SECTION 32 16 00 – CURBS, GUTTERS, SIDEWALKS, and DRIVEWAYS

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes
   1. Concrete curbs and gutters
   2. Concrete sidewalks
   3. Concrete ramps
   4. Concrete driveways
   5. Concrete parking areas

B. Related Sections
   1. Section 07 90 00 - Joint Protection: Sealant for joints.
   2. Section 09 90 00 - Painting and Coating: Pavement markings.
   3. Section 31 22 13 - Rough Grading: Preparation of site for paving [and base].
   4. Section 31 23 23 - Fill: Compacted subbase for paving.
   5. Section 32 11 23 - Aggregate Base Courses.
   6. Section 32 12 00 – Flexible Paving.
   7. Section 32 17 13 - Parking Bumpers: Precast concrete parking bumpers.
   8. Section 32 91 19 - Landscape Grading: Preparation of subsoil at pavement perimeter.
   9. Section 32 14 13.19 – Permeable Concrete Pavers.

1.02 REFERENCES

A. The "PennDOT Sections" noted herein refer to sections contained in the current Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408, as supplemented or revised. The references pertain only to materials, construction, equipment, methods and labor. The payment provisions do not apply to work to be performed under this Contract.

B. Commonwealth of Pennsylvania Department of Transportation Specifications Publication 408, latest edition.

C. Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 459, Occupancy of Highways by Utilities, as supplemented or revised.

D. Commonwealth of Pennsylvania, Pennsylvania Code, Title 67, Transportation, Department of Transportation, Chapter 213, Work Zone Traffic Control (PennDOT Chapter 213).

1.03 SUBMITTALS

A. Submit under provisions of Section 01 33 00.

B. Certificates: Furnish certification from concrete and aggregate producer attesting that materials conform to requirements of PennDOT Specifications.

C. Job-Mix Designs: For each job mix proposed for the Work.

D. Material Slips: Furnish certification of the amount of materials utilized from the producer in accordance with PennDOT specifications.

E. Qualification Data: For manufacturer and installer.

1.04 QUALITY ASSURANCE

A. Source Quality Control:
   1. Use materials conforming to PennDOT Publication 408, latest edition and supplementary bulletins thereto.
   2. The quality of the work shall be maintained by using the products of a qualified bituminous concrete producer and qualified plant operating workmen, registered with and approved by PennDOT.
   3. The bituminous concrete producer shall be a bulk producer regularly engaged in production of hot-mix, hot-laid bituminous concrete conforming to the standards referenced herein.

B. Installer Qualifications:
   1. Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance of not less than five (5) years, and is prequalified for type of work with PennDOT.
   2. Provide at least one person thoroughly trained and experienced in the skills required who readily understands the design and is completely familiar with the application of concrete work. Said person shall be present at all times during progress of concrete paving work and shall direct the performance of the work.
   3. For finishing of concrete surfaces and operation of the equipment, use only personnel thoroughly trained and experienced in the skills required.

C. Requirements of Testing Agency:
   1. To qualify for acceptance, the testing agency must demonstrate to Engineer's satisfaction, based on evaluation of submitted criteria, that it has the experience and capability to conduct required field and laboratory testing as required by Section 03 30 00m without delaying the process of the work.

1.05 SITE CONDITIONS

A. Protection:
1. Protect paved surfaces outside of the pavement removal limits as indicated on the Pavement Restoration Details in the Contract Drawings. Repair pavement outside removal limits damaged by construction operations to PennDOT or local municipalities specifications at no additional expense to Owner.
2. Use all means necessary to protect and maintain pavement materials before, during, and after installation.

B. Environmental Requirements:
1. Do not install aggregate courses when ambient temperature is below or is expected to fall below freezing.
2. Do not use aggregate containing frost nor place aggregate courses on frozen subgrade.
3. Do not place concrete mixtures or courses when surfaces are wet or when the temperature of either air or the surface on which the mixture or course is to be placed is 40°F or lower.

C. Grade Control: Establish and maintain required lines, grades and elevations.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Aggregate Subbase: Type C or better, No. 2A, Section 703.2, placement per PennDOT Publication 408 Section 350.

B. Select Granular Material: Select Granular Material (2RC) conforming to PennDOT Publication 408 Section 703.3.

C. Form Materials: Use acceptable wood or metal forms that extend the full depth of the concrete.

D. Reinforcing Steel and Wire Fabric: in accordance with PENNDOT Publication 408, Section 709, with supplements thereto and revisions thereof.

