V CURB, GUTTER, SIDEWALKS

CURB, GUTTER & SIDEWALK

STANDARDS AND SPECIFICATIONS

1. SCOPE

The work covered by this specification concerns the furnishing of all labor, equipment, and materials and performing all operations in connection with the construction of curb, gutter, cross pans, sidewalks, and driveways in strict accordance with this specification and the applicable drawings.

Related Work Specified Elsewhere

General Requirements Specification

2. GENERAL PROVISIONS

Except as noted below, the General Provisions applicable to this specification are covered in the General Requirements Specification.

3. PROTECTION OF EXISTING FACILITIES

3.01 General

The Contractor shall notify all utility companies and interested parties 48 hours prior to commencement of work in order to insure that there will be no interruptions of services during construction. The Contractor shall be liable for all damages to existing structures, public or private, and he shall leave the City harmless from any liability or expense for injuries, damages or repairs to such facilities.

3.02 Responsibility for Repair

Should any utility be damaged in the construction operations, the Contractor shall immediately notify the owner of such utility, and unless authorized by the owner of the utility, the Contractor shall not attempt to make repairs.

In the event that during construction it is determined that any underground utility conduit, including sewers, water mains, gas mains, and drainage structures and any above-ground utility facilities are required to be relocated, the Contractor shall notify the utility owner well in advance of his approach to such utility so that arrangements with the City and/or owners of the affected utility can be completed without delay of the work. Prior to constructing over another utility, notify the utility and resolve any conflicts.

4. MATERIALS

4.01 Select Material

Select material shall consist of a natural or artificial mixture of hard, durable stones, rock fragments, and soil binder free from soft particles and excess clay and conforming to the following gradation:

Sieve Designation	% by Weight Passing
3/4"	100
No. 4	30 to 60
No. 10	25 to 50
No. 200	5 to 12

4.02 Concrete

Concrete shall be composed of cement, coarse and fine aggregate, water, entrained air and fiber mesh reinforcement. The concrete shall contain a minimum of six (6) sacks of cement per cubic yard, a maximum of five and eight-tenths (5.8) gallons of water per sack of cement, and air content of 6% by volume and a maximum coarse aggregate size of 3/4" unless concrete thickness exceeds eight (8) inches. In no case shall aggregate exceed one and one-half (1 1/2) inches. The finished concrete shall have a minimum twenty-eight (28) day compressive strength of 3,500 psi. Any admixture except air-entraining agent must be approved by the City Engineer, including accelerators and retarders.

4.03 Cement

Cement used shall conform to the Standard Specification for Portland Cement, ASTM C150, Type I or II, or ASTM C175 for Air-Entraining Portland Cement, Type IA or IIA.

4.04 Aggregate

Aggregate shall conform to the Standard Specification for Concrete Aggregate, ASTM C33.

4.05 Reinforcement

#4 Rebar placed @ 12” o.c. E W at vehicular crossings and shall conform to ASTM A185.

4.06 Air-Entraining Agents

Air-entraining agents shall conform to ASTM C260 (5% to 7% air).

4.07 Curing Compounds

Liquid membrane curing compounds shall conform to ASTM Specification C309.

4.08 Expansion Joint Material

Expansion joint material shall be non-extruding preformed joint filler and shall conform to ASTM Specification D1751 or D1752.

4.09 Water

Water used for mixing or curing concrete shall be clean and free from injurious amounts of oil, acids, salt, alkali, or organic substances harmful to concrete. Notify Engineer for prior approval of the use of non-potable water.

4.10 Thickness

4" minimum. 6" on surfaces to be driven over by vehicles.

5. GRADING

Excavation shall be performed to the lines, grades and cross sections indicated on the approved drawings and staked on the ground. Suitable material removed from the excavations shall be used as far as practicable for embankments and backfilling. Unsuitable material shall be excavated below the grade shown on the drawings or indicated by grade stakes as directed by the City and replaced with select material. Any material which the Engineer determines to be uncompactable shall be considered unsuitable and shall be removed and replaced. Excavated materials which are considered unsuitable and any surplus of excavated material not required for embankments or backfill shall be disposed of by the Contractor.

