

the pulverized materials until the water and cement are uniformly distributed throughout the reclaimed material. Maintain moisture content in the range of $\pm 2.0\%$ of OMC during final mixing. Measure the moisture content after final mixing and prior to initial compaction using a nuclear gauge by direct transmission method in accordance with AASHTO T 310.

3.04 Initial Compaction

- A. Begin compaction immediately after cement and water has been incorporated and thoroughly blended with the reclaimed material. Compact the reclaimed materials using approved sheepsfoot roller(s) to 100% of MDD specified in the mix design. Maintain the moisture content prior to breakdown rolling in the range of $\pm 2\%$ OMC. If the reclaimed mixture becomes too wet for initial compaction, adjust moisture content as directed by the Engineer. Compact the entire area using uniform passes of compaction equipment as determined from the test strip, ensuring that uniform density is achieved.

3.05 Shaping

- A. After mixing and initial compaction, shape the surface of the reclaimed material to the required lines, grades, and cross-sections using an approved motor grader. If no lines or grades are provided, maintain the existing profile and provide correction to noticeable imperfections and cross slopes as instructed by the Engineer. Sprinkle the surface until it is damp, but not wet, and clip with a motor grader as directed by the Engineer. Dispose of the material removed by clipping. Intermediate and Final Compaction Following shaping, perform intermediate compaction using a pneumatic tire roller and then seal the surface with a self-propelled steel wheel roller in static mode. At no time shall the finish roller be operated in vibratory mode.

The centerline must be maintained with a max crown of 3.0%-3.5% in each direction.

3.06 Construction Joints

- A. At the beginning of each day's construction, form a straight transverse construction joint by cutting back into the previously completed work a minimum of 5 feet to form a true vertical face, free of loose or shattered material. Straightedge the transverse joints using a 12-foot straightedge during final grading.

If longitudinal joints between adjacent stabilization passes are necessary, the joints shall be overlapped 2 to 4 inches in a neat straight line. Pre-determined cut lines shall be marked in a manner visible to the operator. The overlap cut width should be confirmed before starting a new cut sequence.

The longitudinal joint shall be offset at least 6 inches with the succeeding layer of HMA or surface treatment.

3.07 Surface Tolerances

- A. After finishing and final compaction of the reclaimed material, test the entire reclaimed surface with a 12-foot straightedge applied parallel to the centerline of the pavement. The deviation of the surface from the testing edge of the straightedge shall not exceed 1/2 inch. Any areas failing to meet the surface tolerances shall be corrected at no additional expense to the City.

3.08 Curing

- A. The Contractor is required to proof roll the compacted material. The reclaimed mixture should be allowed to cure for the specified time as in the approved full depth reclamation mix design. Curing is the Contractors responsibility, who should consider all factors, including the weather limitations and restrictions.

SECTION 02770

CONCRETE CURB, CURB AND GUTTER, VALLEY GUTTERS, SIDEWALK, AND DRIVEWAYS

PART 1 - Description

The work covered by this section consists of furnishing all equipment, labor, and materials necessary for constructing concrete curb, curb and gutter, valley gutters, sidewalks, and driveways on natural or prepared subgrades and bases, completed in accordance with the following specifications and dimensions shown on the plans.

PART 2 – Materials

2.01 Materials

A. Portland Cement Concrete

1. Portland Cement Concrete shall conform to the requirements specified under Section 03050 Portland Cement Concrete

B. Reinforcing Steel and Fibers

1. Reinforcing steel for concrete reinforcement shall meet the requirements of ASTM A615, Grade 60.
2. Welded wire fabric for concrete reinforcement shall meet the requirement as ASTM A185. Mesh shall be welded plain cold-drawn steel wire fabric.
3. Reinforcing Fibers
 - a. Concrete reinforcing fibers shall be polypropylene collated, fibrillated fibers designed and engineered specifically for use as secondary reinforcement for concrete, shall be three-quarter inch (3/4") (20mm) to one inch (1") (25mm) in length and be manufactured by Fibermesh Company, Forta Corporation, or approved equal.

C. Preformed Expansion Joint Material

1. Preformed joint material shall comply with the requirement of ASTM D994, ASTM D1751, or ASTM D1752.

D. Leveling Base Course

1. Base course materials, if specified, shall conform to the requirements of sand with less than 10% passing No. 200 sieve.

