

SECTION 31 25 13 - EROSION CONTROL (cont.)

3.2 PROTECTION METHODS

A. General: Surface drainage from cuts, fills, topsoil or other material stockpiles, within the construction limits, whether or not completed, and from borrow and waste disposal areas, shall, if turbidity-producing materials are present, be held in sedimentation ponds or shall be graded to control erosion. Temporary erosion and sediment control measures including but not limited to berms, drains, or ditches, are required to meet these standards and shall be provided and maintained until permanent drainage and erosion control facilities are completed and operating. The area of bare soil exposed by construction operations at any one time should be held to a minimum.

B. Grading Operations:

- Grading operations shall be scheduled so excavated materials shall be immediately placed into compacted embankments.
- Where steep slopes or abrupt changes in grade are required, a division channel or berm shall be constructed at the top of the slope to cause the surface water to flow along the division into controlled slope drains. The contractor shall reference the approved Storm Water Pollution Prevention Plan (SWPPP) for erosion control means and methods.

C. Grassing and Mulching:

- Earth areas outside of building, walks and paving that are not to be immediately planted with permanent grass or landscaping shall be seeded with a temporary seed that will produce a fast growing cover resistant to erosion as required per the City of O'Fallon's Model Best Management Practices (BMP) for Land Disturbance.
- Mulch shall be applied to slopes in excess of one foot vertical to ten feet horizontal unless otherwise shown.
- Temporary grassing and mulching shall conform to the City of O'Fallon's Model Best Management Practices (BMP) for Land Disturbance.

D. Silt Barriers:

- Silt barriers shall be constructed across all swales and ditches immediately upstream from each culvert entrance using wire fencing or stone check dams. Barriers shall be per the City of O'Fallon's Model Best Management Practices (BMP) for Land Disturbance.
- Sediment accumulated behind silt barriers is to be removed when the ponding capacity is reduced by one-half and immediately prior to acceptance of project.

E. Inlet Barriers:

- Silt fence shall be installed around perimeter at each inlet where inlets are near to work performed as part of the project. Silt deposits shall be periodically removed during construction and immediately prior to final acceptance.

F. Silt Fences:

- Silt fences shall be constructed at the toe of embankment or perimeter of all disturbed earth areas and shall be located to interrupt silt transport conveyed by overland surface drainage runoff from the disturbed areas.
- Sediment accumulated behind silt fences shall be removed, redistributed and compacted immediately prior to beginning temporary grassing.

G. Dust Control:

- The Contractor shall maintain all excavations, embankments, stockpiles, haul roads, temporary access roads, plant sites, waste areas, borrow areas and all other work areas within or without the project boundaries free from dust and to minimize offsite transport of soil by wheels which cause a hazard or nuisance to others.
- Temporary or permanent graded access drives from adjacent paved public or private roads or rights-of-way shall be temporarily surfaced per the City of O'Fallon's Model Best Management Practices (BMP) for Land Disturbance. Maintain throughout construction period. Sprinkle regularly to settle accumulated soil.
- Approved temporary methods of stabilization of all areas other than the construction entrance shall consist of sprinkling, light bituminous treatment, light bituminous surface surfacing or similar methods to control dust. Sprinkling to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times. Contractor must have sufficient competent equipment on the job at all times if sprinkling is used.
- Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

END OF SECTION 31 25 13

SECTION 32 12 16 - HOT-MIX ASPHALT PAVING

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

- Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.
- Related Work Specified Elsewhere
 - General Excavation and Rough Grading - See Section 02200.
 - Drainage Structures and Underdrains - See Section 02270.
 - Concrete Paving and Curbs - See Section 02520.
- Specified Elsewhere but Furnished and Installed
 - Painting - See Section 09900.

1.2 DESCRIPTION OF WORK:

- Extent of asphalt concrete paving work is shown on Drawings.
- Prepared aggregate sub-base is specified in earthwork sections.
- Saw-cutting of edge of existing pavement is specified in site preparation section.
- Furnish and install all material and equipment necessary to complete all paving and related work as shown and/or specified herein.

1.3 SUBMITTALS:

- Material Certificates: Provide copies of material certificates signed by material producer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.
- Shop Drawings: Layout of pavement markings.
- Product Data
 - Submit manufacturer's literature for sealer, striping paint, and soil stabilizer, and soil separator.
- Test Reports
 - Submit reports to Architect for all tests as herein specified, to include subgrade surfaces, foundation course, surface material and compaction operations.

