CITY OF CERES, CALIFORNIA

IMPROVEMENT STANDARDS

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CITY OF CERES
PUBLIC WORKS DEPARTMENT
ENGINEERING IMPROVEMENT STANDARDS

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GENERAL PROVISIONS

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GENERAL PROVISIONS

A. STANDARDS

Required improvements shall be built in accordance with the applicable sections of these Improvement Standards including the latest edition of the California Standard Specifications, prepared by the State of California, Department of Transportation (hereinafter called "Standard Specifications") or the Standard Specifications for Public Works Construction; applicable sections of the Ceres Municipal Code and the special provisions prepared by the design engineer and approved by the City Engineer. In case of conflict between the approved Special Provisions prepared by the design engineer and these Improvement Standards and/or the Standard Specifications, the approved Special Provisions shall take precedence. To supplement the above, the design engineer shall prepare necessary plans and profiles using accepted principles of civil engineering and using wherever applicable, the standard plans found in Section IV of these Improvement Standards. The City Engineer may make modifications or additions to these standards when justified by special circumstances.

B. PLANS AND SPECIFICATIONS

All improvement plans, specifications, and special provisions shall comply with the requirements of the approved or conditionally approved development plan and these Improvement Standards. Prior to beginning any construction and at least 30 days prior to the date on which a developer desires the City Engineer to present his final map of the development to the City Council, his engineer shall present completed improvement plans and specifications along with any required special provisions, to the City Engineer for his approval. Construction changes from the approved Improvement Plans shall be permitted only upon approval of the City Engineer. Record plans shall be furnished to the Department of Public Works upon completion of the work and shall be prerequisite to acceptance of the work.

C. DEFINITIONS

When used for the construction of any improvements required by these Improvement Standards, the definitions and terms listed in Section I of the Standard Specifications shall apply, with the following exceptions:

City Engineer. The Director of Public Works/City Engineer acting either directly or through properly authorized agents.

Contractor. The person or persons, firm, partnership, corporation or combination thereof, private or municipal, entering into a contract with the City of Ceres as party or parties of the second part, or his or their legal representatives. Contractor shall also mean the developer who has entered into an improvement work agreement with the City of Ceres.

Department of Public Works. The City of Ceres Department of Public Works.

Design Engineer. The civil engineer retained by the developer for the preparation of plans, specifications and the general supervision of the construction of the required improvements.

Engineer's Estimate. The list of estimated quantities of work to be performed.

Improvement Plans. Plans of proposed improvements prepared by the design engineer, when they have been approved by the City Engineer of the City of Ceres.

Improvement Standards. These plans and specifications prepared by the City to regulate construction in the City so the improvements shall meet the minimum standards of the City to provide a reasonable trouble-free result.

Special Provisions. The directions, provisions, and requirements prepared by the design engineer for the construction of this project.

Specifications. Directions, provisions and requirements contained herein as supplemented by the Standard Specifications and by such special provisions as may be necessary, pertaining to the method and manner of performing the work or to the qualities and quantities of materials involved. The special provisions of specific plans are instructions setting forth conditions or requirements peculiar to the project under consideration and covering work or materials not satisfactorily covered by the Standard Specifications or these Improvement Standards.

Standard Plans. The standard plans of the City of Ceres Department of Public Works.

D. ABBREVIATIONS

AAN	American Association of Nurserymen
AASHO	American Association of State Highway Officials
AISC	American Institute of Steel Construction
AREA	American Railway Engineering Association
ASA	American Standards Association
ASME	American Society of Mechanical Engineers
ASTM	American Society of Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CODE	National Electrical Code
EIA	Electronic Industries Association
IEEE	Institute of Electrical and Electronic Engineers
NEMA	National Electrical Manufacturer's Association
UL	Underwriters' Laboratories, Inc.
UBC	Uniform Building, Plumbing Codes

SECTION II

SECTION II

A. STREETS AND HIGHWAYS

1. Geometric Designs

a. Road Widths - The road widths shall comply with the applicable geometric section listed in Section IV of these Improvement Standards.

b. Grades - Road grades shall not be less than 0.15% except in commercial areas. In commercial areas road grades shall not be less than 0.10%. Maximum grade not to exceed 15%.

c. Intersections - Street intersections shall be as near right angles as practical. In no case shall the angle of intersection be less than 70 degrees. Streets located on opposite sides of an intersecting street shall have their centerline separated by not less than 100 feet.

