SECTION 02110 – CLEARING AND GRUBBING

PART 1 - GENERAL

DESCRIPTION:

Clearing and Grubbing shall consist of clearing the surface of the ground of the designated areas of all trees (except those designated to remain) stumps, down timber, logs, snags, brush, undergrowth, hedges, heavy growth of grass or wads, debris, rubbish of any nature, obstructions, asphalt pavement or such material which is unsuitable for use on the site for embankment material. This shall include the grubbing of stumps, roots, matted roots and the disposal from the project of all spoil material resulting from tht clearing and grubbing. Burning of any spoil material will not be allowed on the site.

This work shall also include temporary erosion control measures to control erosion and water pollution during construction.

PROTECTION:

The Work shall include the protection and preservation from injury or defacement of all vegetation and other objects designated or intended to remain, as well as, ground surfaces, drainage, etc.

Streets, roads, adjacent property and other works shall remain protected, as required by local ordinances, throughout the duration of construction.

PART 2 - PRODUCTS

The Contractor shall furnish the necessary equipment to adequately perform this work.

In all areas of construction the top six (6) inches of unused topsoil shall be stripped and stored in one location, as directed by the Owner. The topsoil will be used for the finish grading work as outlined in Section 02200.

PART 3 - EXECUTION

INSPECTION:

The Contractor shall visit the site and familiarize himself with conditions of the site.

LAYOUT

The Contractor shall layout the construction lines, clearing and grubbing lines and all other construction area limits as necessary for the completion of the Project. These lines shall be laid out and approved by the Architect before any clearing is done. Trees, shrubs and plants, and other objects to remain shall be as directed by the Architect.

CLEARING AND GRUBBING:

In areas designated to be cleared and grubbed, all stumps roots, buried logs, brush, grass, and other unsatisfactory materials shall be removed.
Tap roots and other projections over 1-1/2 inches in diameter shall be grubbed out to depth of at least 18 inches in

diameter shall be grubbed out to a depth of at least 18 inches below the finished subgrade or sloped elevation.

TREES TO REMAIN:

Unless marked for removal, living trees more than two feet outside the construction lines of the drives and parking areas are to be undisturbed and are to be protected by the Contractor during construction of this Project. Cut of scarred surfaces of trees of shrubs shall be treated with an approved asphalt base paint prepared especially for tree surgery.

Low hanging branches and unsound or unsightly branches on trees or shrubs designated to remain shall be removed as directed. All trimming shall be done by skilled workmen and in accordance with good tree surgery practices.

TREES TO BE REMOVED:

Trees more than two feet outside the construction lines and marked for removal shall be removed from the site.

BACKFILLING

Within the area where embankments are to be constructed, all depressions resulting from grubbing operations shall be backfilled with suitable excavation material and shall be compacted in accordance with the provisions of Section 02200 to natural ground elevation before embankment construction is started.

Depressions in excavation area, which are below finished subgrade elevation resulting from grubbing operations, shall be backfilled with suitable material and compacted to finished subgrade in accordance with provisions of Section 02200 during the excavation operation.

DISPOSAL AND BURNING

All unusable material shall be properly disposed of off-site. No burning on-site will be permitted. Contractor shall make necessary arrangements and pay for disposal of all material not designated to become property of Owner.

END OF SECTION 02110

COMFORT SUITES

SECTION 02140 - DEWATERING

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Dewatering consists of performing work necessary to lower and control groundwater levels and hydrostatic pressures to permit excavation and construction to be performed in dry conditions.

Control of surface and sub-surface water, ice and snow are part of dewatering requirements.

Depth of soil below subgrade elevation that is to be dewatered shall be as necessary to construct the project as indicated on the Drawings in dry conditions.

RELATED WORK:

All other Division 2 Sections.
Refer to Geotechnical Data Report dated August 17, 2000, prepared by Professional Service Industries, Inc., bound within this specification.

QUALITY ASSURANCE:

Perform dewatering employing persons that have at least 5 years experience in the field of dewatering.

Maintain adequate supervision and control to ensure that stability of excavated and constructed slopes are not adversely affected by water; erosion is controlled; flooding of excavation or damage to structures does not occur.

The construction site shall be dewatered and kept free of standing water or excessively muddy conditions as needed for proper execution of the construction work. The contractor shall furnish, install, operate and maintain all drains, sumps, pumps, casings, wellpoints, and other equipment needed to perform the dewatering as specified. Dewatering methods that cause a loss of fines from foundation areas shall not be permitted.

