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

27-1 GENERAL

Concrete curbs, gutters, sidewalks, and drainage structures must be constructed as shown on the Plans and as specified in these Specifications.

27-2 FORMS

Forms must conform to the requirements in Section 24, “Side Forms and Headers”, and these Specifications.

Forms for curb and gutter must 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 2 inches. Warped forms and forms not having a straight upper edge cannot be used. Benders, or thin plank forms, rigidly placed, may be used for returns and other curves. Forms must be carefully set to proper alignment and grades and must be rigidly held in place by the use of at least 5 pairs of stakes for every 20-foot, or portion of, section, and other sections in proportion. Clamps, spreaders, and braces must be used where required or as directed by the Agency.

Sidewalk forms must 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 2 inches. Warped forms and forms not having a straight upper edge cannot be used. Sidewalk forms must be set with the upper edge true to line and grade and must 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 must remain in place for at least 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”, of these Specifications in lieu of using forms.

27-3 CONCRETE IN CURBS, GUTTERS, AND SIDEWALKS

Concrete in curbs, gutters, and sidewalks must be Class "B”, as specified in Section 50-5, “Portland Cement Concrete”, of these Specifications.

Subgrade must be prepared as specified in Section 18-2.05, “Subgrade Preparation”, of these Specifications. Relative compaction of not less than 95 percent must be obtained for a minimum depth of 0.5 foot below the subgrade grading plane for driveways, V-ditches, cross gutters, or as directed by Agency. A 6-inch thick Class 2 aggregate base section is required under curbs, gutters, and sidewalks. The requirement to excavate for and place the 6-inch thick Class 2 aggregate base section applies to construction of new curbs, gutters, and sidewalks, and the replacement of existing curbs, gutters, and sidewalks.

Before placing concrete, the subgrade must be well dampened. A joint must be constructed at the end of concrete placement, each day, or whenever the concrete placement work is terminated. The joint must be vertical, and square ended and must be placed at the point of an expansion joint, per Section 27-3.01 of these Specifications.

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

In curbs, gutters, and sidewalks, an expansion joint must 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 locations shown on the Plans or as directed by the Agency. In addition, expansion joints must be placed at 60-foot intervals for all curbs, including median curbs, gutters, sidewalks, and concrete median pavement. Dowels must be placed at expansion joints as shown on Standard Drawing 4-32. For expansion joints in curbing that has longitudinal reinforcing such as Type 4 curbs, Type 6 curbs, and curbs along bus stops, the curb reinforcing must be discontinuous at the expansion joint with the curb reinforcing held back 2 inches from

the expansion joint and the curb reinforcing must overlap the expansion joint dowels. Expansion joint material must be 1/2 inch thick, shaped to fit the geometry of the curbs, gutters, and/or sidewalks, and extend for the full depth of the curbs, gutters and/or sidewalks. Expansion joint material must conform to Section 50-4, "Premoulded Expansion Joint Filler", of these Specifications. Expansion joints must be at right angles to the line of the work. Sealant must be placed over the expansion joint material if directed by the Agency.

All 4-foot wide sidewalks must be scored at 4-foot intervals. In lieu of every third score mark, at 12-foot intervals, weakened plane joints must be constructed. In lieu of every fifth weakened plane joint, at 60-foot intervals, expansion joints must be constructed as detailed above.

All 6-foot sidewalks must be scored at 5-foot intervals. In lieu of every other score mark, at 10-foot intervals, weakened plane joints must be constructed. In lieu of every sixth weakened plane joint, at 60-foot intervals, expansion joints must be constructed as detailed above.

Weakened plane joints must 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 must be constructed with weakened plane joints at 10-foot intervals and expansion joints at 60-foot intervals.

27-3.02 Finishing Concrete Surfaces

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

- A direct finishing method, whereby the curb concrete must be placed to exact form, double screeded, floated, troweled and smoothly finished, after which it must 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 must be finished by double screeding, which includes working the concrete until the coarse aggregate is forced down into the body of the concrete and a layer of mortar is forced to the top for floating and troweling. The surface must then be marked as directed by the Agency and broomed as described above.

All exposed surfaces of sidewalks, curbs, and gutters must be free of rock pockets, discoloration, graffiti, and blemishes. Surfaces must have a uniform texture and appearance free of bulges, depressions, or other imperfections. Surfaces must not vary by more than 1/4 inch from a 10-foot straight edge except at grade changes.