1.4 QUALITY ASSURANCE:

- Codes and Standards: Comply with State highway or transportation department standard specifications, latest edition, and with local governing regulations if more stringent than herein specified.
- Provide material furnished by a bulk asphaltic concrete producer regularly engaged in the production of hot-mix, hot-laid asphaltic concrete paving materials.
- Construct street and access driveway curb cuts and entrance apron paving in accordance with local requirements.

1.5 DELIVERY, STORAGE AND HANDLING:

- Deliver manufactured products in manufacturer's original unopened and undamaged containers with labels intact and legible.
- Store and handle manufactured products to prevent damage and deterioration.

1.6 SITE CONDITIONS:

- Weather Limitations: Apply prime and tack coats when ambient temperature is above 50 degrees F (10 degrees C) and when temperature has not been below 35 degrees F (1 degree 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 degrees F (4 degrees C) and when base is dry. Base course may be placed when air temperature is above 30 degrees F (-1 degree C) and rising.
- Grade Control: Establish and maintain required lines and elevations, including crown, inverted crown, and cross-slopes, for each course during paving operations.
- Provide temporary barricades and warning lights as required for protection of project work and public safety.
- Protect adjacent work from damage, soiling and staining during paving operations.

1.7 EQUIPMENT:

- Paving Equipment: Spreading, self-propelled asphalt paving machines capable of maintaining line, grade and thickness shown.
- Compacting equipment: Self-propelled rollers, minimum 10 ton weight.
- Hand tools: Rakes, shovels, tampers, and other miscellaneous equipment required to complete the work.
- Pavement marking equipment: Provide spray machines specifically designed for pavement marking.

1.8 COOPERATION:

- Examine Drawings and Specifications for all Contracts, to determine nature of proposed construction. Perform work to conform with construction called for in such a manner as not to interfere or delay work of other Contractors.

PART 2 PRODUCTS

2.1 MATERIALS:

- General: Use locally available, State Department of Transportation or County approved materials and gradations which exhibit a satisfactory record of previous installations.

2.2 BITUMINOUS CONCRETE (ASPHALT) PAVEMENT:

- Foundation Course
 - Type "X" crushed limestone with gradation as described in Section 1007 of the "Missouri Standard Specifications for Highway Construction."
- Asphalt Top Course
 - BP-1 Surface Mix material produced and placed in accordance with Section 401 of the "Missouri Standard Specifications for Highway Construction (latest edition)."
- Asphalt Base Course
 - Bit-Base Mix material produced and placed in accordance with Section 401 of the "Missouri Standard Specifications for Highway Construction (latest edition)."
- Pavement Sealer
 - Sealer: Jenite J-16 asphalt surface treatment by Maintenance, Inc., Koppers Pavement Sealer by Koppers Inc., or Playtime Pavement Sealer by Playtime U.S.A., Spec-Seal by Northeast Sealcoat Co., or approved equal.
 - Sand: Clean, hard, and durable, free from clay, silt and organic matter, well graded within the following limits: 100 percent passing #10 sieve, 80 to 100 percent passing #20 sieve, 50 to 90 percent passing #30 sieve, 20 to 60 percent passing #50 sieve, 0 to 5 percent passing #100 sieve.

- Asphalt Cement: AASHTO M 226 (ASTM D 3381) for viscosity-graded material and AASHTO M 20 (ASTM D 846) for penetration-graded material.
- Prime Coat: Cut-back asphalt type: AASHTO M 82 (ASTM D-2027) MC-30, MC-70 or MC-250.
- Tack Coat: Emulsified asphalt; AASHTO M 140 (ASTM D 977) or M 208 (D 2397); SS-1, SS-1h, CSS-1 or CSS-1h, diluted with one part water to one part emulsified asphalt.

2.3 PAVEMENT MARKING PAINT:

- Point shall be factory-mixed, quick-drying, non-bleeding paint specifically formulated for marking asphaltic concrete surfaces.
- Acceptable Manufacturers: Traffic Marking paint by Sherwin Williams; Traffic Paint by Pratt and Lambert, Inc.; Hi-Hide Plexicolor Line Paint by California Products Corporation, or approved equal.
- Color: White/yellow.
- Glass Beads: Conform to AASHTO M424.