Removal of water from the construction site, including the borrow areas shall be accomplished in such a manner that erosion and the transmission of sediment and another pollutants are minimized.

SUBMITTALS:

The Contractor shall submit to the Architect/Engineer, in writing, his plan for dewatering a minimum of ten (10) working days before beginning the construction work for which the dewatering is required. Acceptance of this plan will not relieve the Contractor of responsibility for completing the work as specified.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

DEWATERING:

Provide an adequate system to lower and control groundwater in order to permit excavation, construction of structures, and placement of fill materials under dry conditions. Install sufficient dewatering equipment to pre-drain water bearing strata above and below bottom of structure foundations, drains, sewers, and other excavations.

All excavation of the foundation shall be done in the "dry" condition such that no free seepage is entering the excavation during excavation or backfilling operations.

Reduce hydrostatic head in water-bearing strata below structure foundations, drains, sewers and other excavations to extent that water level and piezometric levels in construction areas are below prevailing excavation surface.

Maintain piezometric water level a minimum of 2 feet below surface of excavation.

Prior to excavation below groundwater level, place system into operation to lower water levels as required and then operate it continuously 24 hours a day, 7 days a week until drains, sewers, and structures have been constructed, including placement of fill materials, and until dewatering is no longer required, as determined by the Engineer.

Dispose of water removed from excavations in a manner to avoid endangering public health, property, and portions of Work under construction or completed. Dispose of water in a manner to avoid inconvenience to others engaged in work about site. Provide sumps, sedimentation tanks, and other flow control devices as required by governing authorities. Disposal of subsurface water shall be in accordance with regulations of the jurisdiction in which the site is located.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Provide standby equipment on site, installed and available, for immediate operation as may be required to adequately maintain dewatering on a continuous basis in event any part of system becomes inadequate or fails. In event dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional expense.

END OF SECTION 02140

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division-1 Specification sections, and the Foundation Inspection report prepared by B & W Engineering Laboratories, Inc. dated July 29, 2005 apply to work of this section.

DESCRIPTION OF WORK:

Section includes earthwork as indicated on drawings, including soil correction, preparation of subgrade, and drainage fill for building slabs and foundations, backfilling, and related work.

Excavation for Mechanical/Electrical Work: Refer to Divisions 15 and 16 sections for excavation and backfill required in conjunction with underground mechanical and electrical utilities, and buried mechanical and electrical appurtenances; not work of this section.

Definition: "Excavation" consists of removal of material encountered to subgrade elevations indicated and subsequent disposal of materials removed.

RELATED WORK:

All other Division 2 Sections.

Refer to Foundation Inspection Report dated July 29, 2005, prepared by B & W Engineering Laboratories, Inc. bound within this specification.

QUALITY ASSURANCE:

1. Codes and Standards: Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.

2. Testing and Inspection Service: Owner will engage soil testing and inspection service who will provide the services of a qualified soils engineer for quality control testing during earthwork operations.

SUBMITTALS:

Test Reports-Excavating: Promptly submit following reports directly to Architect/Engineer from the testing services, with copy to Contractor:

Test reports on borrow material.
Verification of each footing subgrade.
Field density test reports.
One optimum moisture-maximum density curve for each type of soil encountered.

Results of survey activities.
Report of actual unconfined compressive strength and/or results of bearing tests of each strata tested.

JOB CONDITIONS:

Site Geotechnical Information: Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil borings. It is expressly understood that Owner will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data are made available for convenience of Contractor.

Additional test borings and other exploratory operations may be made by Contractor at no cost to Owner.

Existing Utilities: Contractor shall locate any existing underground utilities. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations.

Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

Do not interrupt existing utilities serving facilities occupied and used by Owner or others, during occupied hours, except when permitted in writing by Architect/Engineer and then only after acceptable temporary utility services have been provided.

Provide minimum of 48-hour notice to Architect/Engineer, and receive written notice to proceed before interrupting any utility.

Use of Explosives: The use of explosives is not permitted.

Protection of Persons and Property: Barricade open excavations occurring as part of this work and post with approved warning lights. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

PART 2 - PRODUCTS

SOIL MATERIALS:

Provide and reuse satisfactory soil materials complying with ASTM D2487 soil classification groups GW, GP, SW and SP.