2. Pavement Design

Unless otherwise approved by the City Engineer, pavement structural sections shall be as follows:

Local Streets (50' R/W) 0.17' AC-0.35' AB
Collector Streets (60'-80' R/W) 0.20' AC-0.35' AB
Major Streets (80' - 110' R/W) 0.25' AC-0.50' AB
Industrial Streets (any width) 0.25' AC-0.50' AB

When special conditions are present, it is requested by the Design Engineer, or it is determined by the City Engineer that other criteria are necessary to estimate an adequate street section, the R-value method used by the State of California Department of Transportation shall be used. When the R-value design method is used to determine the thickness of the various structural elements of the roadway, a 10-year design life shall be used. The gravel equivalents and minimum thickness of the various structural layers shall be obtained from Plate B-4 of Section V of these Improvement Standards. The Traffic Index, T.I., shall be determined from Plate B-5 where traffic estimates can be made by conventional means. The minimum traffic index for minor residential streets is 4.5. Commercial, industrial and arterial streets and alleys shall use a minimum traffic index of 8.0. The minimum traffic index for collector streets is 6.0.

3. Structure Design-Bridges

All bridges and culverts shall be designed for the following minimum design loads:

Road Class	AASHO Design Load
Minor	H 20 - 44
Collector	HS 20 - 44
Major or Expressway	HS 20 - 44

The width of the bridge shall be sufficient for the full curb to curb width plus standard sidewalk areas and railings on each side of the bridge.

4. Auxiliary Drainage Facilities

Culverts, ditches at the bottom of slopes, and other such drainage facilities shall be designed for a flood frequency of 50 years or more. Down flumes or other overside drains shall be spaced so as to drain no more than 300 feet of roadway.

Energy dissipaters or other suitable forms of erosion protection shall be placed at culvert outlets where the exit velocity exceeds 2 feet per sec or where the Department of Public Works determines such measures are needed for erosion control.

5. Auxiliary Safety Facilities

Safety facilities such as street name signs, warning-signs, regulating signs, markers, guard rails, and barricades as required shall be included in the design. Guard rails may be required when any of the following conditions exist: (a) height of an embankment more than 10 feet; (b) side slope steeper than 3:1; (c) the distance from any fixed obstruction is less than 8 feet.

6. Sidewalks

Sidewalks in commercial developments shall be constructed to the width required to handle the pedestrian traffic. The sidewalk shall have at least 5 feet of clear width. Sidewalks in residential developments shall be 4 feet 4 inches wide. Sidewalks in industrial areas shall be as required by Planning Commission action on specific site plans.

7. Access Control

Access control shall be provided on all major thoroughfares as designated on the General Plan. Access control fences are to be constructed in accordance with Plate M-6. Other designs may be allowed if they meet the approval of the City Engineer.

8. Header Boards

2" x 4" headers, consisting of treated Douglas fir or redwood, shall be installed to protect all edges of asphalt concrete where streets are partially completed.

9. Street Lights

Electroliers on two lane roadways shall be installed as shown on drawing L-1A, electroliers on four lane roads which shall be placed in accordance with drawing L-1B. The City Engineer may adjust the street light spacing to meet specific safety needs and special situations.

Luminaires shall be as follows or an approved equal:

250 watt I.E.S. Type III G.E. C798N633
Landmark CF6233

150 watt I.E.S. Type III G.E. C760N526
Landmark CD56212-6

100 watt I.E.S. Type II G.E. C760N526
Landmark CD56212-6

Luminaires shall have high pressure sodium vapor lamps, built-in receptacles for photoelectric cells, and regulator or auto-regulator type ballasts with a power factor of not less than 92%. The photoelectric cell shall be General Electric C401G001 or approved equal. The hot-dip galvanized steel street lighting standards shall be Ameron Catalog No. N-2512 or approved equal. All photoelectric cells shall be glass unless otherwise approved by the City Engineer.

10. Signs

Required street name signs and traffic warning devices shall be furnished and installed by the developer. Stop signs including post shall be delivered to the City corporation yard.

