
SECTION 27 – CURBS, GUTTERS, SIDEWALKS, AND DRAINAGE STRUCTURES

27-1 GENERAL

Concrete curbs, gutters, sidewalks, and drainage structures shall be constructed as shown on the Plans and as specified in these Specifications. Unless modified by contract documents or project design, concrete used in the rights-of-way shall meet minimum compressive strength of 3000 psi at 28 days (See Section 50-5.01 “Composition”; Class “B2” Concrete of these Specifications). Concrete that does not meet this requirement will be removed and replaced at no cost to the City.

27-2 FORMS

Forms shall conform to the requirements in Section 24, “Side Forms and Headers”, and this Section (Section 27), of these Specifications.

Forms for curb and gutter shall be wood with a smooth upper edge, having a width equal to the full depth of the curb and gutter and a nominal thickness of two inches (2”). Warped forms and forms not having a straight upper edge shall not be used. Benders, or thin plank forms, rigidly placed, may be used for returns and other curves. All forms shall be carefully set to proper alignment and grades and shall be rigidly held in place by the use of not less than five (5) pairs of stakes to every twenty-foot (20’) section, and other sections in proportion. Clamps, spreaders, and braces shall be used where required or as directed by the City.

Sidewalk forms shall be surfaced wood with a smooth upper edge, having a width equal to the full depth of the finished sidewalk and a nominal thickness of two inches (2”). Warped forms and forms not having a straight upper edge shall not be used. Sidewalk forms shall be set with the upper edge true to line and grade and shall be rigidly held in place by stakes placed on the outside of the forms and set flush with the top edge of the form. The side forms shall not be removed for at least twelve (12) hours after the finishing has been completed.

Curbs, gutters, and sidewalks may be placed by using an extrusion machine as provided in Section 27-7, “Extruded Construction”, in this Section of these Specifications in lieu of using forms.

27-3 CONCRETE IN CURBS, GUTTERS, AND SIDEWALKS

Concrete in curbs, gutters, and sidewalks shall be six inches (6”) thick, Class “B-2”, as specified in Section 50-5, “Portland Cement Concrete”, of these Specifications. Concrete being transported must maintain consistency and workability; no additional mixing water shall be incorporated unless authorized by the City.

Subgrade shall be prepared as specified in Section 18-2.05, “Subgrade Preparation”, of these Specifications. A six-inch (6”) compacted thick Class 2 aggregate base section shall be required under all curbs, gutters, and sidewalks. The requirement to excavate for and place the six-inch (6”) thick Class II aggregate base section shall apply to both construction of new curbs, gutters, and sidewalks, and to the replacement of existing curbs, gutters, and sidewalks.

Before placing concrete, the subgrade shall be well dampened. A joint shall be constructed at the end of concrete placement, each day, or whenever the concrete placement work is terminated. The joint shall be vertical and square ended, and shall be placed at the point of an expansion joint, as defined in the following Section (27-3.01) and shall be dowelled into the existing concrete six-inches (6”) and two-inches (2”) below the surface.

27-3.01 Expansion Joints, Weakened Plane Joints, and Score Marks

In curbs, gutters, and sidewalks, an expansion joint shall be placed at the end of round corners and at major structures such as utility vaults, at portions of sidewalk that include a manhole, and at other places as shown on the Plans or as directed by the City. In addition, an expansion joint shall be placed at sixty-foot (60') intervals of curbs, gutters and sidewalks. Expansion joint material shall be one half inch (1/2") thick and extend for the full depth of the section. Expansion joint material shall conform to Section 50-4, "Premoulded Expansion Joint Filler", of these Specifications. Expansion joints shall be at right angles to the line of the work.

All five-foot (5') wide sidewalk shall be scored at five-foot (5') intervals. Standard control score lines are to be 1/2" deep with a 1/8" radius. In lieu of every other score mark, at ten-foot (10') intervals, weakened plane joints shall be constructed. In lieu of every sixth weakened plane joint, at sixty-foot (60') intervals, expansion joints shall be constructed as detailed above.