Unsatisfactory soil materials are defined as those complying with ASTM D2487 soil classification groups ML, MH, CH, OL, OH, PT, GC, SC, and CL.

Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, crushed slag, natural or crushed sand.

Drainage Fill: Washed, evenly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100% passing a 1/2" sieve, 15% passing a No. 20 sieve, and not more than 2% passing a No. 100 sieve.

Sediment Drainage Fabric: Non-biodegradable, sunlight stabilized, woven polypropylene fabric, type which will retain sediment and reduce water runoff velocity. Provide Mirafi 100X or Propex 1325 by Amoco or approved equal.

Backfill and Fill Materials: Satisfactory soil materials free of clay, rock or gravel larger than 2" in any dimension, debris, waste, frozen materials, vegetable and other deleterious matter. Provide evenly graded, clean granular soil materials with not more than 10% passing No. 200 sieve.

PART 3 - EXECUTION

EXCAVATION:

Excavation for structures: Conform to the Soils Engineer's report and to elevations and dimensions shown within a tolerance of +/- 0.10', and extending a sufficient distance from footings and foundations to permit placing and removal of concrete formwork, installation of services, other construction, and for observation.

Excavation for engineered fill shall be laterally oversized for the planned outside edge of the foundation a distance forward to fill required beneath the foundation at that location to receive a 1:1 oversize.

In excavating for footings and foundations, take care not to disturb bottom of excavation. Excavate by hand to final grade just before concrete reinforcement is placed. Trim bottoms to required lines and grades to leave solid base to receive other work.

Under footings, foundation bases, retaining walls and all sewer piping and accessories, fill unauthorized excavation by extending indicated bottom elevation of footing or base to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position, when acceptable to Architect/Engineer.

The building shall be supported on engineered fill. Prior to commencing placement of engineered fill, excavate from the building area all existing soils as described in the soils report to elevation 805.00'.

Excavation for engineered fill shall be laterally oversized starting from the face of the building or canopy and extending outward a minimum distance of 8 feet.

Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown.

Elsewhere, backfill and compact unauthorized excavations as specified for authorized excavations of same classification, unless otherwise directed by Project Geotechnical Engineer.

If unsuitable bearing materials are encountered at required subgrade elevations, carry excavations deeper and replace excavated material as directed by Project Geotechnical Engineer.

Stability of Excavations: Slope sides of excavations to comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.

Maintain sides and slopes of excavations in safe condition until completion of backfilling.

Dewatering: Prevent surface water and subsurface or ground water from flowing into excavations and from flooding project site and surrounding area.

Dewatering: Refer to Section 02140 and Foundation Inspection report.

Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations. Provide and maintain

pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

Unless otherwise shown, backfill trenches with concrete where trench excavations pass within 18" of column or wall footings and which are carried below bottom of such footings, or which pass under wall footings. Place concrete to level of bottom of adjacent footing.

Concrete is specified in Division 3.

Do not backfill trenches until tests and inspections have been made and backfilling authorized by Project Geotechnical Engineer. Use care in backfilling to avoid damage or displacement of pipe systems.

For piping or conduit less than 2'-6" below surface of roadways, provide 4" thick concrete base slab support. After installation and testing of piping or conduit, provide minimum 4" thick encasement (sides and top) of concrete prior to backfilling or placement of roadway or parking lot driving lane subbase.

Cold Weather Protection: Protect excavation bottoms against freezing when atmospheric temperature is less than 35° F (1° C).

COMPACTION:

General: Control soil compaction during construction providing minimum percentage of density specified in the Soils Report and for each area classification indicated below.

Percentage of Maximum Density Requirements: Compact soil to not less than the following percentages of maximum density of soils which exhibit a well-defined moisture density relationship (cohesive soils) determined in accordance with ASTM D 1557; and not less than the following percentages of relative density, determined in accordance with ASTM D 2049, for soils which will not exhibit a well-defined moisture-density relationship (cohesionless soils).

Structures, Building Slabs and Steps, Pavements: Compact the bottom of the excavation, and all fill, with a Vibratory Compactor in 6" to 12" lifts, in the presence of the soils engineer. Compact to at least 98% of Modified Proctor density (ASTM D 698-78) as outlined in the soils report (page 9).

Landscaped or Unpaved Areas: Compact top 6" of subgrade and each layer of backfill or fill material at 85% maximum density for cohesive materials and 90% relative density for cohesionless soils.