11. Monuments

a. Street monuments and covers, conforming to City Standards, shall be placed on the centerline of each street at the intersection of the street centerlines, beginning and end of curves, change of direction, any other points deemed necessary by the City Engineer.

b. Exterior boundary monuments shall be placed on the subdivision boundary at any change of direction, beginning and end of curves, and any other points deemed necessary by the City Engineer.

c. Monuments shall be placed at all block corners, alley corners, and lot corners.

d. Final maps shall show by appropriate statements by the Engineer or Surveyor when monuments were or shall be set and a description of monuments installed or to be installed.

e. A minimum of one bench mark shall be established within each subdivision. The elevation and datum plan used shall be shown on the Improvement Plans. After construction, one bench mark shall be established on a street monument and the elevation shall be shown on the Record Improvement Plans.

f. Survey monuments at boundary, street, and alley corners shall be a minimum size of 1" O.D. x 24" long galvanized iron pipe. Lot monuments shall be a minimum size of 3/4" O.D. x 24" long iron pipe.

g. Monuments shall be set approximately 6 inches below finished grade whenever practicable so as not to be easily disturbed, and to insure perpetuation of the point.

h. Survey methods and monumentation shall be in compliance with the provisions set forth in the Subdivision Map Act, with the Land Surveyors Act, and these Standards.

12. Road Classification

Local road classifications shall be in accordance with Table 1. The number of dwellings served by a road, including loop roads, shall be the number of dwellings fronting the entire road plus the number of dwellings fronting on other lesser streets connected to it that would logically be served by the road under construction.

B. SANITARY SEWERS

1. General - All sanitary sewer design shall be in accordance with accepted principles of civil engineering practice and these Improvement Standards.

   Extensions of, or ties to, existing sanitary sewer lines shall be permitted only upon approval of the City Engineer. The City Engineer shall determine which existing sanitary sewer lines have adequate capacity to serve proposed developments.

2. Design - Sanitary sewers shall conform to the following standards:
   a. Minimum Slopes

Pipe Size	Manning "N"	Slope
6"	0.012	0.0036
8"	0.012	0.0029
10"	0.012	0.0021
12"	0.012	0.0017
15"	0.012	0.0012
18"	0.012	0.0009

   b. The velocity of the flow in the pipe must be 2.0 F.P.S. Increasing the pipe diameter to extend the line may be considered in special cases with appropriate engineering.

      Manholes shall conform to Plate S-1 of these standards, shall be located at the changes in sewer pipe size, slope, direction, or junction and have maximum spacing as follows:

Pipe Size	Maximum Manhole Spacing
6" thru 8"	350'
10" or larger	400'

   c. When a line is to be extended at a future date, a temporary lamphole as shown in Plate No. S-4 may be installed if it meets the following requirements and is approved by the City Engineer:

      1. New Development

         (a) The length of the line to be extended is to be no longer than half the street width, plus the length of a curb return.

(b) Line extensions must be for units within the same subdivision.

(c) The subsequent units in the subdivision to be served by the extension must be scheduled for improvements within six months from the date that the lamp hole is installed.

2. Extensions to Serve Existing Structures

(a) The distance to the nearest manhole is less than 100 feet.

(b) The number of structures served is two or less.

d. The minimum size pipe diameter for sanitary sewers shall be 8". In short non-extendable runs or cul-de-sacs not exceeding 250 feet, a 6" diameter pipe may be used when approved by the City Engineer.

e. Sanitary sewer pipe shall be vitrified clay pipe, bell and spigot, and conform to the latest edition of ASTM designation C-700. Joints shall be flexible compression joints conforming to the latest edition of ASTM Designation C425.

f. Connections to sanitary sewers shall be made at wyes or by sawing a hole and installing a collar wye saddle. No connections shall be permitted in lines greater than 10" in diameter, except at manholes.

g. Minimum cover over the top of any clay sewer pipe shall be 36" from finished grade of the street. If this minimum cover cannot be obtained, cast iron pipe shall be installed. In no case shall the depth from finished grade be less than 24" in the street. The depth of the collection pipe shall be sufficient that the required minimum slope can be maintained for the house connection.

h. Sewer lines shall be air pressure tested. The contractor shall furnish all materials, equipment and labor for making an air test. Air test equipment shall be approved by the City Engineer unless otherwise provided on the plans or in the Standards.