Foundation Material

1. Where spongy, organic, or otherwise unsuitable material is encountered, which, in the opinion of the Engineer is unsuitable for subgrade, such unsuitable material shall be removed to a minimum of twelve inches (12") (300mm) below the four inch (4") (100mm) thick leveling base course, and replaced with foundation material. The Engineer may direct the Contractor to excavate deeper than the specified twelve inches (12") (300mm).
2. All foundation material shall be compacted to 95% of maximum dry density, as determined by ASTM D698 at a moisture content of $\pm 2\%$ of optimum. Tree roots shall be removed at least one foot (1') (300mm) laterally and twelve inches (12") (300mm) vertically below all prepared subgrades.

C. Proof Rolling

1. Subgrades shall be proof rolled after compaction testing requirements have been passed and prior to placement of the leveling base course.
2. Proof rolling shall be performed in the presence of the Engineer and a representative of the City Engineer's office.

D. Leveling Base Course.

1. Just prior to placement of concrete, the four inch (4") (100mm) thick leveling base course shall be accurately graded to conform to the grade of the forms, and sprinkled if necessary until the moisture content is at or near optimum moisture content. Optimum moisture content shall be determined by the Engineer in accordance with ASTM D698. In no case shall concrete be placed on a saturated base or if free water is standing on the base. This paragraph applies in areas where spot concrete improvements are scheduled such as short runs of new curb and gutter and in areas where valley gutters are removed and replaced and or where concrete is placed manually in lieu of machine placement.

2.04 Forms

- A. When using forms, they shall be of wood or metal, straight, free from warp, and of sufficient strength when staked to resist the pressure of the concrete without springing, and the upper edge shall form a true line. Outside forms for the curbside shall be of a depth equal to the full depth of the sidewalk, and the inside forms shall be of the depth of the gutter and shall be so designed as to permit secure fastening to the outside form. All forms shall be cleaned thoroughly and greased or oiled before concrete is placed against them. Forms that have become worn, bent, or broken shall not be used. Forms shall be securely set true to line and grade.
- B. On short radii curves, steel plates, which can be readily formed to the desired radii, shall be used. Face forms, if used, shall be preshaped to the proper radii. Care shall be exercised to insure the maintenance of the required cross-section around the entire radius.

division plates in the formwork. Sawing shall be done early after the concrete has set to prevent the formation of uncontrolled cracking. The joints may be hand formed either by 1) using a narrow or triangular jointing tool or a thin metal blade to impress a plane of weakness into the plastic concrete; or, 2) inserting one-eighth inch (1/8") (3mm) thick steel strips into the plastic concrete temporarily. Steel strips shall be withdrawn before final finishing of the concrete.

3. After removal of templates and finishing, contraction joints shall be reopened with a mason's trowel to a depth of one-fourth (1/4) the thickness of the section, the line of cut coinciding with and extending into the joint formed by the template. The joints shall be finished with a jointer.

C. Construction Joints

1. At end of day's run, or in case of an interruption which would result in cold joint, construction joints shall be made at right angles to the longitudinal axis of the curbwalk and shall be located at the regular five foot (5') (1.5m) spacing designated for contraction joints unless otherwise specifically permitted by the Engineer. In no case shall any length of curbwalk be less than five feet (5') (1.5m) between joints.
2. Construction joints shall be formed by use of a bulkhead or divider which shall be removed before continuing with the next run. Edges of construction joints shall be edge tooled to form a recess for sealing compound.

2.07 Concrete Placement

- A. Concrete shall be placed either by an approved slipform/extrusion machine, by the formed method, or by a combination of these methods. Concrete shall not be placed until base courses and forms have been checked for depth and alignment. The method used shall adequately vibrate and compact the concrete to achieve a homogeneous dense concrete free from honeycomb and pockets of segregated aggregate.

B. Machine Placement

1. The slipform/extrusion machine approved shall be so designed as to place, spread, consolidate, screed, and finish the concrete in one complete pass in such a manner that a minimum of hand finishing will be necessary to provide a dense and homogeneous concrete section.
2. The machine shall shape, vibrate, and/or extrude the concrete for the full width and depth of the concrete section being placed. It shall be operated with as nearly a continuous forward movement as possible.
3. All operations of mixing, delivery, and spreading concrete shall be so coordinated as to provide uniform progress, with stopping and starting of the machine held to a minimum.