Piping, manholes, catch basins: Compact top 6" of subgrade at 95% maximum density.

Walkways: Compact top 6" of subgrade and each layer of backfill or fill material at 90% maximum density for cohesive material or 95% maximum density for cohesionless material.

Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material. Apply water in manner to prevent free water appearing on surface during or subsequent to compaction operations. Fill that is placed wet shall consist of less than 5% passing #200 sieve, and no more than 40% passing #40 sieve. Refer to soil report.

Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value.

BACKFILL AND FILL:

General: Place acceptable soil material in layers to required subgrade elevations, for each area classification listed below.

In excavations and landscaped areas, use satisfactory excavated or borrow material. Do not use frozen materials. Prevent bottoms of excavations from freezing during backfill operations.

Under walks, steps and pavements, use subbase material, or satisfactory excavated or borrow material, or combination of both.

Under interior building slabs, use granular material with sufficient binder that has been approved by the Geotechnical Engineer.

Under piping and conduit, use subbase material where subbase is indicated under piping or conduit; shape to fit bottom 90° of cylinder.

Ground Surface Preparation: Remove vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Remove topsoil of horticultural value from areas to be covered by new construction, paving, or that will be excavated or regraded. Plow, strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

When existing ground surface has a density less than that specified under "Compaction" for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of maximum density.

Placement and Compaction: Place backfill and fill materials in layers not more than 12" in loose depth for material compacted by heavy compaction equipment, and not more than 8" in loose depth for material compacted by hand-operated tampers. Place structural fill material as recommended in the soil report: page 10.

Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Compact each layer to required percentage of maximum dry density or relative dry density for each area classification. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

Place backfill and fill materials evenly adjacent to structures, piping or conduit to required elevations. Take care to prevent wedging action of backfill against structures or displacement of piping or conduit by carrying material uniformly around structure, piping or conduit to approximately same elevation in each lift.

GRADING:

General: Uniformly grade areas within limits of grading under this section, including adjacent transition areas. Smooth finished surface within specified tolerances, compact with uniform levels or slopes between points where elevations are indicated, or between such points and existing grades.

Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding.

Finish surfaces free from irregular surface changes, and as follows:

Landscape or Unpaved Areas: Finish areas to receive topsoil to within not more than 0.10' above or below required subgrade elevations.

Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 0.10' above or below required subgrade elevation.

Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2" above or below required subgrade elevation.

Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2" when tested with a 10' straightedge.

Compaction: After grading, compact subgrade surfaces to the depth and indicated percentage of maximum or relative density for each area classification.

PAVEMENT SUBBASE COURSE:

General: Subbase course consists of placing subbase material, in layers of specified thickness, over subgrade surface to support a pavement base course.

See other Division 2 sections for paving specifications.

Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12" width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross- section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

When a compacted subbase course is shown to be 6" thick or less, place material in a single layer. When shown to be more than 6" thick, place material in equal layers, except no single layer more than 6" or less than 3" in thickness when compacted.

BUILDING SLAB DRAINAGE COURSE:

General: Drainage course consists of placement of drainage fill material, in layers of indicated thickness, over subgrade surface to support concrete building slabs.

Sediment Barriers: Install at all locations where flows from construction areas including entire perimeter of construction area where ground slopes outward at all drainage structure inlets.

FIELD QUALITY CONTROL:

Quality Control Testing During Construction: Allow testing service to inspect and approve subgrades and fill layers before further construction work is performed. Owner shall pay for initial testing.

Perform field density tests in accordance with ASTM D 1556 (sand cone method) or ASTM D 2167 (rubber balloon method), as applicable.

Engineered fill for building structure: After completing subcut excavation and before proceeding with fill placement, Geotechnical Engineer shall approve bottom of excavation, making tests as required. Placement of engineered fill shall be tested at 2'-0" intervals for each 250 sq. ft.

Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect/Engineer.

Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2000 sq. ft. of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2000 sq. ft. of overlaying building slab or paved area, but in no case less than 3 tests.

Foundation Wall Backfill: Take at least 1 field density test for each 250 yards of backfill, at locations and elevations determined by Geotechnical Engineer.

If in opinion of Architect/Engineer, based on testing service reports and inspection, subgrade or fills which have been placed are below specified density, provide additional compaction and testing at no additional expense, until satisfactory. Contractor shall immediately correct any fill material not complying with the specification.