The contractor shall conduct an air test of the sewer main line after densification of the backfill. Each section of sewer shall be tested between successive manholes by plugging and bracing all openings in the main sewer line and the upper ends of all house connection sewers. Prior to any air pressure testing, all pipe plugs shall be checked with a soap solution to detect any air leakage. If any leaks are found, the air pressure shall be released, the leaks eliminated, and the test procedure started over again.

The final leakage test of the sewer main line and house laterals, shall be conducted in the presence of the Engineer in the following manner:

Air shall be introduced into the pipeline 3.0 psi until (20.68 kPa) gage pressure has been reached, at which time the flow of air shall be reduced and the internal air pressure shall be maintained between 2.5 and 3.5 psi (17.24 and 24.13kPa) (gage) for at least two minutes to allow the air temperature to come to equilibrium with the temperature of the pipe walls. Pressure in the pipeline shall be constantly monitored by a gage and hose arrangement separate from hose used to introduce air into the line. Pressure in the pipeline shall not be allowed to exceed 5 psi (34.47kPa) (gage).

After the temperature has stabilized and no air leaks at the plugs have been found, the air pressure shall be permitted to drop and, when the internal pressure has reached 2.5 psi (17.24kPa) (gage), the time lapse required for the air pressure to drop to 1.5 psi (10.34kPa)(gage) shall be measured.

If the time lapse (in seconds) required for the air pressure to decrease from 2.5 to 1.5 psi (17.24 to 10.34kPa)(gage) exceeds that shown in the following table, the pipe shall be presumed to be within acceptance limits for leakage.

If the time lapse is less than that shown in the table, the contractor shall make the necessary corrections to reduce the leakage to acceptable limits.

T = Time in seconds for pressure to drop from 2.5 to 1.5 psi (17.24 to 10.34kPa)(gage).
D = Diameter (inside) of pipe in inches (mm).

The Contractor shall have the sewer pipe flushed. A T.V. inspection performed by the City Sewer Division shall be made and any deficiencies corrected prior to pressure testing the sewer piping. The actual charges shall be based on the total time spent and equipment used by the Sewer Division flushing and performing the T.V. inspection.

LOW PRESSURE AIR TEST FOR SEWERS
Time (T) in Seconds

Diameter		Length		House Connection Length 0 Feet.	100 Feet	200 Feet	300 Feet	400 Feet
In.	(mm)	Ft	(m)	(0m)	(30.5 m)	(61 m)	(91.4 m)	(121.9 m)
		50	(15.2)	30	40	60	80	90
		100	(30.5)	50	60	80	100	120
		150	(45.7)	70	80	100	120	140
6	(152)	200	(61.0)	90	100	120	140	160
		300	(91.4)	130	140	160	180	200
		400	(121.9)	170	190	200	220	240
		0	(0)	0	20	40	50	70
		50	(15.2)	40	50	70	90	80
		100	(30.5)	70	90	100	100	90
8	(203)	150	(45.7)	110	120	110	100	100
		200	(61.0)	140	120	110	110	100
		300	(91.4)	140	130	120	110	110
		400	(121.9)	140	130	120	120	110
		50	(15.2)	50	70	90	100	90
		100	(30.5)	110	130	120	110	110
10	(254)	200	(61.0)	170	150	140	130	120
		300	(91.4)	170	160	150	140	130
		400	(121.9)	170	160	150	150	140
		50	(15.2)	80	100	110	110	110
		100	(30.5)	160	170	150	140	130
12	(305)	200	(61.0)	200	180	170	160	150
		300	(91.4)	200	190	180	170	160
		400	(121.9)	200	190	180	180	170
		50	(15.2)	120	140	160	140	130
		100	(30.5)	250	220	190	170	160
15	(381)	200	(61.0)	260	230	220	200	190
		300	(91.4)	260	240	230	220	210
		400	(121.9)	260	240	230	220	220

i. Trenches in existing streets shall be resurfaced with the type and thickness of base, surfacing or pavement as indicated on the plans or as required by the City Engineer. In no case shall the resurfacing consist of less than 0.17' Type "B" AC over compacted native material.

j. Manholes and lampholes, where allowed, shall be adjusted to grade after the final layer of street paving is completed.

k. Precast concrete manhole sections, adjustment rings, and tapered sections shall conform to the requirements of ASTM C-478.

