

SECTION 32 13 13.00
CONCRETE (Cement Concrete Curb and Sidewalk)

PART 1 GENERAL**1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
1. Subgrade preparation
 2. Construction of cement concrete curb and sidewalk
 3. Construction of handicap ramps
- B. Related Work Specified Elsewhere:
1. Site Clearing (Trenching, Backfilling and Compaction): Section 31 20 00.02
 2. Asphalt Paving (Bituminous Paving and Surfacing): Section 32 12 16
 3. Concrete (Plain and Reinforced Cement Concrete): Section 32 13 13.01
 4. Concrete (Trench Paving and Restoration): Section 32 13 13.02
- C. Definitions: NONE
- D. Applicable Standard Details:
As shown on the Contract Drawings and in accordance with Publication 408 Specifications.

1.2 QUALITY ASSURANCE

- A. Reference Standards:
1. Pennsylvania Department of Transportation (PennDOT), latest revision:
 - Publication 408, Specifications
 - Publication 213, Temporary Traffic Control Guidelines
 - Department of Justice, Code for Regulations, ADA Standards for Accessible Design
 2. American Society for Testing and Materials (ASTM):
 - A185 Standard Specification for Welded Steel Wire Reinforcement, Plain, for Concrete
 - A615 Standard Specification for Deformed and Plain Biller-Steel Bars for Concrete Reinforcement
 - C94 Specification for Ready-Mixed Concrete
 - C143 Test Method for Slump of Hydraulic Cement Concrete
 - C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
 - C309 Specification for Liquid Membrane-Forming Compounds for Curing Concrete
 - D994 Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type)
 - E329 Specification for Agencies Engaged in Testing and/or Inspection of Materials used in Construction
- B. Inspections:
1. Inspection by the ENGINEER will at a minimum be made of the subgrade, formwork, and any steel prior to placement of the concrete.
 2. ENGINEER will observe all on-site testing of concrete.
- C. Testing:
1. CONTRACTOR shall test concrete strength, slump, air content and temperature on site as specified in Section 32 13 13.01.
 2. All on-site testing as well as laboratory testing shall be performed by the same independent testing agency.

1.3 SUBMITTALS

- A. Submit concrete mix designs, including strength test records, for review and approval.
- B. Submit certified results of compressive strength cylinder tests (from laboratory/testing agency).
- C. Submit copies of concrete batch slips.

1.4 JOB CONDITION

- A. Control of traffic:
 - 1. Take measures to control traffic during all operations. Do not allow traffic on newly placed concrete until adequate strength has been attained.
 - 2. Employ traffic control measures in accordance with Publication 213, Temporary Traffic Control Guidelines.
- B. Protection of work area or adjacent areas:
 - 1. Restore existing surfaces outside the limits of the work that have been damaged by the CONTRACTOR's operations to their original condition, at the CONTRACTOR's expense.
 - 2. CONTRACTOR shall notify property OWNERS to refrain from applying deicing materials on new sidewalks; however, damage as a result of salting is the responsibility of the property OWNER.
- C. Coordination with utilities:
 - 1. Coordinate all necessary adjustments of existing utilities to accommodate this work.
 - 2. Provide access to the site for utility work.

PART 2 PRODUCTS**2.1 CONCRETE**

- A. Portland cement concrete shall be air-entrained and have a minimum 28 day compressive strength shall be 3,500 psi for curbs and 4,000 psi for sidewalks.
- B. Cement Concrete criteria for curbs and sidewalks:
 - Slump: 1" minimum, 5" maximum
 - Air Content: 4.5% minimum, 7.5% maximum
 - Temperature: 50°F minimum, 90°F maximum
- C. For slip formed curb, same as above except with a maximum slump of 1-1/2".

2.2 FORMS

- A. General requirements:
 - 1. Forms shall be coated with a form release agent just prior to placement of concrete.
- B. Straight curbing (or radius greater than 40 feet):
 - 1. Approved metal forms.
 - 2. Wood forms, not less than 2 inch nominal thickness, planed on finish side.
- C. Radius curbing:
 - 1. Approved metal forms.
 - 2. Fabricated plywood or hardboard forms.
- D. Curbing repairs (less than 10 feet):
 - 1. Approved metal forms.
 - 2. Adjust to match existing conditions
- E. Machine-placed curbing:
 - 1. Straight or radius curbing may be placed with a self-propelled machine approved by the ENGINEER.