E. Concrete Materials:
1. Cement Concrete: in accordance with PENNDOT Publication 408, Section 704, with supplements thereto and revisions thereof, and the following:
2. Cement: ASTM C150, Portland Cement, Type I or as specified.
3. Fine and Coarse Aggregates: ASTM C33. Do not use aggregate containing spalling causing deleterious substances.

4. Water: Potable.
5. Admixtures:
    a. Air Entrainment: ASTM C 260, compatible with all other admixtures used.
    b. Water Reducing: ASTM C 494; Must contain less than 0.1% chloride ion.
        1) Type A - Use as required for placement and workability.
        2) Type F or Type G: Use in pumped concrete and concrete with water/cement ratios less than 0.5.
        3) Type E: Use in slabs placed at ambient temperatures below 50 degrees F.

2.02 JOINT DEVICES AND FILLER MATERIALS

A. Joint Filler:
    1. ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick; tongue and groove profile, exterior use only.
    2. ASTM D1752; Premolded sponge rubber fully compressible with recovery rate of minimum 95 percent.

B. Expansion and Contraction Joint Devices: ASTM B221; resilient neoprene filler strip with a Shore A hardness of 35 to permit plus or minus 25 percent joint movement with full recovery; vinyl cover plate, of longest manufactured length at each location, recess mounted.

C. Sealant: ASTM C309, acrylic copolymer, high solids curing and sealing compound.

2.03 CURING

A. White Polyethylene Sheeting—Burlap-Backed.
    1. White Polyethylene Sheeting—natural burlap backed. AASHTO M 171.
    2. White Polyethylene Sheeting—synthetic burlap backed. AASHTO M 171, except weight of synthetic burlap backed white polyethylene sheeting is 8.0 ounces per square yard.

B. Liquid Membrane-Forming Curing Compound, Clear or White. ASTM C 309, Type 1-D, clear or translucent and containing a red fugitive dye; Type 2, white pigmented.

C. Water: Potable and not detrimental to concrete.

2.04 MIXTURES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301.

B. Design Mixes: Provide normal weight concrete with the following properties, as indicated on Contract Drawings and schedules:
   1. Compressive Strength: 4,000 psi 28-day
   2. Slump Limits:
      a. Concrete with high range water reducing admixture - Not more than 8 inches.
      b. Ramps and sloping surfaces - Not more than 4 inches.
      c. Slabs and floors - Not less than 1 inch and not more than 3 inches.
      d. Miscellaneous Concrete - Not less than 1 inch and not more than 4 inches.
   3. Maximum Water-Cement Ratio: 0.47
   4. Minimum Cement Content: 587.5 lbs/cy

C. Use accelerating admixtures in cold weather only when approved by Engineer. Use of admixtures will not relax cold weather placement requirements.

D. Use set retarding admixtures during hot weather only when approved by Engineer.

E. Add air entraining agent to normal weight concrete mix for work exposed to exterior. Design the mix to have air content of 6±1.5 percent.

F. Ready Mix Concrete
   1. Comply with requirements of ASTM C94, with the following exceptions:
   2. Water can be added to batch for material with insufficient slump only with agreement of Engineer. Contractor is solely responsible for amount of water added and resulting strength of concrete. If concrete strength does not conform to 28 day compressive strength requirements, it shall be removed and replaced at no cost to Owner.
   3. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified by ASTM C94 may be required.
   4. When air temperature is between 85°F and 90°F, reduce mixing and delivery time from 90 to 75 minutes, and when air temperature is above 90°F, reduce mixing and delivery time to 60 minutes.

PART 3 – EXECUTION

3.01 GENERAL

A. Restore streets, driveways, parking areas and other areas according to the Pavement Restoration Details shown on the Contract Drawings and the Pavement Restoration Schedule contained at the end of this section.

B. Construct new roadways, streets, driveways, parking areas and other areas according to

the Pavement Restoration Details shown on the Contract Drawings and the Pavement Restoration Schedule contained at the end of this section.

3.02 PREPARATION

A. Refer to the Pavement Restoration Schedule for schedule of materials and thicknesses.

B. Examination:
1. Verify that backfill to surfacing subgrade as specified in Section 31 23 33 – Trenching and Backfilling for Utilities has been properly completed.
2. Fine grade and remove loose material from compacted base surface immediately before applying herbicide treatment or prime coat.

3.03 EXCAVATION

A. Excavation shall be made to the required depth and to a width that will permit the installation and bracing of the forms. The foundation shall be shaped and compacted to a firm, even surface conforming to the section view shown on the Drawings. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

B. For curb installation, the excavation shall be made to the required depth, and the base upon which the curb is to be set shall be compacted to a firm, even surface in accordance with the section view shown on the Drawings. All soft and unsuitable material shall be removed and replaced with compacted aggregate No.57 or as specified on the Drawings.