C. PUBLIC WATER SUPPLY LINES

1. General - The construction of all public water lines shall comply with these Standards, appropriate standards of the American Water Works Association and applicable local, state and federal regulations.

2. Materials - Pipe for construction of water supply lines shall be Class 150 C-900 P.V.C. pipe or Ductile iron pipe conforming to the following specifications. In special cases other acceptable materials may be approved by the City Engineer.

    a. P.V.C. Pipe - Pipe shall conform to AWWA Standard C900. P.V.C. Pipe shall be suitable for the purpose intended, shall be installed as per manufacturer's recommendations, AWWA Standard C603, and these standards.

    b. Ductile Iron Pipe - Pipe shall conform to AWWA Standard C-151/A21.59 for cast iron pipe centrifugally cast in metal molds. The pipe fitting shall conform to AWWA Standard C110 for gray iron and ductile iron fittings. Ductile iron pipe joints shall conform to AWWA Standard C-111/A21.11 for rubber gasket joints.

        Ductile iron pipe shall be suitable for the purpose intended, shall be installed as per manufacturer's recommendations, AWWA Standard C600 and these Standards.

3. Disinfection - Disinfection shall be accomplished by the following or other procedure satisfactory to the City Engineer. Calcium Hypochlorite disinfecting compound in powder or pellet form may be introduced into the pipe while laying. Sufficient amounts shall be placed so as to obtain approximately 50 parts per million of chlorine in all parts of the line when line is filled with water. Treated water shall be retained at least twenty-four (24) hours after which time it shall be tested for residual chlorine. Residual chlorine must be present or the pipe shall be rechlorinated. When disinfection has been completed and approved by the City Engineer, the system shall be flushed and filled with clear water. After refilling the lines a bacteriological sample shall be taken by a qualified laboratory.

    If the sample is found not to be of a safe bacteriological quality, the contractor shall rechlorinate and retest the line until no bacteriological contamination is present.

4. Fire hydrants shall be "Rich Ranger" or "Jones" series of the type shown on the Standard Plans or approved equal, shall conform to AWWA Standard C503 for wet barrel fire hydrants and these Standards. Fire hydrant location shall be at the direction of the City of Ceres Fire Department. The maximum spacing measured within the right-of-way shall be 300 feet.

Self adhesive blue reflective fire hydrant markers are to be provided to the Fire Department by the Contractor. They shall be provided at a ratio of one reflector per hydrant, unless the fire hydrant faces two streets then two reflectors shall be required. Minimum standards for blue reflective fire hydrant markers shall be those standards set forth by the Amerace Corporation, for their model 88SSAB. (Self adhesive, primer type, bidirectional or approved equal.) In lieu of providing the markers and adhesive the contractor may pay the City the equivalent costs for installation. The contractor may also, at his option, install the reflectors. Reflectors are to be placed 1' (one foot) to the hydrant side of the street centerline.

5. Water valves shall be installed as shown on the plans and shall conform to AWWA Standard C-509, resilient seated gate valve.

6. Valves, valve boxes, elbows, tees, adapter caps and fittings shall be handled and jointed as specified for pipe installation listed herein. Thrust blocking shall be constructed at the locations indicated in standard drawings. Blocking shall be made of Class B concrete, and shall be placed between undisturbed ground and the fitting to be anchored. The area of bearing on the pipe and on the ground shall be that required by the City Engineer. The blocking shall be placed so that the joints of the pipe and fittings shall be accessible for repair.

7. The contractor shall make connections to existing water lines as approved by the City Engineer. Connections shall be made at such times as designated by the City Engineer and in such manner as to insure the least inconvenience to water users. No connection shall be made until the new work has passed the pressure and bacteria tests. The contractor shall be responsible for safeguarding the existing system from all damage and possible contamination in the performance of his work. The contractor shall notify the affected property owners and/or adult occupants of the proposed interruption of service at least 24 hours prior to the occurrence for residential customers and one week prior to the occurrence for industrial and commercial customers.