C. Formed Method

2.09 Curing

- A. Concrete shall be sprayed uniformly with curing compound immediately after finishing of the surface and before the set of the concrete has taken place. Curing compound shall be applied at the manufacturer's recommended rate.
- B. Curing compound shall also be applied immediately to the exposed concrete once forms have been removed.
- C. See section **2.02 F** for approved curing compounds.

2.05 Jointing New and Existing Curb Sections

Where the new concrete sections will join existing concrete sections with a different cross-section, five foot (5') (1.5m) long minimum transition section shall be constructed.

2.11 Fiber Reinforced Concrete

- A. Where specified or approved by the Engineer, provide polypropylene fibers added to the concrete mix to control shrinkage cracks.
- B. Polypropylene fibers shall be added at the rate of three pounds (3#) (1.4 kg) of fiber per cubic yard of concrete. Fibers shall be added to the concrete in accordance with the manufacturer's recommendations.

2.13 Cutting and Patching of Asphalt Paving.

- A. When curb cuts, or other concrete structures are installed adjacent to existing asphaltic concrete paving, the asphalt paving shall be saw cut parallel to and a minimum of eighteen inches (18") (450mm) away from the edge of the concrete.
- B. The excavation between the concrete and the asphalt paving shall be backfilled with a minimum of two and one-half inches (2.5 inches) of asphalt over a specified base course. Base course and asphaltic concrete paving shall comply with City of Lakeland standard specification.
- C. Where the existing pavement and base course sections exceed the minimums specified above, the replacement thickness shall match the existing.

END OF SECTION

SECTION 03050

PORTLAND CEMENT CONCRETE

Part 1-Description.

The work covered in this section includes the classification, materials, proportioning of materials, equipment, mixing requirements, and testing for Portland Cement Concrete to be used for curbs, curb and gutter, and sidewalks, streets, bridges, and miscellaneous structures.

Part 2 - Materials

2.01. Classes of Portland Cement Concrete. Portland cement concrete used for construction of the various items specified elsewhere in these Specifications shall be classified by usage as follows:

A. Class A.

Class A concrete shall be used as specified for such items as directed by the Engineer and other uses as noted in the Special Provisions.

B. Class AS.

Class AS concrete shall be used for storm and sanitary structures, concrete curb, curb and gutter, valley gutters, sidewalks, ditch paving, and similar structures unless otherwise noted in the Special Provisions.

C. Class B.

Class B concrete shall be used for roadway base, soil cement, and pavement.

D. Class C.

Class C concrete shall be used as specified for such items as concrete cradles, encasements, embankment slope paving at bridge abutments, and other low strength applications.

E. Class P.

Class P concrete shall be used for cast-in-place box culverts and precast and precast-prestressed concrete structures or structural members. High-early-strength concrete shall be as specified in Specification Section 03050 Paragraph 6.05.

2.02 Materials.

A. Portland Cement.

1. Type I or Type I-SM cement shall be used unless otherwise specified. Different types of cement shall not be mixed. Portland Cement shall conform to all requirements of the "Standard Specifications for Portland Cement," AASHTO M 85. M. Specification C150

C40.

C. Coarse Aggregate. Coarse aggregate for concrete shall consist of crushed stone or gravel or crushed or uncrushed gravel and shall conform to the following requirements:

1. Coarse aggregate for Class A, Class B, or Class C concrete shall be furnished in two sizes: Size No. 4 and Size No. 67 as shown hereinafter in the attached Table Coarse Aggregate Gradation Table.

2. The two sizes shall be manufactured, within the specified limits, to produce Size No. 467 when combined in the proper proportions at the batching plant. If the supplier provides a proper stockpile to prevent segregation, then a combined Size No. 467 can be used in lieu of blending Size No. 4 and Size No. 67.

3. Coarse aggregate for Class AS concrete shall be Size No. 57. Only limestone coarse aggregate will be used for Class AS concrete; gravel coarse aggregate will not be permitted.

4. Coarse aggregate for Class P concrete shall be size No. 57 or Size No. 67 as may be specified or directed. Only limestone coarse aggregate shall be used for Class P concrete; gravel coarse aggregate will not be permitted.