27-3.03 Curing of Concrete

Curing of concrete in curbs, gutters, and sidewalks must be with pigmented compound as specified in Section 50-6, "Curing Compounds for Concrete", of these Specifications. The curing compound must be applied as recommended by the manufacturer. Curing compound is to be completely and uniformly applied to the exposed surfaces of the concrete so that the compound leaves a neat appearance. Median islands must have white-pigmented compound. The Contractor must 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 Median Openings and Allowance for Sign Placement on Ends of Medians and Traffic Islands

Gaps in medians must be provided where called for on the Plans to allow for roadway surface drainage and for the installation of pull boxes as shown on Standard Drawing 4-31. For the purposes of measurement and payment for medians, no deduction in the length of the median will be made at median openings less than 4 feet in length.

At each end of new medians and traffic islands the cross slope of the final 2 feet of the median or island must be 1.0 percent, as shown on Standard Drawing 4-31 and as required by these Specifications. For these final 2 feet the height of the lower of the 2 curbs on either side of the median or island must be increased as needed to achieve the required cross slope.

Conforms from the revised height for the curb on the lower side of the median or island must be achieved in a distance of 1 foot from 2 feet from the end of the curb to 3 feet from the end of the curb. For purposes of measurement and payment, the modification in the curb height for the final 3 feet of the median or traffic island is incidental and included in the bid price paid for the various items of work.

27-3.05 Minor Curb and Gutter and Sidewalk Replacement

For minor (single location, 12 cubic feet or less of concrete) curb and gutter and sidewalk replacement, the Contractor may use a portable concrete mixer, or a 1 yard transit-mix truck. Pre-mixed "buggy" concrete is not acceptable. A 50-50 mixture of concrete mix (fine and coarse aggregate) equivalent five (5) sack mix (aggregate and cement approximately 4:1) may be used. The County inspector may make concrete test cylinders in order to verify the mix. Test cylinders must attain 28-day strength of 2500 psi. Minor concrete that does not attain 2500 psi in 28 Calendar Days must 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.

27-4 DAMAGE REPAIRS

All damage done or openings cut in concrete walks, curbs, or gutters during the progress of the Work must be repaired by the Contractor to the satisfaction of the Agency. Patching of damaged areas is not allowed. Partial removal and replacement of flags of sidewalk or portions of curbs and/or gutters less than 4 feet in length is not allowed. Removal of damaged sidewalk and/or curbing and gutter sections must extend to the nearest score mark, weakened plane joint, construction joint or expansion joint if within 4 feet of the limit of damaged concrete. A dowelled joint must be used as shown on Standard Drawing 4-32 at all connections of new sidewalk to existing sidewalk, new sidewalk to existing curbing, new curbing to existing curbing, and new curb and gutter to existing curb and gutter. Damaged areas must be removed per detail and replaced to the satisfaction of the Agency without additional cost to the Agency.

27-5 SIDEWALKS

27-5.01 Widening of Existing Sidewalk

If the Work includes widening an existing sidewalk, the existing sidewalk must be removed and replaced. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new sidewalk to existing curb and to existing sidewalk.

Payment for sidewalk removal will be made per square foot and includes saw cutting of the existing sidewalk, removal, disposal and all incidentals, providing all labor, tools and equipment required to remove the existing sidewalk and no additional payment will be allowed. If there is no bid item for sidewalk removal, the saw cutting, removal and disposal of the existing sidewalk in the area of sidewalk widening is incidental and included in the bid prices for the various items of work and no additional compensation will be made. Payment for sidewalk construction will be made per square foot of sidewalk installed as specified in Sections 27-14 and 27-15 of these Specifications and includes the supply and installation of dowels for the connection of the new sidewalk to existing curb and sidewalk.

27-5.02 Slope of Sidewalks

Unless otherwise shown or specified in the Contract, sidewalks and planting strips between curb and sidewalk must slope uniformly toward the street at a rate of 1.5 percent. At no place must the cross slope of sidewalk be greater than 2 percent. The transverse slope of the finished surface must be uniform to a degree such that no depressions greater than 0.01 foot are present when tested with a 10-foot straightedge laid in a direction transverse to the centerline and extending across the width of the sidewalk.