Embankments shall be constructed by depositing, placing, and compacting materials of acceptable quality above the natural ground in accordance with lines, grades, and cross sections shown on the approved plans and/or staked out on the ground. Before any embankment is placed, clearing, tree removal and topsoil removal, shall be performed as directed by the City Public Works Director. Clearing shall include removal and disposal of obstructions and rubbish to a minimum depth of twelve (12) inches below sub-grade elevation; sod will be removed to a minimum depth of six (6) inches and trees and stumps to a minimum depth of eight (8) inches below sub-grade elevation. Each lift of embankment material not to exceed six (6) inches of loose depth shall be thoroughly mixed and moistened to full depth and compacted to uniform minimum density of 90% of maximum density (ASTM D1557), and optimum moisture content of plus or minus 2%.

Embankments shall be constructed to a width two (2) feet greater than the width of the section to be constructed with the top four (4) inches of compacted base being three-quarter (3/4) inch gravel.

The sub-grade under the forms shall be compacted and shaped to a firm, even surface so that the forms, when set, will be uniformly supported for its entire length at the specified elevation. The finished grade shall be maintained in a smooth and compacted condition until concrete has been placed.

5.01 Compaction

Compact native backfill to 95% of maximum density obtained at optimum moisture as determined by AASHO T 180-57, Method A, and Class 3 and 6 road base to 90% Modified Proctor. Certification of Compaction test must be submitted to the City prior to concrete placement.

6. FORMS

Forms shall be metal or wood such that exposed concrete is true, clean and free of deviation and defects and shall have a depth equal to or greater than the section being placed. Approved flexible forms shall be used for construction where the radius is one hundred fifty (150) feet or less. The supply of forms shall be sufficient to permit their remaining in place for a minimum of six (6) hours after the concrete has been placed. Face plates for curb and gutter may be removed as soon as practicable. Each section of form shall be straight and free from warps and bands. Maximum deviation of the top surface shall not exceed one-quarter (1/4) inch in ten (10) feet and the inside face not more than one-quarter (1/4) inch in ten (10) feet. The method of connection between sections shall be such that the joint just formed is tight and free from movement in any direction. Forms that have been previously used shall be cleaned of all mortar and dirt before being set. Forms shall be set true to established line and grade and shall be thoroughly staked in place. Bracing and staking of forms shall be such that the forms remain in both horizontal and vertical alignment until their removal.

At the option of the Contractor and with the approval of the Engineer, slip-form equipment may be used for the construction of concrete curb and gutter.

Slip-form equipment shall be provided with traveling side and top forms of suitable dimensions, shapes, and strength to support the concrete for a sufficient length of time during placement to produce curb and gutter of the required cross section. The equipment shall spread, consolidate, and screed the freshly placed concrete in such a manner as to provide a dense and homogeneous product.

The slip-form equipment shall have automatic sensor controls which operate from an offset control line. The line and grade of the slip-form equipment shall be automatically controlled.

7. MIXING CONCRETE

7.01 Job-Mixed Concrete

Job-mixed concrete shall be mixed in a drum-type mixer which shall conform to the standards of the Mixer Manufacturers Bureau of the Associated General Contractors of America. The mixer shall be capable of combining the aggregates, cement, and water into a thoroughly mixed and uniform mass within the specified time and discharge the material without segregation. The entire contents of the drum shall be discharged before recharging. The volume of the mixed materials per batch shall not exceed the manufacturer's rated capacity of the mixer. Mixers must be kept clean of hardened concrete. Job-mixed concrete must comply with Section 4.06.

The mixing of each batch shall continue for not less than one minute after all materials, except water, are in the drum. All mixing water shall be introduced before one-quarter of the mixing time has elapsed. The mixer shall rotate at the rate recommended by the manufacturer but not less than fourteen (14) or more than twenty (20) revolutions per minute. When concrete is mixed at the site, cement must be Type IA or IIA. The addition of any admixture at the job is prohibited, except where required or approved by City representative.

7.02 Ready-Mixed Concrete

Ready-mixed concrete shall be proportioned, mixed, and transported in accordance with the current ASTM Specifications for Ready-Mixed Concrete (Designation C-94).