5. Coarse aggregate for concrete curbing placed by machine extrusion methods shall be Size No. 57 or Size No. 67.

6. The coarse aggregates shall otherwise conform to the requirements of AASHTO M 80 and ASTM C 33 with the following exceptions and stipulations:

a. Deleterious Substances. The coarse aggregate shall not contain more than the following maximum amounts of deleterious substances:

	<u>Max. % of Weight</u>
Clay lumps	0.25
Material passing No. 200 sieve	1.0
Coal or Lignite	1.0
Other deleterious substances such as	
friable, thin, elongated, or laminated pieces	10.00
Other Local deleterious substances	1.00
Soft or nondurable fragments (fragments which	
Are structurally weak such as shale, soft	
Sandstone, limonite concretions, gypsum,	
Weathered schist, or cemented gravel.	3.0

7. The sum of the above, excepting thin or elongated pieces, shall not exceed 5% by weight.

Nominal Max Size of Coarse Aggregate	Total Air Content Percentage by Volume Concrete
3/8 inch	6 to 10
1/2 inch	5 to 9
3/4 inch	4 to 8
1 inch	3 1/2 to 6 1/2
1 1/2 inch	3 to 6
2 inch	2 1/2 to 5 1/2
3 inch	1 1/2 to 4 1/2

- F. Chemical Admixtures. Chemical admixtures shall conform to ASTM C494, except TYPE C accelerating admixtures shall contain no chlorides, shall be non-toxic after thirty (30) days, and shall be compatible with air-entraining admixtures. The amount of admixture added to the concrete shall be in accordance with the manufacturer's recommendations.
- G. Pozzolan Admixture. Pozzolan admixture shall conform to the requirements of ASTM C311 and ASTM C618-85 (including Table IA) for either Class C or Class F. Class C fly ash may be used as a replacement for Portland cement if approved in writing by the Owner. The maximum amount of cement being replaced by fly ash shall not exceed 15 percent. When a specific air content has been required and fly ash is being used, the air content shall be tested on each truck load of concrete at the batch plant and the tested value shall be indicated on the ticket.
- H. Fiber-Reinforced Concrete shall conform to ASTM C1116 material requirements and classifications. Concrete containing fibers (steel, glass fibers, or synthetic fibers) shall conform to the manufacturers addition rate and shall be included in the mix design approved by the Engineer. Glass Fiber and synthetic fiber reinforced concrete shall not be used to replace structural reinforcement, and shall be added at the batch plant.

PART 3 – Execution

3.01 Sampling and Testing and Storage of Materials.

- A. Cement. Cement may be accepted on the basis of mill tests and the manufacturer's certification of compliance with the specifications, provided the cement is the product of a mill with a record for production of high quality cement. Certificates of compliance shall be furnished the Engineer by the Contractor, for each lot of cement furnished prior to use of cement in the work. This requirement is applicable to cement for job-mixed, ready-mixed, or transit-mixed concrete. Cement proposed for use where no certificate of compliance is furnished, or where,

1. Coning or building up stockpiles by depositing the materials in one place will not be permitted. The storing of aggregates in stockpiles, or otherwise, upon the subgrade or shoulders will not be permitted.

3.02 Concrete Mixture Requirements.

- A. The concrete shall meet the following requirements as outlined in the Concrete Classification Table attached to the end of this Section.
 1. If it is found impossible to produce concrete having the required air content with the materials and mixing procedures that are being used, the Contractor shall make such changes in the materials or mixing procedures, or both, as may be necessary to insure full compliance with the requirements of air content in the concrete.
 2. The total weight of aggregates per sack of cement and the relative proportions of coarse and fine aggregate shall be determined by yield tests made during the progress of the work. The Engineer may, at his discretion, adjust the laboratory mix design to obtain the proper yield, and consistency of concrete.
 3. The Contractor shall receive written permission from the Engineer prior to adding Pozzolan admixture to Portland Cement Concrete.
 4. Any combination of aggregates which requires the use of more than six and one-half gallons (6.5g) (25l) of water per sack of cement to produce a workable mixture, with the brand of cement used will be considered as being unsatisfactory, and all such combinations of aggregate will be rejected.
 5. Concrete shall be uniformly plastic, cohesive, and workable. Workable concrete is defined as concrete which can be placed without honeycomb and without voids in the surface. Workability shall be obtained without producing a condition such that free water appears on the surface when finished. The consistency of the mixture shall be that required for the specified conditions and methods of placement; however, the previously determined maximum water cement ratio shall not be exceeded.