2.4 CONSTRUCTION ROAD(S) AND PARKING LOT(S):

- Where indicated, construction road(s) and/or parking lot(s) are to become permanent road(s) and/or parking lot(s).

- Foundation Course
- Type "B" crushed limestone with gradation as described in Section 1007 of the "Missouri Standard Specifications for Highway Construction."

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION:

- Remove loose material from compacted sub-base surface immediately before applying herbicide treatment or prime coat.
- Proof roll prepared sub-base surface to check for unstable areas and areas requiring additional compaction.
- Proof Rolling in Cut Sections - Immediately prior to final trimming of the subgrade surface and placement of sub-base materials in cut sections, all areas of the subgrade surface within roadway and parking areas shall be proof rolled. The contractor shall reference the approved Storm Water Pollution Prevention Plan (SWPPP) for erosion control means and methods.
- Purpose: In cut sections, the purpose of proof rolling is to determine the location and extent of areas below the subgrade surface that require corrective undercutting and are not so specified in the contract plans.
- Equipment: Proof roller shall be loaded to achieve a single stress level in operation, using a gross ballasted weight of 30 tons and all tires inflated to 40 psi.
- Procedure: Two complete passes shall be applied over all elements of the area to be proof rolled. Where a portion of the cut subgrade surface falls to a satisfactory support for the proof rolling operation, the Architect may order corrective undercut and backfill work performed. Backfill of undercuts as ordered by the Architect shall meet the requirements of the foundation course as specified in this work, and be compacted to 95 percent of standard Proctor (ASTM D 698) maximum dry density. Where natural soil below this course will not support the weight of the construction equipment, and when ordered by the Architect, the course shall be placed in one lift.
- Exceptions: Proof rolling of the subgrade surface in cut sections will not be required in any area where the subgrade surface is in a rock cut, or where undercut and backfill has been previously performed unless required by the geotechnical engineer. The Architect may order undercutting and backfill work proof rolling of any cut where the need for corrective work is obvious without actual proof rolling.
- Notify Contractor of unsatisfactory conditions. Do not begin paving work until deficient sub-base areas have been corrected and are ready to receive paving.
- Prime Coat: Apply at rate of 0.20 to 0.30 gal. per sq. yd., over compacted subgrade. Apply material to penetrate and seal, but not flood, surface. Cure and dry as long as necessary to attain penetration and evaporation of volatiles.
- Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into asphalt concrete pavement. Distribute at rate of 0.05 to 0.15 gal. per sq. yd.
- All to dry out at proper condition to receive paving.
- Exercise care in applying bituminous materials to avoid smearing of adjoining concrete surfaces. Remove and clean damaged surfaces.

3.2 PLACING FOUNDATION:

- Bituminous Concrete (Asphalt) Paving
 - Foundation Course
 - Place on dry subgrade in lifts from minimum 6" to maximum 12". Remove all subgrade material churned or mixed with foundation course and replace as necessary at Contractor's expense.
 - Grades for foundation course shall be $\pm .25'$ of required grades.
 - Remove loose and foreign material from compacted foundation course immediately before application of surface materials.

3.3 PLACING MIX:

- General: Place asphalt concrete mixture on prepared surface, spread and strike-off. Spread mixture at minimum depth 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.
 - Comply with Asphalt Institute (AI) MS-3 Asphalt Plant Manual for material storage, control and mixing, and for plant equipment and operation.
- Transport asphaltic concrete mixtures from the mixing plant to the project site in trucks with tight, clean compartments.
- Power Paving: Place in strips not less than 10' wide, unless otherwise acceptable to Architect. After first strip is placed and rolled, place succeeding strips and extend rollers 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 paving operation. Construct joints to have same texture, density and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

3.4 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 roller marks are shown 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.
 - After placement and compaction of binder course, binder shall be proof-rolled in presence of air unless it is impractical to determine that no displacement or deflection occurs.
 - Top course compaction shall be minimum 98 percent of laboratory specimen density.
 - Form or cut all pavement edges to clean, sharp lines of dimensions, alignment, or radius indicated.
- 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 segregation of volatiles.
- 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.
- Pavement Sealer
 - Preparation work - Asphalt surface must be cured as per pavement sealer manufacturer's foundation course, surface material and compaction operations.
 - Application of sealer, fog spray the pavement surface with clean, fresh water. Pavement sealer shall not be applied when weather is rainy or foggy, or when ambient temperature is below 45 deg. F.
 - Application - Apply two coats of sealer uniformly at .09 gal./sq. yd. per coat. Apply in accordance with manufacturer's Specifications.