Delivery of central-mixed concrete shall not be made in non-agitating equipment without securing the prior written approval of the Engineer of the type of equipment to be used and method of operation. Concrete shall conform with Section 4.02 of these specifications.

7.03 Retempering of Concrete

Retempering of concrete which has partially hardened by remixing, with or without water, will not be permitted.

8. CONSISTENCY

Concrete shall have a slump of not less than two (2) inches, nor more than four (4) inches, when tested in accordance with the standard method of test for slump of Portland Cement Concrete, ASTM C-143.

9. PLACING CONCRETE

9.01 General

The alignment and grade elevations of the forms shall be checked by the Contractor immediately ahead of concrete placement and necessary corrections made. Any forms that have been disturbed or sub-grade that has become unsuitable shall be corrected and forms reset and rechecked. Any variations in grade and alignment shall be subject to approval by the City prior to placing the concrete. Forms shall be oiled, and the foundation shall be thoroughly moistened immediately prior to placing the concrete.

After the City has approved the forms and sub-grade, the concrete shall be deposited on the sub-grade to the required depth and width in successive batches and in a continuous operation. Concrete shall be placed in curb and gutter forms in horizontal layers not exceeding six (6) inches in thickness, each layer being spaded along the forms and thoroughly tamped. Concrete may be placed in layers of more than six (6) inches in thickness only when authorized by the Engineer, and the spading and tamping is sufficient to consolidate the concrete for its entire depth. The concrete shall be placed as uniformly as possible to minimize the amount of spreading necessary. While being placed, the concrete shall be tamped, spaded, and/or vibrated with suitable tools to prevent the formation of voids or honeycomb.

After the concrete for the walk has been placed, a strike-off shall be used to bring the surface to the proper elevation when compacted. It shall be spaded along the form faces and tamped to assure a dense and compact mass, and to force the larger aggregate down while bringing to the surface not more than three-eighths (3/8) inch of the free mortar for finishing purposes.

Concrete shall be placed in cross gutters in horizontal layers of not more than six (6) inches in thickness, each layer being spaded along the form faces and thoroughly tamped into a dense and compact mass. If internal vibrators are used, the full specified thickness may be placed in one operation. After the concrete has been placed and tamped, the upper surface shall be struck off to the specified grade.

Any evidence of lack of consolidation shall be regarded as sufficient reason for requiring the removal of the section involved and its replacement with new concrete. The Contractor shall be responsible for any defects in the quality and appearance of completed work.

9.02 Cold Weather Concreting

Except by specific written authorization, concrete shall not be placed unless the air temperature is thirty (30) degrees Fahrenheit, and ascending and placing shall cease when the descending air temperature in the shade and away from artificial heat falls below forty (40) degrees Fahrenheit.

When concreting is permitted during cold weather, the temperature of the mix shall be not less than fifty (50) degrees Fahrenheit at the time of placing. Aggregates or water shall not be heated to a temperature exceeding 150 degrees Fahrenheit. Materials containing frost or lumps of frozen material shall not be used.

Before placing concrete, ice, snow, and frost shall be removed from the forms and sub-grade. In no case shall concrete be placed against frozen ground or against ground containing frost.

After placing, the temperature of the concrete shall be maintained above fifty (50) degrees Fahrenheit for at least four (4) days, and the concrete temperature shall be maintained above the freezing point for at least ten (10) days by the use of not less than twelve (12) inches of loose, dry straw or with insulated curing blankets. With the use of high early strength cement (the use of which must be pre-approved in writing by the City), the concrete temperature shall be maintained above fifty (50) degrees Fahrenheit for two days and above freezing by the use of straw or blankets for five (5) days. Concrete injured by frost action shall be removed and replaced at the Contractor's expense.

9.03 Hot Weather Concreting

Except by written authorization, concrete shall not be placed if the temperature of the plastic concrete cannot be maintained at ninety (90) degrees Fahrenheit or lower. To facilitate the placement of concrete in hot weather, the aggregate or water may be cooled.

9.04 Finishing Concrete

After the concrete has been placed and consolidated in the forms, it shall be finished. A float shall be used to bring the surface of the concrete to its final form; excessive working of the surface will not be permitted. The final texture of all exposed surfaces shall be obtained by light brooming. After completion of brooming and before the concrete has taken its initial set, all edges in contact with the forms shall be tooled with an edger having a one-quarter (1/4) inch radius. No plastering, dusting, or topping of the surface, or sprinkling with water to facilitate finishing, will be permitted.