27-6 CURB DOWELS AND REINFORCEMENT

Curb dowels and reinforcement must be installed as shown on Standard Drawings 4-43, 4- 44, 4-30, 4-40 and 4-32, and as shown or specified in the Contract,

27-7 EXTRUDED CONSTRUCTION

At the Contractor's option, subject to the Agency's approval, curbs, gutters, and sidewalks may be constructed using an approved extrusion or slipform machine and method. The Contractor must provide the Agency with a written proposal and a test section if requested by the Agency. Except as noted otherwise, all extruded construction must comply with these Specifications and Standard Drawings 4-30, and 4-32. Curb, gutter and sidewalk may be constructed monolithically if approved by the Agency.

Concrete for extruded construction must be Class "B", as specified in Section 50-1, "Portland Cement Concrete", of these Specifications. The grading limits must 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 3/16 inch in diameter.

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

Except as noted otherwise in the Contract documents, extruded concrete curbs must be anchored to existing pavement either by placing dowels 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 must be thoroughly cleaned, and the adhesive must be applied. The pavement must be cleaned either by wire brushing or by blast cleaning. The cleaned surface must be free from dust, loose material, or oil.

The adhesive must be an epoxy resin adhesive conforming to 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 must be true and straight, and the top surface of curbs must 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 must not exceed ± 0.05 foot in any 25-foot length.

Concrete must be fed to the machine at a uniform rate. The machine must 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.

27-8 CURB RAMPS AND DRIVEWAYS

Curb ramps and driveways must be constructed to the dimensions, lines, grades, and details shown or specified in the Contract. Curb ramps and driveways must conform to all requirements in these Specifications, including the requirement for excavating for and placing the 6-inch thick Class 2 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 must be the area including and bounded by the 1-foot wide tactile strip on either side of 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 TO ACCOMMODATE DRIVEWAYS

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 must be removed and reconstructed. The actual limit of concrete removal must extend to nearest score mark or joint, if nearest score mark or joint is within 4 feet of limit of removal as indicated on the Plans. Adjacent to all areas of removal of curb and gutter, a 2-foot minimum width, 4-inch minimum depth bank of existing roadway pavement must be saw cut and removed and replaced with permanent asphalt concrete pavement. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new driveway construction to existing sidewalk and curb and gutter. Removed materials must be disposed by the Contractor outside of the road right-of-way. Unless otherwise directed in the Special Provisions, payment for removals is included in the price paid for clearing and grubbing and no additional payment will be allowed.

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

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 must be removed and reconstructed. The actual limit of concrete removal must extend to nearest score mark or joint, if nearest score mark or joint is within 3 feet of limit of removal as indicated on the Plans. A dowelled joint must be used as shown on Standard Drawing 4-32 at the connection of new sidewalk, and curb and gutter to existing sidewalk, and curb and gutter. Adjacent to all areas of removal of curb and gutter, a 2-foot minimum wide, 6-inch minimum deep bank of existing roadway pavement must be saw cut and removed. Removed materials must be disposed of by the Contractor. Portland cement concrete for the replacement must be Class “A” 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 must be free from humps, sags, or other irregularities. The surface must be uniform to a degree such that no depressions greater than

0.02 foot are present when tested with a 10-foot straightedge, except at grade changes. Curb and gutter must be tested by the application of water in the presence of the Agency. No standing water is permitted.

27-12 NOT USED

27-13 DROP INLETS AND CATCH BASINS

Drop inlets, catch basins, grates, and frame types must conform to the Standard Drawings and Section 50-34, "Sewer and Storm Drain Castings", of these Specifications.

Drop Inlets and catch basins must have bedding material that conforms to Section 50-16 “Clean Crushed Rock” Type B or C and is 4-inches thick. Concrete for drop inlets and catch basins must be Class "A", and must conform to Section 50-5, “Portland Cement Concrete”, of these Specifications. The concrete box portion of the drop inlet and/or catch basin must be cast to the proper grade in a maximum of 2 placements of concrete. Use of grout to adjust the drop inlet and/or catch basin frame to the proper grade is not permitted without written approval from the Agency.

Grate and frame materials and method of placement must conform to the Standard Drawings and these Specifications. The use of reinforcing bar supports, concrete blocks, concrete dobies or masonry bricks must be utilized to support the frame or precast drop inlet or catch basin tops during placement of final concrete. Broken pieces of concrete, wood, or other debris cannot be used for this purpose.

Final concrete must include concrete necessary to fill all voids between the drop inlet or catch basin top and the base. Prior to placement of or as part of final concrete, a concrete collar must be installed around the drop inlet or catch basin. The concrete collar must conform to Standard Drawing 9-37 and be:

A. A minimum of 6-inches and maximum of 12-inches wide
B. Cover the entire joint between the top and base of the drop inlet or catch basin. Additionally, the collar must extend at least 4-inches above and below the joint.

At the option of the Contractor, drop inlets and 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. Connections to precast units may be boot, integral connection or concrete with a water stop. The maximum horizontal deflection of a boot is 7 degrees. If the horizontal deflection is more than 7 degrees, the unit must be built as a cast-in- place structure. The maximum vertical pipe slope for any connection may not exceed 12-percent.

Pipe connections for cast-in-place structures with pipes entering at a horizontal angle between 7 degrees and 20 degrees shall be made with a water stop per Standard Drawing 9-35. On a case-by-case basis, pipe connections for cast-in-place structures with pipes entering at a horizontal angle greater than 20 degrees shall be made per Standard Drawing 308-0, with approval of the Agency. For polypropylene pipe, structure connections shall be made per Standard Drawing 9-39.

The pipe connection to drop inlets and catch basins must conform to Standard Drawing 308-0 for the following two conditions:

A. Pipe connection is through the corner of the structure.
B. Pipe connection angle is less than 70 degrees or greater than 110 degrees for pipes with a diameter less than or equal to 30 inches.

Minimum wall thickness for cast-in-place structures is equal to the thickness specified on the standard drawing for each structure. The maximum wall thickness for cast-in-place structures is 2-inches larger than the wall thickness specified on the standard drawing for each structure. Cast-in-place wall thickness must be uniform on all sides and bottom. Internal dimensions of cast-in-place structures must maintain the specified dimensions throughout, as shown on the standard drawing for each structure.

All drop inlet and catch basin installations, whether new or reconstructions, must include a permanent stormwater quality marking stamped in concrete behind the window/curb per the County of Sacramento Improvement Standards, and Standard Drawing 9-41, or as directed by the Agency. For drop inlets and catch basins with precast tops, steel storm drain markers may replace the concrete stamp per Standard Drawing 9-41. The use of any other marking method is not acceptable unless approved by the Agency.

Unless otherwise specified, exposed surfaces of the grates, frames and hoods with the parts assembled and disassembled must be painted with commercial quality asphaltum paint after testing and assembly.

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 will be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the curb ramp will be measured and paid for by the square foot as sidewalk.

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 will be measured and paid for by the linear foot as curb and gutter, and the sidewalk portion of the driveway will 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, 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 Agency.

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 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 Agency.

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 Agency.

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 Agency.

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 Agency.

The unit price paid per EACH Drain Inlet of the size and type specified in the bid proposal includes full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, including excavation and backfill, as shown or specified in the Contract, the Standard Construction Specifications, these Special Provisions, and as directed by the Engineer and no additional compensation will be allowed therefor. The price paid for drop inlets and catch basins includes full compensation for the cost of removal and replacement of adjacent asphalt, curb, gutter, and sidewalk to the limits required in Section 27-10, “Reconstruction of Curbs, Gutter, and Curb and Gutter to Accommodate Sewer and Storm Drain Service Installation”, of these Specifications and no additional or separate payment will be made. Unless otherwise specified in the Special Provisions, pipe connections to all manholes shall be included in the cost per LINEAR FOOT of the size and type of pipe to be connected and no

additional compensation will be allowed therefor.

Excavation for aggregate base beneath sidewalk, curb ramps, driveways, and curb and gutter sections must be included in the bid item for roadway excavation if the Contract includes such an item. If there is no item for roadway excavation, the excavation for the aggregate base beneath sidewalk, curb ramps, driveways, and curb and gutter sections is incidental and included in the various pay items and no additional payment will be made. Supply and placement of aggregate base material will be measured and paid for as detailed in Section 22-3, “Aggregate Base”, of these Specifications.