3.5 TRAFFIC AND LANE MARKINGS:

- Cleaning: Sweep and clean surface to eliminate loose material and dust.
- Over clean, dry bituminous pavement, following application and curing of sealer, apply parking line stripes and other pavement markings as indicated, per manufacturer's recommendations. Provide uniform lines with straight edges, 4' minimum width.
- Provide lines, lettering, and markings shown to define parking spaces and traffic flow.
 - Stencil all parking spaces noted as handicapped parking with the international symbol of access.
- Striping: Use traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding.
 - Color: White/Yellow
 - 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.

3.6 CONSTRUCTION ROAD(S) AND PARKING LOT(S):

- Install where indicated, construction road(s) and/or parking lot(s) that are to become permanent road(s) and/or parking lot(s).
- Prepare subgrade as specified above.

- Foundation Course
 - Place and roll in accordance with "Missouri Standard Specifications for Highway Construction", Section 304.
 - Compaction for foundation course shall be 98 percent of standard proctor maximum density - unless it is taken before installation of bituminous concrete.
 - Grades for foundation course shall be $\pm .25'$ of required grades.
 - Maintain to required grades during construction period, by the addition (when required) of specified foundation course material, well compacted.
- Bituminous Course
 - When directed by the architect, repair foundation course, with specified material, to obtain proper grade and required compaction.
 - Install bituminous pavement as detailed and specified, over repaired foundation course.

3.7 FIELD QUALITY CONTROL:

- General: Test in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Repair or remove or 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: 1/4"
 - Surface Course: 1/4"
- 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 areas. 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.

3.8 CLEANING:

- Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris, and equipment resulting from paving operations.
- Sweep pavement and wash free of stains, discolorations, dirt, and other foreign material immediately prior to final acceptance.

END OF SECTION 32 12 16

SECTION 32 13 13 - CEMENT CONCRETE PAVEMENT

PART 1 GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- Extent of Portland cement concrete paving is shown on Drawings, including curbs, gutters, walkways, and pavement.
 - Related Sections: The following sections contain requirements that relate to this Section.

- Division 2 Section "Earthwork" for subbase preparation.
- Division 2 Section "Storm Sewage Systems" for drainage structures and underdrains.
- Division 3 Sections for concrete and related materials.
- Division 7 Section "Joint Sealers" for related joint sealers and fillers.

1.3 SUBMITTALS:

- Shop Drawings: Layout of concrete pavement course lines and expansion joints.
- Test Reports: All test reports required by this section and referenced related sections.
- Certificates: Written "Certificate of Compliance," signed by Contractor, that all concrete paving and curb materials and products, to be used on this project will comply with Standards referenced in the Specifications.

1.4 QUALITY ASSURANCE:

- Codes and Standards: Comply with local codes if more stringent than herein specified. Comply with State Department of Transportation's standard specifications, except as otherwise specified herein.
- Do not change source of brands of cement and aggregate materials during course of the work.
- Maintain accurate field records of time, date of placing, curing and removal of forms for concrete work in each portion of the work.

1.5 DELIVERY, STORAGE AND HANDLING:

- Store decorative exposed aggregate in segregated area to prevent mixing with foreign materials.
- Deliver curing materials, admixtures, and retarders in manufacturer's standard, unopened containers with labels legible and intact. Store and protect from freezing and damage.

1.6 PROJECT CONDITIONS:

- Establish and maintain required lines and grade elevations.
- Do not install concrete over wet, saturated, muddy or frozen subgrade.
- Protect adjacent work.
- Provide temporary barricades, warning lights and signs as required for protection of work and public safety.

1.7 COOPERATION:

- Examine Drawings and Specifications for all Contracts, to determine nature of proposed construction. Perform work to conform with construction called for in such a manner as not to interfere or delay work of other Contractors.