9.05 Joints

1. Dummy Joints. Transverse joints shall be located at intervals of five (5) feet in sidewalk slabs. The joints shall be tooled to a minimum depth of one-quarter (1/4) inch.

2. Contraction Joints. Unless otherwise approved by the Engineer, combination curb, gutter, and sidewalk shall be constructed in ten (10) foot monolithic sections with contraction joints averaging one-quarter (1/4) inch thick between sections. The templates for the contraction joints shall be made and set to allow three (3)

inches clearance between bottom place of the concrete and lower edge of template.

3. Expansion Joints. Expansion joints shall be provided approximately every fifty (50) feet in sidewalks and at cross pans and shall extend for the full depth and width of the concrete. Expansion joint material shall also be installed between new structure slabs and existing concrete slabs, around fire hydrants, poles, etc., and also between the ends of sidewalk slabs and curbs. Expansion joint material must be set vertical and with the top edge flush with the finished surface. The joint shall be edged with a suitable edging tool.

10. CURING

Concrete shall be cured by protecting it against moisture loss, rapid temperature change and from rain, flowing water, and mechanical injury for a period of not less than five (5) days after placement. It shall be the Contractor's responsibility to protect the concrete from traffic and the elements. Concrete shall be cured by the following method.

10.01 Liquid Membrane Curing

Curing compound may be used and shall be applied immediately after the water sheen has left the finished concrete. The compound shall be applied at a rate to completely cover the surface uniformly and at a rate that will achieve the performance requirements specified in ASTM Specification C309. The compound shall be kept agitated while being applied to prevent the pigment from settling. After the forms have been removed, the exposed edges shall be covered immediately with the compound.

11. DEFACED, DEFECTIVE & DAMAGED CONCRETE

It shall be the Contractor's responsibility to protect fresh concrete from damage as a result of vandalism or other cause; defective or damaged concrete shall be removed and replaced by and at the expense of the Contractor.

12. BACKFILLING

No power equipment used for the preparation of sub-grade will be permitted adjacent to concrete curb, gutter, or alley intersections until the fourth day following placement of the concrete. The placement of bituminous pavement adjacent to concrete curb, gutter, or alley intersections will not be permitted until the seventh day following the placement of concrete and until it has a strength of at least 2500 psi, nor will concrete paving operations be permitted until the seventh day and at least 2800 psi compressive strength where placing or finishing equipment will ride on the previously placed concrete. If admixtures, additional cement, or Type III cement is used to obtain high early strength concrete, grading operations will be permitted on the second day following the placement of the concrete and paving operations on the third day as long as the compressive strength has reached 2500 psi and 2800 psi respectively.

When side forms are removed, the space adjoining the concrete shall be promptly backfilled with suitable material, properly compacted, and brought flush with the surface of the concrete and adjoining ground surface. Such compaction shall be done at a time and in a manner that it will not harm the curing concrete. In embankments, the backfill shall be level with the top of the concrete for at least two (2) feet and then sloped to the property line.

13. OPENING TO TRAFFIC

Walks shall not be opened to pedestrian traffic for at least twenty-four (24) hours after placement. Driveways, curbs, gutters, and cross pans shall not be opened to vehicular traffic for at least seven (7) days after placement. The Contractor shall maintain suitable barricade to comply with the foregoing requirements.

14. CONNECTIONS WITH EXISTING SIDEWALKS

Where new sidewalk construction abuts existing sidewalks, the work shall be accomplished so that no abrupt change in grade between the old and new work results.

15. REPAIRS

Where repairs are made in existing sidewalks, all edges of the old sidewalk allowed to remain shall be sawcut to a minimum depth of one and one-half (1-1/2) inches. No rough edges will be permitted where new construction joins old. No section less than five (5) feet in length shall be placed or left in place.