2.3 REINFORCEMENT

- A. Welded Wire Fabric - ASTM A185, size and spacing as specified on Contract Drawings.
- B. Reinforcing Bars - ASTM A615, Grade 60 billet steel. Size and spacing as specified on Contract Drawings.

2.4 JOINT MATERIAL

- A. Joint Filler – Pre-molded expansion joint material shall be fiber joint filler conforming to ASTM D994.

2.5 FORM COATING MATERIALS

- A. Form release agents shall be non-staining, liquid chemical coatings free of kerosene and oil which effectively prevent absorption of moisture into the forms and bonding of the concrete to the forms.

2.6 CONCRETE CURING COMPOUNDS

- A. Curing compounds shall be clear, non-staining liquid coatings containing no oil or wax and conforming to ASTM C309, such as Safe-Cure, Sealtight 1100, Klear Seal R-75 or Enviocure Clear 500, or similar material.

PART 3 EXECUTION**3.1 CURB CONSTRUCTION**

- A. Excavate to required depth, remove and dispose of material, including existing curbs, and compact the subgrade material to a firm, even surface.
- B. Saw cut existing pavement a minimum of 12" from face of new curb. Exposed edges of existing work shall be smooth and square.
- C. Forms shall be placed as appropriate to the type of curbing on 2 sides (front and back). Forms shall be securely braced to limit deflection during placement of concrete.
- D. Concrete shall be placed in accordance with the Contract Drawings and in accordance with Publication 408 Specifications.
- E. Variation of more than 1/8" from the established line and grade shall be cause for rejection of that portion of the work.
- F. Form or saw contraction joints 3/16" wide and 2" deep at 10-foot maximum intervals on 2 sides (front and top). Saw as soon as possible after the concrete has set sufficiently to preclude raveling during the sawing and before any shrinkage cracking occurs in the concrete, but in no case later than 24 hours following completion of the curb placement.
- G. Provide 1/2" expansion joints at 60-foot intervals, at the end of each pour, and at the beginning and end of all radii. 1/2" expansion joint material shall also separate curb from adjacent sidewalks, poles, hydrants, walls and other permanent structures, except that 3/4" thick expansion joint material shall be provided at storm inlets.
- H. The last three feet of curb shall be tapered to a 1-1/2" reveal with expansion joint at the beginning of taper.
- I. Finish top surface with wood floats. Provide depressions for drainage, driveways, and ramps for the handicapped as directed by the ENGINEER. Tool all exposed edges to the specified radius.
- J. Do not remove forms until concrete has set. Begin proper curing immediately after placement.
- K. Reapply curing compound 30 days following first application.
- L. For slip formed curb, uniformly feed the concrete to the machine so the concrete maintains the shape of the section, without slumping after extrusion. Voids or honeycomb on the surface of the finished curb will not be allowed. Immediately after extrusion, perform any additional surface finishing required.
- M. Correct minor irregularities with a carborundum stone or mortar comprised of two parts fine aggregate to one part cement.

3.2 SIDEWALK CONSTRUCTION

- A. Inform ions. Excavate to required depth, remove and dispose of material, including any existing sidewalks, and compact the subgrade material to a firm, even surface.
- B. Exposed edges of existing work shall be smooth and square.
- C. Construct ramps for the handicapped persons at all street crossings (as required by ADA regulations and as indicated on the Contract Drawings) and as directed by the ENGINEER. Handicap ramps shall be 6" thick concrete. All handicap curb ramps shall have detectable warning domes as shown on the Contract Drawings.
- D. Sidewalks across sanitary sewer or storm sewer easements shall be 8" thick.
- E. Spread AASHTO N. 57 aggregate and compact to the thickness specified on the Contract Drawings.
- F. Concrete shall be placed in accordance with the Contract Drawings and Publication 408 Specifications. Hand float to desired line and grade.
- G. Score contraction joints at 5-foot intervals to sufficient depth to insure cracking at the joint. Do not saw cut the contraction joints without prior approval from the ENGINEER. Also score sidewalks over each drainage pipe placed underneath.
- H. Provide 1/4" expansion joint at 30-foot intervals and at the end of each pour. Place ½" expansion joint material at adjacent curbs, poles, hydrants, walls, and other permanent structures.
- I. Apply light broom finish immediately after float finish as specified in the Contract Drawings and Publication 408 Specifications.
- J. Provide depressions for driveways, downspouts, and drainage as directed by the ENGINEER or shown on the Contract Drawings. Reapply curing compound 30 days following first application.
- K. Begin proper curing in accordance with the Contract Drawings and Publication 408 Specifications, and immediately following placement.
- L. Monolithic sidewalk and curb will be allowed at a radius curb ramp only. Mid-block ramps must have separate curbs.
- M. Apply curing compound.