PART 2 PRODUCTS

2.1 MATERIALS:

- Forms: Steel, wood, or other suitable material of sufficient size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion, defects and of height equal to full depth of concrete work.
 - Use flexible spring steel forms or aluminum forms.
 - 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. Refer to Division 3 Section "Concrete Reinforcing".
 - Furnish in flat sheets, not rolls, unless otherwise acceptable to Architect.
- Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.
- Hook Bolts: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
- Concrete Materials: Comply with requirements of applicable Division 3 sections for concrete materials, admixtures, bonding materials, curing materials, and others as required.
 - Minimum compressive strength of 4000 psi at 28 days, 6 percent (plus or minus 1 percent) air entrained unless otherwise indicated.
- Expansion Joint Materials: Comply with requirements of the following for preformed expansion joint fillers and sealers:
 - Fillers: Preformed expansion joint fillers conforming to ASTM D-1752, 1/2" thickness. Filler material(s) selected must be compatible with sealant(s) to be used when applicable, and suitable for intended use.
 - Sealants: Meeting requirements of ASTM C920, Type M, Grade P or NS as required by application, Class 25, Use T, Color: Gray, unless otherwise indicated.
- Antislipping Compound: Combination of bled linseed oil and mineral spirits, complying with AASHTO M-223.
- Liquid-Membrane Forming and Sealing Durable Compound: Comply with ASTM C 309, Type I, Class A unless other type acceptable to Architect. Mixture loss no more than 0.055 gr./sq. cm. when applied at 200 sq. ft./sq. yd.
 - Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
 - "Masterseal"; Master Builders.
 - "A-H-3 May Sealer"; Anti-Hydro Waterproofing Co.
 - "Ecoseal"; Euclid Chemical Co.
 - "Clear Seal"; A.C. Horn.
 - "J-20 Acrylic Cure"; Dayton Superior.
 - "Sure Cure"; Kaufman Products Inc.
 - "AR-30"; W.R. Meadows.
 - "Spartan-Cure"; The Burke Co.
 - "SealKure"; Toab Div. - Carboline.
 - "Kure-N-Seal"; Sonneborn-Contech.
 - "Polyseal"; Upco Chemical/USM Corp.
 - "L&M Cure"; L & M Construction Chemicals.
 - "Klearseal"; Seton Industries.
 - "LR-152"; Protes Industries.
 - "Hardtop"; Gilford - Hill.
 - Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type.
 - Products: Subject to compliance with requirements, provide one of the following:
 - "J-40 Bonding Agent"; Dayton Superior Corp.
 - "Masterseal"; Larsen Products.
 - "IntraSeal"; W.R. Meadows.
 - "Everbond"; L & M Construction Chemicals.
 - "Euroweal"; Euclid Chemical Co.
 - "Hornwald"; A. C. Horn.
 - "Sonocrete"; Sonneborn-Contech.
 - "Acrylic Bondcrete"; The Burke Co.
 - Epoxy Adhesive: ASTM C 881, 2-component material suitable for use on dry or damp surfaces. Provide material "Type", "Grade", and "Class" to suit project requirements.
 - Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to the following:
 - "Epoxtite"; A. C. Horn.
 - "Edoco 2118 Epoxy Adhesive"; Edoco Technical Prod.
 - "Sikadur Hi-Mod"; Sika Chemical Co.
 - "Euco Epoxy 463 or 615"; Euclid Chemical Co.
 - "Tack and bond Epoxy"; The Burke Co.
 - "Sure-Poxy"; Kaufman Products Inc.

2.2 PAVEMENT MARKING PAINT

- Traffic marking paint by Sherwin Williams; Traffic Paint by Pratt and Lambert, Inc.; Hi-Hide Plexicolor line paint by California Products Corporation, or approved equal.
 - Color: Yellow / White

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION: REFER TO SECTION "EARTHWORK".

3.2 FOUNDATION COURSE PLACEMENT: PAVEMENT AND WALKS/PADS:

- Place and roll in accordance with MODOT Specification Section 304-3.
- Place on dry subgrade in lifts from minimum 6" to maximum 12" for pavement, maximum 6" lifts for walks. Remove all subgrade material churned or mixed with foundation course and replace as necessary at Contractor's expense.
- Compaction for foundation course shall be 98 percent of standard proctor maximum density.
- Grades for foundation course shall be $\pm .25'$ of required grades.

3.3 FORM CONSTRUCTION:

- Set forms to required grades and lines, braced and secured. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.
 - Check completed form work for grade and alignment to following tolerances:
 - Top of forms not more than 1/8 inch in 10 feet.
 - Vertical face on longitudinal axis, not more than 1/4 inch in 10 feet.
 - Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.4 REINFORCEMENT:

- Locate, place, and support reinforcement as specified in Division 3 sections, unless otherwise indicated.
 - Install slip bars at all expansion joints.