All six-foot (6') sidewalk shall be scored at five-foot (5') intervals as described above. In lieu of every other score mark, at ten-foot (10') intervals, weakened plane joints shall be constructed. In lieu of every sixth weakened plane joint, at sixty-foot (60') intervals, expansion joints shall be constructed as detailed above.

Weakened plane joints shall extend through both the sidewalk and the curb and gutter when constructed at the same time and monolithically. Curb and gutter constructed without monolithic sidewalk construction shall be constructed with weakened plane joints at ten-foot (10') intervals and expansion joints at sixty-foot (60') intervals.

27-3.02 Finishing Concrete Surfaces

The top and exposed surface of the concrete curb and sidewalk shall be finished as follows:

- A direct finishing method, whereby the curb concrete shall be placed to exact form, double screeded, floated, troweled and smoothly finished, after which it shall be broomed with a fine hair push broom drawn over the surface transverse to the line of work. Water may be applied to the surface immediately in advance of brooming.
- Surfaces of sidewalks shall be finished by double screeding, which shall include working the concrete until the coarse aggregate is forced down into the body of the concrete and a layer of mortar is thus forced to the top for floating, and troweling. The surface shall then be marked as directed by the City, and broomed as described above.

27-3.03 Curing of Concrete

Curing of concrete in curbs, gutters, and sidewalks shall be with pigmented compound as specified in Section 50-6, "Curing Compounds for Concrete", of these Specifications. The curing compound shall be applied as recommended by the manufacturer. Curing compound is to be completely and uniformly applied to the exposed surfaces of the concrete such that the compound leaves a neat appearance. Median islands shall have white-pigmented compound. The Contractor shall take care that the pigmented compound is contained

within the intended area of work and does not discolor asphalt concrete or other adjoining improvements.

27-3.04 Allowance for Signs in Median and Traffic Islands

At each end of all new medians and traffic islands, the Contractor shall place a four-inch (4") diameter PVC pipe, aligned vertically and cut flush with surface grade of the median. Pipes shall extend from the surface grade of the median to the pavement surface. Pipes shall be centered in the medians and shall be located approximately two feet (2') from the ends of the medians. Pipes shall be left unfilled and will be used by City forces for installation of signposts. Supply and installation of PVC pipe sections shall be considered incidental and included in the various unit prices paid for median construction.

27-3.05 Minor Curb and Gutter and Sidewalk Replacement

For minor curb and gutter and sidewalk replacement only, the Contractor may use a portable concrete mixer ("Mix on Site" truck) with approval from the City Inspector. Pre-mixed "buggy" concrete is not acceptable. The amount of concrete placed by this method shall not exceed twenty (20) cubic yards per work day. A 50-50 mixture of concrete mix (fine and coarse aggregate) may be used. The mix shall be proportioned (aggregate and cement approximately 4:1) such that an equivalent five (5) sack mix is obtained. The City inspector may make concrete test cylinders in order to verify the mix. Test cylinders should attain strength of three thousand (3000) psi in twenty-eight (28) days.

Just like ready-mixed concrete, minor concrete that does not attain three thousand (3000) psi in twenty-eight (28) days shall be removed and replaced with transit mix concrete at the Contractor's expense.

This method of mixing and placing concrete applies only to minor curb and gutter and sidewalk replacement.

27-3.06 Concrete Testing

Concrete sampling and testing for sidewalk, curb and gutter shall be completed at a minimum frequency of one (1) test per mix design, per project per day and be made in accordance with ACI standards. Additional testing may be required at the direction of a representative of the Public Works Department. Compression testing results and load tickets will be submitted to Public Works at the completion of the project. For specialty concrete designs (air-entrained concrete, high-early strength, etc.) the Contractor shall submit a quality control plan for review and approval by the Public Works Department.