16. ACCEPTANCE

The Contractor shall guarantee curbs, gutters, walks, driveways, and cross pans for a period of one (1) year after completion against defective workmanship and materials and shall keep the same in good order and repair. The determination of the necessity, during such guarantee period, for the Contractor to repair said curbs, gutters, walks, driveways, or cross pans, or any portion thereof, shall rest entirely with the City, whose decision upon the matter shall be final and obligatory upon the Contractor.

CURB, GUTTER, SIDEWALKS & STREETS

MINIMUM DESIGN STANDARDS

GENERAL

All curb, gutter, sidewalk, and street construction design, rights-of-way widths, and street widths shall conform to the minimum requirements enumerated on the City typical drawings and the requirements of the Subdivision Regulations of the City of Ouray. Care shall be taken to insure continuity of grades, widths, etc., of proposed, existing, and future installations. Deviations from these standards and specifications may be permitted, when in the opinion of the City the quality of the finished work would not vary materially from the intent of these requirements.

Plan Approval

Plans for proposed street construction shall be submitted on 24x36-inch sheets to the City for Approval. An overall plan shall be submitted, along width individual plan and profile sheets. The plans shall show lots and blocks, shall give centerline street grades, and show vertical curves and the original ground profile. Grades shall be indicated for the curb and gutter for each side of the street; elevations of curb and gutter at the ends of each block shall be indicated. Cross pans shall be indicated on the street plan. The roadway width and type of curb, gutter, and sidewalk shall be indicated for each street.

Street Construction

Gravel streets shall be accepted on residential streets.

When asphalt pavement is to be provided, minor residential streets serving fewer than ten lots shall have a minimum of six (6) inches of Class 6 base course with prime coat and a three (3) inch asphaltic concrete surface. Other residential and collector streets shall have a minimum of six (6) inches of Class 6 base course with prime and four (4) inches of asphaltic concrete surface. Base and surface treatment for arterial streets shall be designed by an engineer based on traffic load and soils conditions.

All paved streets shall have curb, gutter, and sidewalk on both sides. The curb, gutter, and sidewalk shall conform with City standard drawings and specifications or that work.

Street Layout

Street widths shall conform to City of Ouray standard drawings for the type of street being designed. Gravel streets shall have a cross slope of 3%, and paved streets shall have at least 2% cross slope.

The minimum grade for all streets is 0.5%. The maximum grade shall not exceed 7% on any street and 5% on collector streets. Minimum length of vertical curves for all streets

shall be three hundred (300) feet, except that where the algebraic change in grades is less than 2%, vertical curves may be omitted. On local streets the minimum radius of horizontal curves shall be one hundred (100) feet and one hundred fifty (150) feet on all other streets.

In special topographic conditions, the City may allow deviations from these requirements in order to provide the City with better drainage or a better intersection design.

Multiple tee intersections shall have the leg of the tees at least 125' apart centerline-to-centerline to facilitate a reasonable line of sight between the intersections. If the width of the street right-of-way is more than sixty (60) feet, the separation of the tees shall be increased proportionally.

Sidewalks shall be located six (6) inches outside the private property line unless otherwise approved by the City.

Service Line Installation

All service lines shall be installed (in accordance with the appropriate City Standards) prior to paving any street.

Drainage

All streets shall be designed to provide continuous surface drainage directed to storm drain inlets and drainage courses. Grade shall permit flow without ponding. A check shall be made to be sure of continuity of drainage design between the proposed construction and existing or future construction. In no case shall surface drainage be permitted to be disposed of overland except by approved storm drainage facilities. The Developer shall remedy any problems which are created by the addition of storm drainage from his subdivision to any existing drainage.

Culverts shall only be installed where V-ditches, gutters, and valley pans will not carry the necessary flow. Culverts shall be corrugated galvanized metal with metal end sections, unless otherwise authorized by the City. Diameter and slope shall be based on flows. Minimum diameter in roadways shall be eighteen (18) inches and minimum in driveways shall be twelve (12) inches.

Monumentation

Centerline monuments shall be set at each street intersection upon completion of street construction. If an existing street is to be resurfaced, the monuments shall be restored or set as necessary. Monuments in gravel streets shall include a bar and cap set in concrete at a minimum of four (4) inches and a maximum of six (6) inches below finished grade. In paved streets the bar and cap set in concrete shall be set under a valve box cover labeled survey marker with the cover set at finished grade.