'-0"
4. Clean forms after each use and coat with form release agent as often as required to ensure separation from concrete without damage.
B. Reinforcement: Locate, place, and support reinforcement in accordance with Section 03300.
C. Concrete Placement
1. Place concrete in accordance with requirements of Section 03300.
2. Do not place concrete until base material and forms have been checked for line and grade. Moisten base material if required to provide uniform dampened condition at time concrete is placed. Concrete shall not be placed around manholes or other structures until they are at required finish elevation and alignment.
3. Place concrete using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.
4. Deposit and spread concrete in continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2 hour, place construction joint.
D. Joint Construction: Construct expansion, weakened-plane control or contraction, and construction joints straight with face perpendicular to concrete surface. Construct transverse joints perpendicular to centerline, unless otherwise detailed.
1. Weakened-Plane Control or Contraction Joints: Provide joints at spacing of 15'-0" o.c. maximum each way. Construct control joints for depth equal to at least 1/4 concrete thickness, as follows:
a. Form tooled joints in fresh concrete by grooving top with recommended tool and finishing edge with jointer.
b. Form sawed joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.
2. Construction Joints: Place concrete joints at end of placements and at locations where placement operations are stopped for period of more than 1/2 hour, except where such placements terminate at expansion joints. Construct joints using standard metal keyway-section forms.
3. Expansion Joints: Locate expansion joints at maximum of 180'-0" o.c. maximum each way. Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, sidewalks, and other fixed objects.
E. Joint Fillers: Extend joint fillers full-width and depth of joint, and not less than 1/2-in. or more than 1-in. below finished surface where joint sealer is indicated. Furnish joint fillers in 1-piece lengths for full width being placed, wherever possible. Where more than 1 length is required, lace or clip joint filler sections together.
F. Joint Sealants: Joints shall be sealed with approved exterior pavement joint sealants and shall be installed in accordance with manufacturer's recommendations.

3.03 CONCRETE FINISHING
A. After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with 10'-0" straightedge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide continuous smooth finish.
B. Work edges of slabs and formed joints with edging tool, rounding edge to 1/2-in. radius. Eliminate tool marks on concrete surface. After completion of floating and troweling, when excess moisture or surface sheen has disappeared, complete surface finishing, as follows:
1. Inclined Slab Surfaces: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom, perpendicular to flow of traffic.
2. Paving: Provide coarse, nonslip finish by scoring surface with stiff-bristled broom perpendicular to flow of traffic.
C. Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point up minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner.
D. Protect and cure finished concrete paving using acceptable moist-curing methods, more particularly described in "water-curing" section of ACI 308.

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RESOURCECONSULTING
CIVIL ENGINEERING
6700 Jefferson Highway - Suite 4A
Baton Rouge, Louisiana 70806
ResourceConsulting@hotmail.com
Tel. (225) 761-9909, Fax (225) 766-6672

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