27-4 DAMAGE REPAIRS

All damage done or openings cut in concrete walks, curbs, or gutters during the progress of the Work shall be repaired by the Contractor to the satisfaction of the City. Patching of damaged areas shall not be allowed. Partial removal and replacement of flags of sidewalk or portions of curbs and/or gutters less than four feet (4) in length will not be allowed. All removal of damaged sidewalk and/or curbing and gutter sections shall extend to the nearest score mark, weakened plane joint, construction joint or expansion joint if within four feet (4) of the limit of damaged concrete. Damaged areas shall be removed and replaced to the satisfaction of the City without additional cost to the City.

27-5 SLOPE OF SIDEWALKS

Unless otherwise shown or specified in the Contract, sidewalks and planting strips between curb and sidewalk shall slope uniformly toward the street at a rate of 1.5% per City Standard Drawing ST-31. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.01 foot are present when tested with a ten-foot (10') straightedge laid in a direction transverse to the centerline and extending across the width of the sidewalk.

27-6 CURB DOWELS AND REINFORCEMENT

Where shown or specified in the Contract, curb dowels and reinforcement shall be installed. The dowels and reinforcement shall conform to Section 31, "Reinforcement", of these Specifications.

27-7 EXTRUDED CONSTRUCTION

At the Contractor's option, subject to the City's approval, curbs, gutters, and sidewalks may be constructed monolithically using an approved extrusion machine.

Concrete for extruded construction shall be Class "B-2", as specified in Section 50-1, "Portland Cement Concrete", of these Specifications. The grading limits shall be restricted if necessary to produce concrete that, after extrusion, has well defined web marks of water on the surface and is free from surface pits larger than three-sixteenths-inch (3/16") in diameter.

The consistency of the concrete shall be such that it will maintain the shape of the section without support after extrusion.

At the Contractor's option, or at the direction of the City, extruded concrete curbs shall be anchored to existing pavement either by placing dowels and reinforcing or by using an approved adhesive. If an adhesive is used, in advance of placing the curbs on the existing pavement, the surface of the pavement shall be thoroughly cleaned and the adhesive shall be applied. The pavement shall be cleaned either by wire brushing or by blast cleaning. The cleaned surface shall be free from dust, loose material, or oil.

The adhesive shall be an epoxy resin adhesive conforming to Section 95-1.02D, "Epoxy Adhesive for Bonding Freshly Mixed Concrete to Hardened Concrete", of the State Specifications. Such adhesive may also be used for bonding new portland cement concrete to existing asphalt concrete.

The top and face of the finished curbs shall be true and straight and the top surface of curbs shall be of uniform width, free from humps, sags, or other irregularities. Grade tolerance of the gutter flowline, back of curb and gutter, and back of sidewalk shall not exceed ± 0.05 foot in any twenty-five-foot (25') length.

Concrete shall be fed to the machine at a uniform rate. The machine shall be operated under sufficient uniform restraint to forward motion to produce a well compacted mass of concrete free from surface pits and requiring no further finishing, other than light brooming with a broom filled with water only. Finishing with a brush application of grout will not be permitted.

In extruded construction, deep-score lines may be placed in curbs, gutters and sidewalks in lieu of expansion joints. Deep-score lines shall be one and one-half inches (1-1/2") deep and one-eighth inch (1/8") to one-quarter inch (1/4") wide. For five-foot (5') or six-foot (6') wide sidewalks deep-score lines shall be placed every ten feet (10') with a standard control score line every five feet (5') between deep-score lines. For sidewalk widths other than five feet (5') or six feet (6'), deep-score lines and control score lines shall be placed at the direction of the City. Standard control score lines

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are to be ½” deep with a 1/8” radius. Expansion joints in conformance with the requirements of Section 27-3.01, “Expansion Joints, Weakened Plane Joints, and Score Marks”, in this Section of these Specifications shall be placed at sixty-foot (60’) maximum spacing, and at curb returns, light poles, fire hydrants, both sides of driveways, and other fixed objects, or as directed by the City. Deep-score lines and control score lines shall conform to the details shown on the Standard Drawings. In addition, dowels or keyways shall be placed at the end of concrete placement, each day, with a deep-score line placed at the cold joint.