3.03 Proportioning of Materials.

All materials shall be separately and accurately measured by weight, and each batch shall be uniform. The coarse and fine aggregates shall be weighed separately. A sack of cement shall weigh ninety-four pounds (94#) (43kg). When bulk cement is used, ninety-four pounds (94#) (43kg) shall be considered as one sack. The Contractor shall furnish and use approved weighing devices, which, in operation, will give the exact quantity of materials required for the class of concrete. When the cement is in contact with the aggregate, it shall not remain more

approved adjustable, water measuring device which will prevent excess water flowing into the mixer, in order that the consistency may be under positive control and that all batches may be of the same consistency.

1. In general, the minimum amount of water shall be used which will produce the required workability. The mortar shall cling to the coarse aggregate and shall show no free water when removed from the mixer.

B. Mixer. The mixing machine used shall be of an approved type known as a batch mixer, and of a design having a suitable device attached for automatically measuring the proper amount of water accurate to one percent (1%) and for automatically timing each batch of concrete so that all materials will be mixed together for the minimum time required. Such device shall be easily regulated and controlled to meet the variable conditions encountered. If the time device becomes broken or fails to operate, the Contractor will be permitted to continue the balance of the day without the timing device while the same is being repaired, provided that each batch of concrete is mixed two (2) minutes.

1. The normal mixing time for each batch shall be one (1) minute, and the measuring of this period shall begin after all the materials are in the drum. During this mixing period, the drum shall revolve at the speed for which the mixer is designed, but shall make not less than fourteen (14) nor more than twenty (20) revolutions per minute.
2. No materials for a batch of concrete shall be placed in the drum of the mixer until all of the previous batch has been discharged therefrom. The discharge of water into the drum shall commence with the flow of the aggregates, but shall not be started before the entrance into the drum of part of the aggregates. The discharge of all of the mixing water for any batch shall be completed within ten (10) seconds after all of the aggregates are in the drum. The inside of the drum shall be kept free from hardened concrete.
3. The use of mixers having a chute delivery will not be permitted except by permission of the Engineer. In all such cases the arrangement of chutes, baffle plates, etc., shall be such as will insure the placing of fresh concrete without segregation.
4. Ready-mixed concrete from a central mixing plant delivered at the work ready for use, will be permitted, provided the mixture is transported to the job site in an agitating truck having the concrete contained in a revolving drum and provided there is no segregation of the mixture at the point of placing. Ready-mixed concrete from a central batching plant and mixed in transit will be permitted; however, the mixing and transporting equipment will be subject to the special approval of the Engineer. Any ready-mixed concrete shall comply with all of the requirements of these specifications.
5. The time elapsing from the time the water is added to the mix until the concrete is deposited in place at the site of the Work shall not exceed 30 minutes when hauled in non-agitating

other foreign substances.

- C. Concrete shall be thoroughly consolidated against and along the faces of all forms and along the full length and on both sides of all joint assemblies, by means of vibrators inserted in the concrete. Vibrators shall not be permitted to come in contact with a joint assembly, the grade, or a side form. In no case shall the vibrator be operated longer than 5 seconds in any one location.

3.08 Protection.

- A. It shall be the responsibility of the Contractor to protect from damage all freshly poured concrete regardless of the location or type of structure for a minimum period of seven (7) days or for such longer period as the Engineer may direct. Any concrete which is damaged shall be repaired to the satisfaction of the Engineer prior to acceptance of the completed work.

3.09 Quality Control Testing.

- A. The Owner or Consultant will employ a testing laboratory to perform test and submit test reports. Test reports will be reported in writing to Consultant, Owner, and Contractor as soon as possible upon completion of tests.

- 1. Compressive Strength Tests. Concrete test cylinders will be made by a qualified technician from a certified material testing laboratory.
- 2. The cylinders shall be made and tested in accordance with ASTM C39.
- 2. Tests may be required for each day's run or according to the following schedule:

<u>Total Cubic Yards of Concrete Placed (m³)</u>	<u>Minimum Number of Tests* (3 cylinders each)</u>
0 – 100(0-75)	One for 7 days, two at 28 days
100 – 1000 (75 -750)	One for each 50 cu. Yds. (38m ³)
1000 – 2000 (750 – 1500)	One for each 125 cu. Yds. (100m ³)
2000 and Over (1500)	One for each 175 cu. Yds. (125 m ³) One for each 250 cu. Yds. (200 m ³)

*One test per pour minimum.

- iii. Results of all tests shall be furnished to the Engineer as soon as they are available.
- 2. Slump. Slump test shall be conducted in accordance with ASTM C172. A test shall be performed for each day's pour of each type of concrete and for each set of compressive strength test.