8. After installation the entire length of each line and each valve shall be subjected to a hydrostatic pressure of not less than one hundred fifty pounds per square inch for a period of not less than one hour.

The Contractor shall permanently stop all leaks. All pipe, joints, or valves, which prove defective, shall be replaced and the lines on which such defects occur shall be tested again to determine final acceptability of the installation. Test pumps and instruments shall be furnished by the contractor.

9. All water lines, including services to meter boxes, shall be installed with a No. 12 gage TW solid coated tracer wire. All joints in the tracer wire shall be weather tight and waterproof.

10. Water meters for all development shall be supplied by the developer. Make and type of meter shall be approved by the City Engineer.

D. STORM DRAIN SYSTEMS

1. General - All drainage designs shall be in accordance with the accepted principles of civil engineering, the Stanislaus County Storm Drainage Design Manual, and these Improvement Standards.

2. Storm Drain Pipe and Fittings - Storm drainpipe shall be one of the three types of pipe specified in this section. One type shall be used throughout the project unless otherwise authorized by the City Engineer.

    a. Corrugated Polyethylene Pipe - Corrugated polyethylene pipe shall have a smooth interior and an annular corrugated exterior. The joints shall be bell and spigot, with an integral bell and shall conform to the requirements of AASHTO M294.

    b. Reinforced Concrete Pipe - Reinforced concrete pipe shall be Class III and shall conform to the provisions in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these provisions.

    c. Type PSM Poly (Vinyl Chloride) Pipe - P.V.C. pipe shall meet ASTM D3034-SDR35 with ring-tite joints.

    Storm Drain Pipes shall be video inspected per Section B.2.h.

3. Type of System - Residential, Commercial, and Industrial developments shall have surface drainage disposal accommodated in one of the following ways:

    a. Positive Drainage - Positive drainage to a river, stream, creek or other natural water course.

    b. Irrigation Facility - Drainage into an irrigation district facility, either by gravity or pumping.

    c. Drainage Ponds - Utilize drainage ponds, either in individual lots within a subdivision or in the case of larger developments, within a depressed portion of a common area.

    d. Drainage Unit - Utilize French Drain drainage unit within depressed areas of the street right-of-way for those subdivisions or portions of subdivisions of such size that one of the above solutions is not feasible as determined by the City Engineer.

e. On-site Drainage-Commercial - In the development of commercial properties, on-site drainage shall be contained within the property unless method A or B is available and the developer participates in a system to take care of on-site drainage as approved by the City Engineer.

f. On-Site Drainage-Industrial - All on-site industrial drainage shall remain on site.

4. Flow Volumes - Volumes of flow shall be determined by using the rational formula Q = CIA.

a. Formula - Q = CIA, "Q" represents the quantity of run off expressed in cubic feet per second. "A" represents the total run off area expressed in acres. "I" is the intensity of rainfall in inches per hour taken from and approved storm frequency curve. "C" is the coefficient of run off. "C" for residential districts shall be between 0.40 and 0.50. "C" for commercial and industrial development shall be between 0.80 and 0.90.

b. The minimum gutter slope is 0.15% in residential areas and 0.10% in commercial and industrial areas.

5. Drainage Basins

a. Drainage basins shall be used when the area to be drained is approximately one (1) acre or more.

b. Capacity shall be large enough to entrap the total run off from a 50-year frequency - 24 hour duration storm.

c. The basins are to be designed in such a manner that the highest design water elevation shall be 6 inches below the lowest gutter elevation for the 50-year storm.

d. The bottom shall be shaped to concentrate the water at the drain well except for temporary retention facilities.

e. Basin shall be screened with a six (6) foot masonry wall on all sides except the street frontage which shall be a six (6) foot chain link fence with slats and a twelve (12) foot gate.

f. There shall be a 3½ foot minimum unimproved walkway adjacent to the inside of the fence around the top of the basin. This area is to drain away from the basin unless otherwise authorized.

g. A minimum of three (3) drain wells or one (1) French drain the length of the basin shall be installed in the bottom of each basin as approved by the City Engineer.