27-8 CURB RAMPS AND DRIVEWAYS

Curb ramps and driveways shall be constructed to the dimensions, lines, grades, and details shown or specified in the Contract. Curb ramps and driveways shall conform to all requirements in these Specifications, including the requirement for excavating for and placing the six-inch (6”) thick Class II aggregate base section. No utility pull box, utility pole, traffic signal pull box, traffic signal pole foundation, or any other facility that is visible on or above the surface of a curb ramp may be located within the area of a curb ramp. For the purpose of this Section, the area of the curb ramp shall be the area including and bounded by the inclined portion of the ramp, the gutter section and the curb along the back of sidewalk.

27-9 RECONSTRUCTION OF CURBS, GUTTER, AND SIDEWALK

Where curb and gutter and/or sidewalk are to be removed for the purpose of constructing a driveway, a sidewalk ramp, utility relocation or construction of utility facilities, or to replace cracked, broken, heaved or otherwise unacceptable concrete, the entire curb and gutter and/or sidewalk shall be removed and reconstructed. Actual limit of concrete removal shall extend to nearest score mark or joint, if nearest score mark or joint is within four feet (4) of limit of removal as indicated on the Plans. At the discretion of the City, adjacent to all areas of removal of curb and gutter, a two-foot (2’) minimum width, four-inch (4”) minimum depth bank of existing roadway pavement shall be saw cut and removed and replaced with permanent asphalt concrete pavement. Removed materials shall be disposed by the Contractor outside of the road right-of-way. Unless otherwise directed in the Special Provisions, payment for removals shall be considered to be included in the price paid for clearing and grubbing and no additional payment shall be allowed.

27-10 RECONSTRUCTION OF CURBS, GUTTER, AND CURB AND GUTTER TO ACCOMMODATE SEWER AND STORM DRAIN SERVICE INSTALLATION AND DRIVEWAYS

Where curbs, gutters, or curb and gutter are to be removed for the purpose of constructing a sewer service or storm drain service, the entire curb, gutter, or curb and gutter shall be removed and reconstructed. Actual limit of concrete removal shall extend to nearest score mark or joint, if nearest score mark or joint is within four feet (4) of limit of removal as indicated on the Plans. Adjacent to all areas of removal of curb and gutter, a two-foot (2’) minimum width, six-inch (6”) minimum depth bank of existing roadway pavement shall be saw cut and removed. Pavement removal is to be in accordance with the appropriate standard detail for the trench and extend the full length of the affected area of curb and gutter. Removed materials shall be disposed of by the Contractor. portland cement concrete for the replacement shall be Class “A-2” in accordance with Section 50-5, “Portland Cement Concrete”, of these Specifications.

27-11 CURB AND GUTTER TESTING AND TOLERANCE

The finished surface of curb and gutter shall be free from humps, sags, or other irregularities.

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The surface shall be uniform to a degree such that no depressions greater than 0.02 foot are present in face or pan when tested with a ten-foot (10') straightedge, except at grade changes. Curb and gutter shall be tested by the application of water in the presence of the City. No standing water will be permitted.

27-12 RESERVED

27-13 DROP INLETS AND CATCH BASINS

Drop inlets, catch basins, grates, and frame types shall conform to the Standard Drawings and Section 50- 31, "Sewer and Storm Drain Castings", of these Specifications.

Concrete for drop inlets and/or catch basins shall be either Class "A" or "B", and shall conform to Section 50-5, "Portland Cement Concrete", of these Specifications. The concrete box portion of the drop inlet and/or catch basin shall be cast to the proper grade in a maximum of one (1) placement of concrete. Use of grout to adjust the drop inlet and/or catch basin frame to the proper grade will not be permitted without written approval of the City.