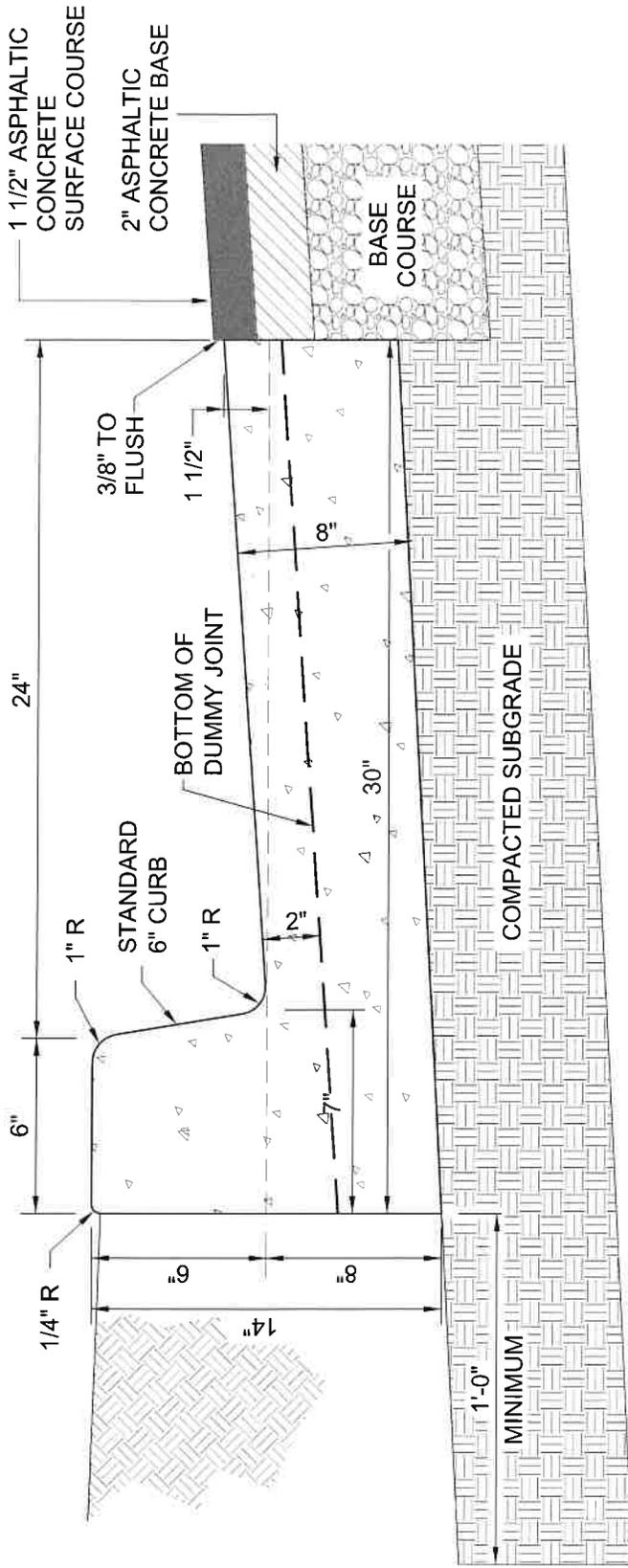
CONCRETE CLASSIFICATION TABLE

Class of Concrete	Min. 28 day Compressive Strength (psi)	Slump in Inches	Min Cement-Sacks/CY (3)		Min Cement-#/CY (3)		Net Water Max. Gal/CY (3)		Net Water Max-#/CY (3)	
			Gravel Course Aggregate	Limestone Course Aggregate	Gravel Course Aggregate	Limestone Course Aggregate	Gravel Course Aggregate	Limestone Course Aggregate	Gravel Course Aggregate	Limestone Course Aggregate
A	3000	3-5	6.0	5.5	564	517	36	33	300	275
AS	4000	3-5	(2)	6.2	(2)	583	(2)	(2)	(2)	310
B	3500(1)	1-2.5	6.2	5.8	583	545	34.1	31.9	284	266
C	2500	2-4	5.0	4.5	470	423	34	30.6	283	255
P	5000	1-3	(2)	7.0	(2)	658	(2)	35	(2)	292

Notes:

- (1) Minimum compressive strength at 14 days. Minimum flexural strength at 14 days of 550 psi per AASHTO T 22
- (2) Gravel Course Aggregate not permitted.
- (3) Tabulated values are for Type I cement conforming to the requirement of AASHTO M 85 only.