6. Catch Basins.

Catch basins and drainage units, when permitted, shall be constructed to City standards. There shall be a minimum of two (2) catch basins for each acre of street right-of-way. When the distance between catch basins exceeds 500 feet, the design engineer shall design the proposed catch basin to handle the anticipated flows.

7. Pipes

a. Pipe used as a conductor pipe under a highway or railroad shall be either welded steel or reinforced concrete pipe. The City Engineer may specify which type shall be used in any instance. The protective lining and coating, if any, shall be as shown on the plans or specified in the Special Provisions.

b. Minimum size of all pipes under City streets shall be 18 inches. The minimum size of cross pipe drains shall be 12 inches.

c. Pipe slopes shall be as indicated in section B.2a, Minimum Slopes for sanitary sewer, except as approved by the City Engineer.

8. Manholes

a. Standard precast concrete, saddle type manholes shall be used whenever feasible. Whenever cases arise where special manholes or junction boxes are required, the design must be approved by the City Engineer. In no case shall junction boxes or manholes be allowed which are smaller than thirty-six inches inside diameter.

b. Manholes shall be located at junction points, changes in gradient, changes in pipe size, and at termination of pipe. On curved pipes, manholes shall be placed at the B.C. and E.C. of the curve and on 300 foot maximum intervals along curves for pipes 24 inches and less in diameter and 400 foot maximum intervals along the curve for pipes greater than 24 inches in diameter. Manholes located on curves with radii less than 200 feet shall be specified on an individual basis.

c. Spacing of manholes on straight pipe maintenance shall not exceed 300 feet for drains 24 inches and smaller in diameter and 400 feet for pipes greater than 24 inches in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.

d. All manholes shall have standard manhole covers, as shown in Plate S-1. Manholes shall not be allowed in gutter line except as approved by the City Engineer.

9. Drainage Pumps

Drainage pumps shall be of the non-clog type and each installation shall have two pumps that automatically operate on an alternating basis with both pumps operating together during times of heavy flow. The capacity of the system shall be such that the combined capacity of both pumps can efficiently handle the design storm run off for the area being drained within a 24 hour period. Each pump shall be capable of handling the design storm in a 36 hours period. Single pump Systems may be allowed at the discretion of the City Engineer.

Pumps shall be submersible quick disconnect type. Pump pit shall be supplied with an automatic override switch if the T.I.D. facility into which it is discharging is too full.

Each pumping plant installation shall be designed for the purpose intended and shall be approved by the City Engineer.

E. ELECTRICAL

The design of all necessary electrical installations and related facilities shall conform to all applicable local, State and Federal electrical codes and these Standards. All conduit installed shall be rigid metal unless otherwise approved by the City Engineer. Street light conduit may be PVC.

F. MISCELLANEOUS

1. Oil and Sand Interceptor

An approved Industrial oil and sand interceptor and separator is required for all commercial establishments that may discharge sand, grit, oil, etc., into the sewer or storm drain systems as a result of their operations.

2. Grease (Trap) Interceptor

All commercial food serving and preparation establishments that discharge grease, etc. into the sewer system shall be equipped with an approved 100 lb. minimum grease interceptor, unless a smaller unit is shown to be adequate and approved by the City Engineer.

3. Backflow Prevention Device

All water service connections that are classified as possible cross connections by the State Health Department, California Code of Regulations, Title 17, Group 4, shall be required to install an appropriate, approved Backflow prevention device.

4. Lot Drainage

No lots shall drain onto an adjacent lot unless through a recorded drainage easement, and such drainage has been approved by the City Engineer.

5. Small Car Stalls

If desired, thirty (30) percent of the required parking stalls may be designated for parking small cars. Small car stalls shall be seven and one-half (7.5) feet in width and fifteen (15) feet in length for 90E angle. Each small car space shall be identified with the word "compact" painted on the pavement.