Concrete used for drop inlets and/or catch basins shall be tested at a minimum frequency of one (1) test per mix design, per project per day and be made in accordance with ACI standards. Additional testing may be required at the direction of a representative of the Public Works Department. Compression testing results and load tickets will be submitted to Public Works at the completion of the project. For specialty concrete designs (air-entrained concrete, high-early strength, etc.) the Contractor shall submit a quality control plan for review and approval by the Public Works Department.

Grate and frame materials and method of placement shall conform to the requirements in Section 75-1.02, "Miscellaneous Iron and Steel / Materials", of the State Specifications. Reinforcing bar supports or other approved means shall be used to hold the frame at proper grade during final placement of concrete. Broken pieces of concrete, or other debris, shall not be used for this purpose.

At the option of the Contractor, drop inlets and/or catch basins may be furnished and installed as precast units, or the units may be combined precast and cast-in-place structures, provided the structures in place substantially conform to cast-in-place construction as specified in these Specifications.

All drop inlet and catch basin installations, whether new or reconstructions, shall include a permanent stormwater quality marking per the City Standard Drawings SQ-10.1 or 10.2, or as directed by City.

27-14 MEASUREMENT

Curb, gutter, and curb and gutter will be measured and paid for by the linear foot for the type of curb, gutter, or curb and gutter designated in the Contract.

Sidewalks will be measured and paid for by the square foot for the type of sidewalk designated in the Contract.

Curb ramps will be measured and paid for by the unit, as designated in the Contract. If curb ramps are not included as a separate pay item in the Contract, the curb and gutter portion of the curb ramp shall be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the curb ramp shall be measured and paid for by the square foot as sidewalk.

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Driveways will be measured and paid for by the square foot or by the unit, as designated in the Contract. If driveways are not included as a separate pay item in the Contract, the curb and gutter portion of the driveway shall be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the driveway shall be measured and paid for by the square foot as sidewalk.

Removal of sidewalk, curbs, gutters, or curb and gutters will be measured and paid for by the linear foot as designated in the Contract. If removal of sidewalks, curbs, gutters, or curb and gutters are not designated as separate pay items in the Contract, the removal of said facilities is included in the various items of work and no additional payment will be made.

Gutter drains, drop inlets, and/or catch basins will be measured and paid for by the unit for the types of gutter drains, drop inlets, and/or catch basins designated in the Contract.

27-15 PAYMENT

The price paid per linear foot for curb, gutter, or curb and gutter includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing curb, gutter, or curb and gutter, complete in place, including preparing the subgrade, all form work, finishing and curing the concrete, furnishing and placing expansion joint material, furnishing and placing dowels and reinforcement, curb and gutter testing, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the City.

The price paid per square foot for sidewalk includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing sidewalk complete in place, including all form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the City.

The unit price paid for curb ramps includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing curb ramps complete in place, including all form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the City.

The unit price paid for driveways includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in constructing driveway complete in place, including all form work, finishing and curing the concrete, furnishing and placing expansion joint material, and repairing any damage, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the City.

Cost of removal and replacement of the required amount of any existing curb and gutter to obtain the standard depression as indicated on the Plans, Special Provisions, or the Specifications is included in the unit price paid for each drop inlet or catch basin.

The unit price paid for gutter drains includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in gutter drains, complete in place, including excavation, furnishing and installing the cast iron drain and vitrified clay or PVC elbow, and the concrete pad foundation and elbow encasement, as shown on the Plans, as specified in these Specifications and the Special Provisions, and as directed by the City.

Excavation for and placement of aggregate base beneath sidewalk, curb ramps, driveways, and curb and gutter is incidental and included in the unit prices paid for the various pay items and no

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additional payment will be made. Class II aggregate base will be measured and paid for as detailed in Section 22-3, "Aggregate Base", of these Specifications.