3.5 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. Place concrete in place. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
- Place concrete by methods that 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 slide forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent displacement of reinforcing, dowels, and joint devices.
- Use bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- 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.

3.6 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 center line, 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:
 - Tooled Joints: Form weakened-plane joints in fresh concrete by growing top portion with a recommended cutting tool and finishing edges with a jointer.
 - Sowed Joints: Form weakened-plane joints with 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.
 - 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.

- Walks/Pads: Score joints at approximately 5 ft. on center or matching width of walk, unless otherwise noted on Plans. Use tool that produces "V" joint not over 1/4" wide.
- Concrete Curbs: Score joints at approximately 5 ft. on center matching, as closely as possible, abutting walk joints. Use tool that produces "V" joint not over 1/4" wide.
- Construction Joints: Place construction joints at end of placements and at locations where placement operations are stopped for more than 1/2 hour, except where such placements terminate at expansion joints.
 - Construct joints as shown or, if not shown, use standard metal keyway-section forms.
 - Where load transfer-slip devices are used, install so that one end of each device bar is free to move.
- Expansion Joints: Provide premoled joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks, and other steel objects, unless otherwise indicated.
 - Locate expansion joints in step construction where indicated on Drawings.
 - Locate expansion joints at maximum intervals of 15 ft. on center and at all beginnings and ends of radius of curb. Match ends of curbs. Match ends of walks and other steel objects, as much as possible.
 - Locate expansion joints at a maximum interval of every 225 sq. ft. of drive/pads with a minimum dimension one way between joints of 10 lin. ft.
 - Locate expansion joints at a maximum of 150 sq. ft. of walks/pads, except that maximum dimensions between joints in a linear work to be no more than 10 ft.

- Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
- H. Finish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, loose or clip joint filler sections together.
- I. 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.
- J. Fill joint, with sealant, flush with top surfaces and tool concave, unless otherwise indicated.
- K. Fillers and Sealants: Comply with requirements of applicable Division 7 sections for preparation of joints, materials, installation, and performance.

3.7 FIELD QUALITY CONTROL:

- Provide field quality control testing and inspection during concrete operations.
- Contractor shall provide adequate notice, cooperate with, provide access to the work, obtain samples, and assist test agency and their representatives in execution of their function.
- Testing
 - Provide slump test on first load of concrete delivered each day and whenever requested due to changes in consistency or appearance of concrete.
 - Provide air indicator tests and air meter tests for all air-entrained concrete.
 - Perform air indicator test with a "Chase" AE 35 or equal air indicator, and air meter test in accordance with ASTM C231 or C173.
 - Test first load of concrete delivered each day.
 - Furnish copies of field records and test reports as listed for strength tests.
 - Strength testing:
 - Provide 1 set of 3 test specimens for each 50 cu. yd. placed in any one day. Secure samples in accordance with ASTM C172 and mold specimens in accordance with ASTM C39.
 - Test 1 specimen at 7 days and 2 specimens at 28 days in accordance with ASTM C39.
 - Furnish copies of field records and test reports as follows:
 - (1) 2 copies to Architect
 - (2) 1 copy to Contractor
 - (3) 1 copy to Ready Mix Supplier
 - Record the exact location of the concrete in the work represented by each set of cylinders and show on test reports.
 - Provide an insulated moist box for protection of the test cylinders until shipped to the laboratory.
 - Finishing and Sealing - See Division 3. Scored to grade and wood float, edge all sides, fine broom finish (except where otherwise indicated) and seal.

3.8 CONCRETE FINISHING:

- After striking-off and consolidating concrete, smooth surface by screening and floating. Use hand methods only unless mechanical floating is not possible. adjust floating to compact surface and produce uniform texture.
- After floating, test surface for trueness with a 10-ft. 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"-inch radius, unless otherwise indicated. Eliminate tool marks on concrete surface.
- After completion of floating curb when excess moisture or surface sheen has disappeared, complete troweling and finish surface as follows:
 - All flat work to receive a fine 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 wire brush.
 - Burlap finish by dragging a seamless strip of damp burlap across concrete, perpendicular to line of traffic. Repeat operation to provide a gritty texture acceptable to Architect.

3.9 CURING:

- Protect and cure finished concrete paving in compliance with applicable requirements of Division 3 sections. Use membrane-forming curing and sealing compound