3.3 HANDICAP RAMPS

The following requirements shall be followed in all construction of handicap ramps, where these requirements are less stringent or different from ADA requirement, the ADA requirements shall govern.

- A. Sidewalks
 - 1. Sidewalk cross slopes shall not exceed 2%.
 - 2. A minimum of 36" pedestrian path of travel, clear of obstructions, grates and other openings, shall be provided along the run of a sidewalk. A 42" pedestrian path of travel is preferred.
 - 3. Objects shall not project more than 4 inches into the pedestrian path of travel between 27" and 80" above the sidewalk surface unless a detection barrier is provided beneath the object at a maximum of 4" less than the projection into the pedestrian path of travel.
- B. Driveway aprons
 - 1. Driveway aprons shall provide a minimum of 36" pedestrian path of travel, clear of obstructions, grates and other openings, in line with the run of a sidewalk with a maximum cross slope of 2%.
- C. Curb ramps
 - 1. Curb ramps shall have a maximum slope of 1:12.
 - 2. The sum of the percent slope of the curb ramp and the roadway cross slope, when added together as positive values, shall not exceed 13%.
 - 3. Curb ramps shall have a minimum width of 4 feet.
 - 4. Curb ramps shall be constructed flush, without a reveal, at the edge of the roadway surface.

5. Curb ramps shall be perpendicular to the curb.
 6. Curb ramps shall be within the crosswalk if a crosswalk exists.
 7. Flares shall be provided at a maximum slope of 1:10 when a curb ramp is located in the pedestrian path of travel.
 8. Return curbs shall only be provided in areas outside the pedestrian path of travel or walkway.
- D. Diagonal Curb ramps
1. Diagonal curb ramps shall not be permitted in new construction. For projects proposing improvements to handicap facilities, diagonal curb ramps shall be permitted on a case to case basis as determined by the Municipality.
 2. Diagonal curb ramps shall have a minimum 4'x 4' maneuvering space at the bottom of the ramp. The maneuvering space shall have a maximum 2% cross-slope in any direction. The maneuvering space shall be within the projected curb line measured from the point of curvature and point of tangent to the point of intersection of the project curb lines. The maneuvering space shall be within the crosswalk delineation.
 3. Diagonal curb ramps having flared sides shall have at least a 24 inch long segment of straight curb located on each side of the curb ramp and within the marked crossings.
- E. Detectable Warning Surfaces
1. Detectable warnings shall provide significantly contrasting texture and light reflective color.
 2. Detectable warnings shall be the width of the curb ramp and two feet in depth.
 3. Detectable warnings shall be provided at a maximum 8" from the roadway surface.
 4. Detectable warnings may be considered part of the ramp portion of the curb ramp.
 5. Truncated domes within the detectable warnings surface shall provide domes in alignment with the direction of travel.
 6. Truncated domes shall have a diameter of 0.9 inches, a height of 0.2 inches and a center to center spacing of 2.35 inches and shall contrast visually with adjoining surfaces, either light on dark, or dark on light.
- F. Landing Areas
1. A landing area shall be provided at any curb ramp where there is more than one pedestrian path of travel accessible to the curb ramp.
 2. Landing areas shall be provided as required in accordance with Federal regulations.
 3. Landing areas shall be a minimum 5' X 5' area, clear of any obstructions, with a maximum slope of 2% in any direction. 4' X 4' landing with a 60" clear turning diameter maybe be permitted if a written report of noncompliance is submitted for each location proposed and approved by the Engineer.
 4. Landing areas shall be provided at the following locations:
 - every location the pedestrian path of travel would change direction
 - at any location where the rise of a ramp exceeds 30 inches.
 5. The landing area shall be at least as wide as the ramp run leading to it.

3.4 BACKFILLING AND RESTORATION

- A. Temporary backfill at curbs shall consist of select granular material front and back, to within 8" of top of curb.
- B. Restore adjacent areas as indicated in the Contract Drawings and Publication 408 Specifications.

END OF SECTION