END OF SECTION



CONSTRUCTION NOTES:

1. PRECUT EXPANSION JOINT MATERIAL WILL BE USED IN ALL EXPANSION JOINTS.
2. DUMMY JOINTS WILL BE INSTALLED AT 10' MAXIMUM INTERVALS.
3. EXPANSION JOINTS WILL BE INSTALLED AT 40' O.C. MAX.
4. EXPANSION JOINTS WILL BE INSTALLED AT ENDS OF RADII.
5. EXPANSION JOINTS WILL BE LOCATED ADJACENT TO INLET STRUCTURES.
6. CONCRETE WILL BE CLASS "AS" CONCRETE, 4000 PSI.
7. SEE DETAIL FOR EXPANSION JOINTS.

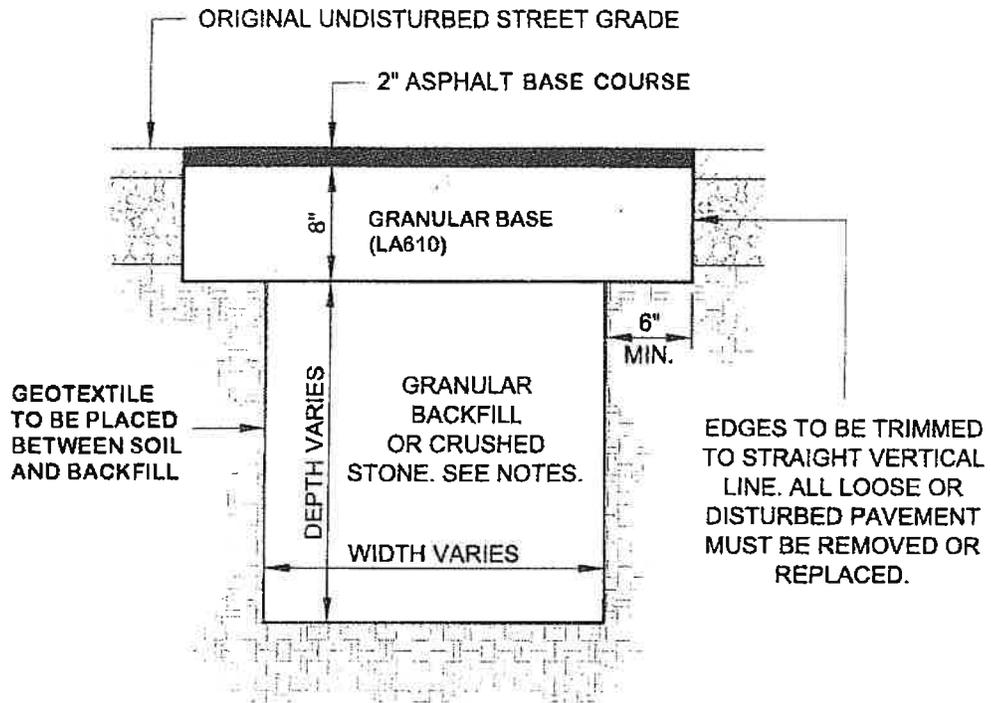
*CITY OF LAKELAND
ENGINEERING DIVISION*

**6-30 CURB
AND GUTTER**

NOT TO SCALE

**6-30 CURB
AND GUTTER**

REV.	DESCRIPTION	DATE
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NOTES:

1. SAND MAY BE USED AS BACKFILL MATERIAL IN TRENCHES 6' DEEP OR LESS.
2. ANY TRENCH GREATER THAN 6' IN DEPTH SHALL BE REQUIRED TO BE BACKFILLED WITH CR610 CRUSHED STONE OR AS DIRECTED BY THE CITY ENGINEER.
3. CEMENT TREATED BASE MUST BE PLACED AND COMPACTED WITHIN 3 HOURS OF DISPATCH.
4. GRANULAR BACKFILL MATERIAL SHALL BE COMPACTED TO 95% MAXIMUM DRY DENSITY.

**TYPICAL PAVEMENT
REPAIR DETAIL**
NOT TO SCALE

<i>CITY OF LAKELAND ENGINEERING DIVISION</i>		
TYPICAL PAVEMENT REPAIR DETAIL		
REV.	DESCRIPTION	DATE
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