3.04 FORMS

A. Forms shall be of wood, metal or other approved material and shall extend for the full depth of the concrete. Forms shall be straight, free from warp and of sufficient strength to resist the pressure of the concrete without springing. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

3.05 PLACING CONCRETE

A. Preparation:
1. The subbase shall be thoroughly moistened immediately prior to the placing of the concrete.
2. Concrete shall be proportioned, mixed and placed in accordance with the requirements for the class of concrete specified.
3. Reinforcement shall be placed in accordance with the Contract Drawings and as specified herein.

B. Place concrete filling forms and consolidate by tamping and spading or vibrated until mortar entirely covers the surface, strike off and float.

C. Forms shall be left in place for 24 hours or until the concrete has set sufficiently so that they can be removed without injury to the curbing. Upon removal of the forms, the exposed curbing face shall be rubbed immediately to a uniform surface. Rubbing shall be accomplished by the use of water and a carborundum brick. For the purpose of matching adjacent concrete finishes or for other reasons, the Engineer may permit other methods of finishing. Plastering will not be permitted.

3.06 FINISHING

A. The surface shall be finished with a float. No plastering of the surface will be permitted.

B. All outside edges of the slab and all joints shall be edged with a radius edging tool of the size shown on the Contract Drawings.

C. Sidewalk Paving: Light broom and trowel joint edges.

D. Direction of Texturing: Perpendicular to foot traffic.

3.07 JOINTS

A. Curbing:
1. For curb and gutter installation, where the adjacent pavement contains joints, such joints shall be continued through the integral curb. Contraction joints shall be carried through integral curb with preformed joint material 1/4 inch thick, shall conform to the cross section of the curb, and shall be set perpendicular to the face and top of the curb. Preformed expansion joints shall be placed at the beginning and end of all curb returns and also at all castings.
2. Curbing that is not constructed integral with adjacent pavement shall be constructed with intermediate planes of weakness, 2 inch depth, sawed at 10 foot intervals (not less than 4 feet). The width shall not be less than 3/16 inch and they shall be placed at the beginning and end of all curb returns and also at all castings.

B. Expansion joints shall be carried through the sidewalk, with preformed joint filler. Expansion joints shall be a minimum of 1/2 inch wide, full depth and spaced at a distance not to exceed 25 feet. Remolded expansion joint filler 1/2 inch thick shall be provided between new and old sidewalks and driveways and abutting existing buildings or steps. Seal all expansion joints with sealant.

C. Dummy transverse joints shall be evenly spaced between expansion joints and/or drives and steps with a maximum spacing of 5 feet, approximately 1/8 inch wide, and at least 1

inch deep.

D. Construction joints shall be formed around all appurtenances such as manholes, utility poles, etc., extending into and through the sidewalks. Pre-molded expansion joint filler 1/4 inch thick shall be installed in these joints. This expansion joint material shall extend for the full depth of the sidewalk.

3.08 CURING

A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Concrete shall be cured for at least 72 hours. Curing shall be by means of moist burlap or mats or by approved curing compounds.

D. During the curing period, all traffic, both pedestrian and vehicular, shall be excluded.

3.09 CURB MACHINE

A. Curb machines may be used to construct curb provided the curb can be constructed to the requirement of these Specifications.

3.10 DRIVEWAY CLOSURE AND RESTORATION

A. Property owners shall be notified of work at driveway a week prior to driveway closure.

B. Replace and repair driveways back to original condition and as specified.

3.11 INSTALLATION TOLERANCES

A. Curbing: The face and the top shall be checked with a 10 foot straight-edge. Portions showing irregularities of 1/4 inch or more shall be removed and replaced at the expense of the Contractor.

B. Sidewalk and Driveways: The surface shall be within ¼ inch of the grades shown on the Contract Drawings. Portions showing irregularities shall be removed and replaced at the expense of the Contractor.

3.12 FIELD QUALITY CONTROL

A. Inspect reinforcing placement for size, spacing, location, support.

B. Field Testing:
   1. Measure slump and temperature for each compressive strength concrete sample.
   2. Measure air content in air entrained concrete for each compressive strength concrete sample.
   3. One set of 6 compressive strength concrete samples shall be for each 50 cubic yards of concrete placed but not less than one set for each pour.

C. Remove and replace placed concrete material where test results or measurements indicate that it does not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION