

7. Portland Cement Concrete Improvements

7.1 General

Portland cement concrete improvements shall be constructed in accordance with Section 73 of the State Standard Specifications and these Standard Specifications. As used herein, the term "*concrete improvements*" shall include curbs, gutters, curb & gutter, sidewalks, wheel chair ramps, drive approaches, alley approaches, valley gutters, and other slab concrete constructed within the City right-of-way.

7.2 Portland Cement Concrete

7.2.1 General

Portland cement concrete shall conform to the requirements of Section 90-10 of the State Standard Specifications, *Minor Concrete*.

7.2.2 Cement

Cement shall be Portland Cement Type II, conforming to Section 90 of the State Standard Specifications, latest revision.

7.2.3 Strength Requirements

All Class "A" concrete shall be proportioned to attain a minimum cylinder strength of 3,000 psi in 28 days. All Class "B" concrete shall be proportioned to attain a minimum cylinder strength of 2,500 psi in 28 days. The compressive strengths are to be determined in accordance with ASTM C39. Not less than 6 sacks of cement shall be used per cubic yard of Class "A" concrete, or less than five (5) sacks of cement shall be used per cubic yard of Class "B" concrete. All ready-mix shall comply with ASTM C94-72.

7.2.4 Aggregates

Aggregates for Portland cement concrete shall conform to Section 90-2.10 of the State Standard Specifications and shall be free from deleterious coatings, clay balls, roots, bark, sticks, and other extraneous material. Appearance of such materials in the concrete mix shall be grounds for rejection of the entire transit truck of material.

7.2.5 Aggregate Gradation

Aggregates for Portland cement concrete shall conform to the requirements of Section 90-3.04 of the State Standard Specifications, for 1-inch maximum aggregate size. Unless otherwise noted on the plans, a specific aggregate gradation will not be required.

7.2.6 Admixtures

No specific admixtures are required, unless noted on the plans. Contractor may submit a concrete design containing admixtures for review by City. Such submittal shall be made at least five working days in advance of the planned concrete pour. Admixtures proposed in any such submittal shall conform to the requirements of Section 90-4 of the State Standard Specifications.

7.2.7 Calcium Chloride

Unless specifically permitted by City, calcium chloride shall not be added to Portland cement concrete. In no case shall calcium chloride be added to concrete which will be used in structures containing steel or other embedded metals.

7.2.8 Proportioning

If aggregate is greater than 1-inch aggregate size, the exact proportions of the concrete ingredients shall be established by a material testing laboratory selected by the City's Representative. Contractor shall notify the City's Representative of his proposed mix design and source of the aggregate in sufficient advance time to permit testing.

7.2.9 Mixing and Transporting

All Portland cement concrete for use in public works improvements shall be mixed in mechanical mixers, except that City may allow batches of less than 1/3 cubic yard to be mixed by hand in conformance with Section 90-6.05 of the State Standard Specifications.

Machine mixing shall conform to the provisions of Section 90-6.02 of the State Standard Specifications. Mix temperature shall be maintained between 50° and 90° F at all times.

Concrete shall be transported to the project site by vehicles conforming to the provisions of Section 90-6.03 of the State Standard Specifications. - Unless specifically allowed by City, no additional mixing water shall be added to the concrete mix during hauling or after arrival at the project site. If City does authorize such addition, the mixing drum shall be revolved not less than thirty revolutions at mixing speed after water is added and before delivery is commenced.

Any concrete which has been in the transit truck more than 45 minutes is subject to rejection by City's Representative.

7.2.10 Placing

The Contractor shall notify the City's Representative 24 hours in advance of any concrete placing. Concrete shall not be placed until all form work, reinforcement, electrical conduit, installation of fixtures to be embedded, and preparation of concrete surfaces to be bonded have been completed and are ready for new concrete.

Concrete surfaces on or against which other concrete is to be placed shall be thoroughly cleaned of surface latency. Clean aggregate shall be exposed as specified herein for joints.

Each concreting operation shall be continuous until the placing in the course, section or monolith is completed. Fresh concrete shall not be permitted to fall from a height greater than six (6) feet without the use of adjustable length pipes or "tremmies."

In order to assure that there will be no interruption in such continuous placing, the Contractor shall have available standby concrete mixing equipment ready for use in case

of breakdown, or he shall make arrangements, satisfactory to the City's Representative, with the supplier of the concrete, if transit mix concrete is being used, so that the City's Representative may be assured that once placement is started it can be completed without interruption.

Appropriate mechanical vibration shall be used in placing concrete to eliminate stone pockets and voids, to consolidate each layer with that previously placed, to completely embed reinforcing bars and other fixtures, and to bring just enough fine material to the faces of top and exposed surfaces to produce a smooth, dense and even texture. Vibrators shall be of the high frequency internal type. The number in use shall be ample to consolidate the incoming concrete to a proper degree within 15 minutes after it is deposited in the forms. In all cases, at least two (2) vibrators shall be available at the site. The use of external vibration for compacting concrete will be permitted when the concrete is otherwise inaccessible for adequate compaction, provided the forms are constructed sufficiently rigid to resist displacement or damage from external vibration, and the type of vibrators are approved by the City's Representative.

7.2.11 Forms

All forms shall be smooth, mortar tight, true to the required lines and grades, and of sufficient strength to resist any appreciable amount of deflection during the placing of concrete. All foreign matter shall be removed from forms before concrete is placed therein. Forms previously used shall be thoroughly cleaned before reuse. Prior to placing concrete, all forms shall be oiled with a high penetration form oil, which leaves no film that can be absorbed by the concrete. Immediately prior to placing concrete, all forms shall be thoroughly wetted.

Forms shall not be removed until the concrete has hardened sufficiently to safely support its own weight and possible construction loads. Forms supporting concrete members which are subject to direct bending stress shall not be removed or struck until concrete test cylinders show that sufficient strength to support the required structural load has been attained. In no case shall forms be removed or released prior to the expiration of 24 hours following placing of the concrete.

Forms for all surfaces, which will not be completely enclosed or hidden below the final surface of the ground, shall be made of surfaced plywood. Insofar as practicable, forms shall be so constructed that the form marks will conform to the general lines of the structure. All sharp edges shall be chamfered with 3/4-inch by 3/4-inch triangular fillets.

Form clamps and ties with effective water stops, shall be used to maintain accurately the specified wall thickness. Ties shall be either of the threaded or snap-off type so that no metal will be left within 1-1/2-inches of the surface of the wall. The use of twisted wire ties will not be permitted.

7.2.12 Openings

Pipe sleeves, inserts for pipe connections, anchors, and forms for pipe holes must be accurately placed and securely fastened to the forms in such a manner that the placing of

concrete and stripping of forms will not alter their alignment or location. Openings may be formed at sleeve locations and sleeves placed and grouted with cement mortar containing 15 lbs. of EMBECO, or equal, per sack of cement, after wall concrete is placed. Rubber water stops may be required at block-outs and shall be placed as directed by the City's Representative.

7.2.13 Joints

Construction joints shall be made only where shown on the Plans unless otherwise approved by the City's Representative. In case of emergency, construction joints shall be placed as directed by the City's Representative. After the pour has been completed to the construction joint and the concrete has hardened, the entire surface of the joint shall be thoroughly cleaned of surface latency, and clean aggregate shall be exposed by abrasive blast cleaning. Wire brushing, air and water jets may be used while the concrete is fresh provided results equal to abrasive blast cleaning are obtained. Where subsequent concrete pour is a wall or other restricted formed member, approximately 3-inches of grout shall be placed immediately before placing first lift of concrete. Concrete shall be placed over grout before the grout begins to set. Construction joints shall be keyed. Keyways shall be formed by beveled strips or boards placed at right angles to the direction of shear. Except where otherwise shown on the Plans or specified, keyways shall be at least 1-1/2 inches in depth over at least 25% of the area of the section. Water stops may be required and shall be placed as directed by the City's Representative at the Contractor's expense and no payment will be made therefore.

When it is necessary to make a joint because of an emergency, reinforcing steel shall be furnished and placed across the joint as directed by the City's Representative. Furnishing and placing such reinforcing steel shall be at the Contractor's expense and no payment will be made therefore.

7.2.14 Surface Finishes

During the placing of concrete, care shall be taken in vibrating or otherwise consolidating the concrete to ensure surfaces of even texture free from voids.

Immediately after the forms have been removed, all form bolts shall be removed to a minimum depth of 1-1/2 inches below the surface of the concrete. All holes and depressions caused by the removal or cutting back of such form bolts shall be cleaned and filled with cement grout. All rock pockets and honeycombed areas shall be repaired by chipping back to solid concrete and filling the resulting space in the same manner as specified for bolt holes. This work shall be done immediately following the removal of forms. If in the judgment of the City's Representative rock pockets are of such an extent or character as to affect the strength of the structure materially, or to endanger the life of the steel reinforcement, he may declare the concrete unacceptable and require the removal and replacement of that portion of the structure.

Except for surfaces which are to be buried all fines and other projections shall be removed and the surfaces shall be brushed with stiff wire brushes or otherwise finished until a uniform color has been obtained. The use of carborundum stones may be required

to remove unsightly bulges or discolorations. The object of these operations is to obtain smooth, even surfaces of uniform appearance, free from unsightly bulges or depressions due to form marks and other imperfections.

All flat work shall be floated and troweled to a smooth, hard finish.

7.2.15 Reinforcement

Reinforcing bars shall be deformed billet-steel bars for concrete reinforcement, ASTM A615, Grade 40, unless otherwise provided. At Contractor's option, Grade 60 bars may be substituted for Grade 40, except that the two grades of steel may not be used interchangeably in structures.

Bars shall not be bent or straightened in a manner that would injure the material. Hooks shall conform to the Manual of Standard Practice of the American Concrete Institute.

Main reinforcing bars shall not be spliced except as shown on the Plans. Splices at points of maximum stress shall be avoided. Where bars are spliced, they shall be lapped at least 30 bar diameters and wired together to provide a minimum distance of two (2) inches between the splice and the nearest adjacent bar or surface of the concrete. Splices shall be staggered at least 40 bar diameters.

Metal reinforcement shall be accurately placed as shown on the Plans and shall be securely held in position by wiring at intersections with No. 16 or larger wire and by using concrete spacers. The minimum spacing center to center of parallel bars shall be three times the diameter, but in no case shall the clear distance between bars be less than two (2) inches. All bars shall have a clear coverage of 1-1/2 bar diameters, but not less than 2-1/2 inches measured from the surface of the concrete to the outside of the bar. Metal supports may be used provided no portion of the support extends to within one inch of the surface of the concrete. Wooden supports shall not be used.

Wire mesh used for reinforcement shall be rolled flat before placing concrete and shall be supported and tied to prevent movement during concrete placement. Mesh shall conform to ASTM A-185.

Reinforcement, at the time concrete is placed, shall be free from rust, scale and other coatings that would destroy or reduce the bond.

7.2.16 Rubber Water stops

Materials, fabrication, and splices shall conform to the article on Rubber Water stops in Section 51 of the Standard Specifications of the California Department of Transportation (CALTRANS), latest revision. Stops shall be firmly supported during concrete placement to prevent dislocation and to insure that ends remain at right angles to the construction joints. All junctions shall be welded to provide a continuous watertight seal.

7.2.17 Grout

Grout shall contain Portland cement, sand, water, and (for patching, anchoring, packing, or similar work) a non-shrinkage additive such as EMBECO. Where finish surface is not

covered, grout shall be tinted by color of cement, aggregate, or additive as approved by the City's Representative so that surface matches adjacent concrete in appearance after both have cured. Ratio of cement to sand shall be 1 to 2 by volume unless otherwise shown or specified. The proportion of non-shrinkage additive shall be in accordance with the manufacturer's instructions. Grout shall be placed against thoroughly wetted concrete and shall be water cured by providing a moist atmosphere for at least 3 days.

7.2.18 Curing Concrete

All newly placed concrete shall be cured in accordance with the provisions of Section 90-7 of the State Standard Specifications. Any of the prescribed methods (water, curing compound, water-proof membrane, forms-in-place) may be used.

7.3 Construction

7.3.1 General

Concrete improvements shall conform to the provisions of Section 73 of the State Standard Specifications and these Standard Specifications.

7.3.2 Subgrade

The subgrade shall be constructed true to grade and cross-section, as shown on the plans. It shall be graded and compacted in accordance with the requirements of Section 2, *Roadway Excavation and Grading*.

7.3.3 Expansion Joints

Expansion joints for curb, gutter and sidewalk shall be constructed at a maximum spacing of 45 feet, and at each drive approach, and at each curb return.

7.4 Sidewalk Patterns

Sidewalk patterns shall follow the requirements of the table below, and these Standard Specifications.

Residential sidewalk shall be constructed in a parkway pattern, unless specifically directed otherwise by City during plan check for the purpose of blending into existing adjoining properties. Contiguous curb, gutter, and sidewalk is limited to those areas already having a preponderance of development using the contiguous pattern, or where there are other compelling reasons to not use the parkway pattern.

Parkway pattern sidewalk shall be 4.5 feet wide, except on the arterial and collector streets where it shall be six (6) feet wide when directed by City during plan check. A four foot nine-inch distance from back of curb to front of walk shall be maintained. Additional sidewalk width shall be located in either a landscaping easement or in an separate pedestrian easement, which shall be dedicated by the property owner prior to sidewalk construction.

Commercial sidewalk shall be constructed from the back of curb to the property line, but shall not be more than 12 feet wide unless directed by City during plan check.

Zone District	Residential	Commercial
R, RM	X	
CC-SC, CH ML, MP		X
All Industrial	X ¹	
RA, MH	X ²	

Sidewalk pattern requirements may be modified by the Planning Commission or the City staff at the time of Site Plan Review.

7.5 Tree Wells

All commercial sidewalks shall have provision for trees by the construction of tree wells in accordance with Standard Drawing M-3, in locations required by City. Water and sanitary sewer service shall be a minimum of ten lineal feet from edge of tree well. See also Section 28, *Street Trees*.

7.6 Driveway Width, Location, and Frontage Limitation

The minimum width of a commercial driveway shall be nine (9) feet. The maximum width shall be 35 feet.

The minimum width of a residential driveway shall be nine (9) feet. The maximum width shall be 28 feet.

Driveway width shall be measured at the back of the approach, and shall not include flares. Driveways shall not be closer than three (3) feet to the nearest street fixture (e.g., fire hydrant, street light).

No more than 60 percent of any frontage shall be utilized for driveways, and no driveway shall be located within five (5) feet of a property line, except in a cul-de-sac bulb or adjacent to an alley, where the minimum distance shall be three (3) feet.

7.7 Finishing Concrete

Sidewalks, curbs, driveways and curb returns shall be finished with a steel trowel, and given a light broomed finish.

¹ Except where exempted from constructing sidewalk by the Municipal Code

² Sidewalk is only required on arterial streets in these zones. City may direct commercial pattern in lieu of residential pattern at its discretion

Drive approaches, alley approaches, gutters, and wheelchair ramps shall be given a wood float finish.

7.8 Rock Pockets

Immediately upon stripping forms and prior to backfilling, all rock pockets or honeycombs shall be repaired to the satisfaction of City. Repairs shall be made with Portland cement mortar conforming to the requirements of Section 51-1.135 of the State Standard Specifications.

7.9 Backfilling Improvements

After forms are removed, the area between the sidewalk and curb (if any) and the area behind the sidewalk shall be cleaned of all surplus concrete and other debris, and the area shall be filled with clean native soil suitable for planting.

If curb and gutter is installed in an area where there is an existing paved street, Contractor shall repair all excavations made for such curb and gutter installation, and shall backfill and pave the area between the old pavement and the new gutter with a like material. The edge of the existing pavement shall be cut to a true line (using a concrete saw if the existing pavement is asphalt concrete) and the excess paving material shall be removed from the project site. All paving work shall be done in accordance with Section 5, *Asphalt Concrete Pavement*.

If more than two (2) inches of cut or fill are required behind the sidewalk (or behind the curb, if no sidewalk exists), Contractor shall construct a slope not steeper than 10:1 between the top of the sidewalk (or curb) and the adjacent property.

7.10 Protecting Concrete

In addition to his customary responsibilities with respect to work and materials, Contractor shall protect concrete as provided herein and in Section 90-8 of the State Standard Specifications.

Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar. The only exception to such stoppage will be in the case that Contractor protects new concrete during rainy weather to the satisfaction of City.

8. Encasement Concrete

8.1 General

Encasement, cradling, bidding or pipe-covering concrete shall be either reinforced or non-reinforced, uniformed or rough formed, and of the classes designated in project specifications, on project plane, or as directed by the City's Representative.

8.2 Materials and Workmanship

8.2.1 Earthwork

Earthwork for encasement concrete shall conform to the provisions of Section 13, *Earthwork (Pipelines)*.

8.2.2 Concrete

Concrete for encasement purposes shall conform to the provisions of Section 7, *Portland Cement Concrete Improvements*.