MAINTENANCE:

Protection of Graded Areas: Protect newly graded areas from traffic and erosion. Keep free of trash and debris. Repair and re-establish grades in settled, eroded, and rutted areas to within specified tolerances.

Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, re-shape, and compact to required density and moisture content prior to further construction.

Settling: Where settling is measurable or observable at excavated areas during general project warranty period, remove surface (pavement, lawn or other finish), add backfill material, compact, and replace surface treatment. Restore appearance, quality, and condition of surface or finish to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

END OF SECTION 02200

SECTION 02281 – TERMITE CONTROL

PART 1 - GENERAL

DESCRIPTION:

Provide termite control by means of chemical barriers at all underslab areas and at external and internal foundations of building structures.

SUBMITTALS:

Submit copies of technical data on the materials and applications to be employed in accordance with Section 01340.

GUARANTEE:

The Contractor shall furnish a five-year written guarantee stating that any additional treatment of areas where termites may appear and the correction of any damages caused by termite appearance shall be borne by him, at no cost to the Owner.

In addition, provide the Owner an annually renewable Termite Inspection Control Contract (to be accepted at the Owner's option), effective five years from date of original soil treatment, to asure necessary retreatment and liability for termite damage.

PART 2 - PRODUCTS

MATERIALS:

Dursban in water emulsion. Other chemicals acceptable as approved by the local, state and federal governing authorities.

Mix in accordance with manufacturer's printed instructions.

PART 3 - EXECUTION

APPLICATION:

Agitate solution thoroughly and periodically to maintain uniform strength and apply as follows:

1. Two gallons per five (5) lineal feet along inside perimeter of foundation walls to one (1) foot below grade, and over backfill at the sane rate.
2. One gallon per ten (10) lineal feet along inside ground floor area if application is over earth fill. Apply at a rate of 1-1/2 gallons per 10 square feet if application is over gravel fill.
3. Two gallons per ten (10) lineal feet applied along outside perimeter of foundation walls to one (1) foot below grade, and end over backfill at the same rate.

If, after the soil treatment and prior to the placement of the concrete slabs bearing on the soil, measurable rain in excess of .2 of an inch falls on the treated soil, the process shall be repeated as outlined above. The Contractor is advised to consult the local weather bureau prior to application.

END OF SECTION 01045

SECTION 02513 - ASPHALT CONCRETE PAVING

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

DESCRIPTION OF WORK:

Extent of asphalt concrete paving work will be shown on drawings.

Prepared aggregate subbase is specified in earthwork sections.

SUBMITTALS:

Material Certificates: Provide copies of materials certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

QUALITY ASSURANCE:

Codes and Standards: Comply with State highway or Transportation Department (DOT) standard specifications, latest edition, and with local governing regulations if more stringent than herein specified.

The Owner reserves the right to make corings of the bituminous paving to establish the depth of the paving layers. Depths indicated are minimum; if Owner's corings indicates undersizing, Owner may order additional corings at Contractor's expense to confirm findings. Fill all boring holes with bituminous material and conpact to match surrounding surface.

SITE CONDITIONS:

Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 deg.F (10 deg.C), and when temperature has not been below 35 deg.F (1 deg.C) for 12 hours immediately prior to application. Do not apply when base is wet or contains an excess of moisture.

Construct asphalt concrete surface course when atmospheric temperature is above 40 deg.F (4 deg.C), and when base is dry. Base course may be placed when air temperature is above 30 deg. F (-1 deg.C) and rising.

Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

MATERIALS:

General: Use locally available materials and gradations which exhibit a satisfactory record of previous installations.

Base Course Aggregate: Sound, angular crushed stone, crushed gravel, or crushed slag, sand, stone or slag screenings.

Surface Course Aggregate: Crushed stone, crushed gravel, crushed slag, and sharp-edged natural sand.

Asphalt Cement: AASHTO M 226 (ASTM D 3381) for viscosity-graded material and AASHTO M 20 (ASTM D 946) for penetration-graded material.

Tack Coat: Emulsified asphalt, AASHTO M 140 (ASTM D 997) or M 208 (D 2397); SS-1, SS-1h, CSS-1 or CSS-1h, diluted with one part water to one part emulsified asphalt.

Lane Marking Paint: Chlorinated rubber-alkyd type, AASHTO M 248 (FS TT-P-115), Type III.

Wheel Stops: Precast of 3,500 psi air-entrained concrete, approximately 6" high, 9" wide, and 7'0" long, with chamfered corners and drainage slots on underside.

ASPHALT-AGGREGATE MIXTURE:

Provide plant-mixed, hot-laid asphalt-aggregate mixture complying with State Department of Transportation Standard Specifications for base course and wear course, and as recommended by local paving authorities to suit project conditions.

PART 3 - EXECUTION

SURFACE PREPARATION:

Remove loose material from compacted subbase surface immediately before beginning paving operations.

Notify Contractor in writing of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

Fine Grading: Grade in strict accordance with DOT Specification for indicated type of construction. Subgrade shall be final graded, trimmed and finished within the limits and as required by elevations shown on Drawings. Do not move or loosen materials beyond limits of paving. Material for spot subgrade reinforcment shall comply with DOT specifications.

Granular base shall be minimum 6" thick 100% crushed DOT Specified material.

Tack Coat: Apply to contact surfaces of previously constructed asphalt paving in accordance with referenced standards.

Allow to dry until at proper condition to receive paving.

Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean

damaged surfaces.

Bituminous base course shall be minimum 1-1/2" thick Dot Spec 100L with minimum 4.7% oil content by the job mix formula.

Bituminous wear course shall be minimum 1-1/2" thick Dot Spec 1100T with a minimum 5.7% oil content by the job mix formula.

PLACING MIX:

General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum temperature of 225 deg.F (107 deg.C). Place inaccessible and small areas by hand. Place each course to required grade, cross-section, and compacted thickness.

Paver Placing: Place in strips not less than 10' wide, unless otherwise acceptable to Architect. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for a section before placing surface course.

Joints: Make joints between old and new pavements or between successive days' work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

ROLLING:

General: Begin rolling when mixture will bear roller weight without excessive displacement.

Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

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, if required, with hot material.

Second Rolling: Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

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.

Patching: Remove and replace paving areas mixed with foreign materials and defective areas. Cut-out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

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.

TRAFFIC AND LANE MARKINGS:

Cleaning: Sweep and clean surface to eliminate loose material and dust.

Striping: Use chlorinated-rubber base traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding.

Color: White.

Do not apply traffic and lane marking paint until layout and placement has been verified with Architect.

Apply paint with mechanical equipment to produce uniform straight edges. Apply in 2 coats at manufacturer's recommended rates.

FIELD QUALITY CONTROL:

General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove and replace unacceptable paving as directed by Architect.

Thickness: In-place compacted thickness will not be acceptable if exceeding following allowable variation from required thickness:

Base Course: 1/2", plus or minus.

Surface Course: 1/4", plus or minus.

Surface Smoothness: Test finished surface of each asphalt concrete course for smoothness, using 10' straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding the following tolerances for smoothness.

Base Course Surface: 1/4".

Wearing Course Surface: 3/16".

Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template, 1/4".

Check surface areas at intervals as directed by Architect.

END OF SECTION 02513

SECTION 02514 - PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work specified in this section.

DESCRIPTION OF WORK:

Extent of portland cement concrete paving will be shown on drawings, including curbs, gutters, and sidewalks.

Prepared subbase is specified in "Earthwork" section.

Concrete and related materials are specified in Division 3.

QUALITY ASSURANCE:

Codes and Standards: Comply with State Department of Transportation (DOT) Standard Specifications. Comply with local governing regulations if more stringent than herein specified.

SUBMITTALS:

Furnish samples, manufacturer's product data, test reports, and materials certifications as required in referenced sections for concrete and joint fillers and sealers.

JOB CONDITIONS:

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

Utilize flagmen, barricades, warning signs and warning lights as required.

Examine areas of subbase and report deficiencies to Owner in writing before commencing work.

PART 2 - PRODUCTS

MATERIALS:

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 a non-staining form release agent that will not discolor or deface surface of concrete.

Welded Wire Mesh: Welded plain cold-drawn steel wire fabric, ASTM A 185.

Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.

Reinforcing Bars: Deformed steel bars, ASTM A 615, Grade 40.

Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 40. Cut bars true to length with ends square and free of burrs.

Metal Expansion Caps: Furnish for one end of each dowel bar in expansion joints. Design caps with one end closed and a minimum length of 3" to allow bar movement of not less than 1", unless otherwise indicated.

Concrete Materials: Comply with requirements of applicable Division-3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.

Expansion Joint Materials: Comply with requirements of applicable Division-7 sections for preformed expansion joint fillers and sealers.

Liquid-Membrane Forming Curing Compound: Complying with ASTM C 309, Type 2, Class A unless other type acceptable to Architect. Moisture loss not more than 0.55 gr./sq. cm. when applied at 200 sq. ft./gal.

Products: Subject to compliance with requirements, provide one of the following:

"Masterseal"; Master Builders.
"Ecocure"; Euclid Chemical Co.
"Kure-N-Seal"; Sonneborn-Contech.
"L&M Cure"; L & M Construction Chemicals.

CONCRETE MIX, DESIGN AND TESTING:

Comply with requirements of applicable Division 3 sections for concrete mix design, sampling and testing, and quality control, and as herein specified.

Design mix to produce standard-weight concrete consisting of portland cement, aggregate, air-entraining admixture and water to produce the following properties:

Compressive Strength: 4000 psi, minimum at 28 days, unless otherwise indicated.

Slump Range: 3".

Air Content: 5% to 8%.

PART 3 - EXECUTION

SURFACE PREPARATION:

Remove loose material from compacted subbase surface immediately before placing concrete.

Proof-roll prepared subbase surface to check for unstable areas and need for additional compaction. Thoroughly wet subgrade and then compact with two passes of a 500 pound roller. Material yielding more than 1/2" shall be removed to a depth of 4", replaced with suitable material, and compacted. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

FORM CONSTRUCTION:

Set forms to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

Check completed formwork for grade and alignment to following tolerances:

Top of forms not more than 1/8" in 10'.

Vertical face on longitudinal axis, not more than 1/4" in 10'.

Clean forms after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

REINFORCEMENT:

Locate, place and support reinforcement as specified in Division- 3 sections, unless otherwise indicated.

CONCRETE PLACEMENT:

General: Comply with requirements of Division-3 sections for mixing and placing concrete, and as herein specified.

Do not place concrete until subbase and forms have been checked for line and grade. Moisten subbase if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

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. Use only square- faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surface.

Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.

When adjacent concrete work is placed in separate pours, do not operate equipment on concrete until pavement has attained sufficient strength to carry loads without injury.

Curbs and Gutters: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed

minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

JOINTS:

General: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated.

When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

Weakened-Plane (Contraction) Joints : Provide weakened-plane (contraction) joints, sectioning concrete into areas as shown on drawings. Construct weakened-plane joints for a depth equal to at least 1/4 concrete thickness, as follows (at contractor's option):

Tooled Joints: Form weakened-plane joints in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

Inserts: Use embedded strips of metal or sealed wood to form weakened-plane joints. Set strips into plastic concrete and carefully remove strips after concrete has hardened.

Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such pours terminate at expansion joints.

Construct joints as shown or, if not shown, use standard metal keyway-section forms.

Where load transfer-slip dowel devices are used, install so that one end of each dowel bar is free to move.

Expansion Joints: Provide premolded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated.

Locate expansion joints at 20' o.c. unless otherwise indicated.

Extend joint fillers full-width and depth of joint, and not less than 1/2" or more than 1" below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.

Furnish joint fillers in one-piece lengths for full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together.

Protect top edge of joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.

Fillers and Sealants: Comply with the requirements of applicable Division-7 sections for preparation of joints, materials, installation, and performance.

CONCRETE FINISHING:

After striking-off and consolidating concrete, smooth surface by screeding and floating. Use hand methods only

where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

After floating, test surface for trueness with a 10' straightedge. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 1/2" radius, unless otherwise indicated. 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:

Broom finish, by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Architect.

On inclined slab surfaces, provide a coarse, non-slip finish by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

Do not remove forms for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

CURING:

Protect and cure finished concrete paving, complying with applicable requirements of Division-3 sections. Use membrane- forming curing and sealing compound or approved moist-curing methods.

REPAIRS AND PROTECTIONS:

Repair or replace broken or defective concrete, as directed by Architect.

Drill test cores where directed by Architect, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to pavement with epoxy adhesive.

Protect concrete from damage until acceptance of work. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

Sweep concrete pavement and wash free of stains, discolorations, dirt and other foreign material just prior to final inspection.

END OF SECTION 02514