6. Handicap Spaces

Every parking facility serving commercial, industrial and public uses shall include

parking stalls for the physically handicapped. Parking stalls for the handicapped shall have a minimum width of twelve (12) feet and a minimum length of nineteen (19) feet. The number of handicapped parking stalls required shall be two (2) percent of the total number of stalls provided in any such parking facility. In no case shall a parking facility contain less than one such stall. Handicapped stalls shall be situated so that the handicapped person shall not be required to wheel behind parked cars other than their own while entering or exiting the parking area. Each parking stall for the physically handicapped shall be identified by posting immediately adjacent to and visible from, each stall or space, a sign consisting of a profile view of a wheelchair with occupant in white on a blue background. The sign shall be a minimum of twelve (12") inches in width by eighteen (18") inches in height, and may contain the words, "parking only." Ramped access ways shall be provided between off-street parking areas and adjacent walkways. Ramping of access ways shall meet the requirements of the Title 24 Section of the California Administrative Code. Any dwelling, boarding house, motel or hotel, which may provide accommodations specifically for the physically handicapped, shall also provide parking for the handicapped on not less than a 1 to 1 ratio, one physically handicapped stall to each specially equipped living unit.

SECTION III

CONSTRUCTION

CONSTRUCTION

A. CONTROL OF THE WORK

All work accomplished and all materials furnished under these Improvement Standards shall be subject to the inspection and approval of the City Engineer. Such inspection and approval of work and materials shall not relieve the contractor of any of his obligations to complete the work specified and deliver an operational system. Work and materials not meeting these requirements shall be made good, and unsuitable work and materials shall be removed.

The City Engineer shall have access to the work at all times and shall be furnished every reasonable facility for ascertaining that the methods, materials and workmanship are in accordance with the requirements and intent of these Improvement Standards. The contractor or his authorized agent shall be in charge of, and responsible for all phases of work while it is in progress.

The City Engineer shall be notified and contacted by the contractor at least twenty-four (24) hours prior to beginning of any of the following stages of work, and shall be notified when each of the stages has been completed. Subsequent stages shall not be begun without approval of the City Engineer. Should the contractor fail to so notify the City Engineer, the cost of all subsequent inspection and testing necessary to ascertain if the work has met all the specified requirements shall be borne by the contractor or the work shall not be approved.

1. Roadway and ditch excavation including the preparation of embankment areas and the placement of embankment materials.

2. Structure excavation.

3. Placing culvert pipes, storm drains, sanitary sewers, and water lines.

4. Placing all types of backfill material.

5. Construction of forms or setting guide wires for all concrete work including concrete curbs.

6. Placing concrete.

7. Placement of any layer of sub-base, base or surfacing material including the preparation of the subgrade therefore.

8. Final cleanup.

In addition to the above, the contractor shall notify the City Engineer whenever improvement work is to be performed on Saturdays, Sundays, or holidays or during hours of the day when such work is normally not performed so that inspection may be provided. The contractor shall pay the overtime rate for such inspection.

The source of materials used for work performed under these Improvement Standards shall be approved by the City Engineer before delivery is made. The contractor shall give the City Engineer sufficient notice of sources of material so that such tests and inspections as the City Engineer deems necessary can be performed to determine that the materials comply with the specifications. If the source is not already approved, the notice shall not be less than 10 working days prior to delivery of the material to the project. Only approved material that meets the specifications shall be used in the work. No material which, after approval, has in any way become unfit for use shall be used in the work.

All tests of materials and work to determine compliance with the approved specifications shall be in accordance with City approved methods and procedures. The contractor shall furnish to the City Engineer, without charge, samples of all materials to be used in the work. Samples of material from which tests are to be made shall be taken under the supervision of the City Engineer, by a recognized laboratory retained by the contractor.

In lieu of prior sampling and testing of certain manufactured products such as reinforcing and structural steel, culvert pipe, paint, cement and asphalt products, the City Engineer may permit or require certificates of compliance from the supplier of such products before such materials can be used in the work.

Construction control testing of materials entering the work shall be performed by a recognized laboratory. The cost of all testing shall be paid by the contractor.

Failure of the contractor to comply with the approved plans, specifications, or the procedures specified herein shall be deemed sufficient cause for the rejection by the City Engineer of all or any portion of the work. The City Engineer may cause rejected work to be remedied, removed or replaced, all at the expense of the contractor.

B. STREETS AND HIGHWAYS

1. General - The construction of all streets, highways, drainage structures, and their auxiliary facilities shall comply with the requirements of the following portions of the Standard Specifications, except as such portions shall be amended by these Improvement Standards and/or the special provisions. All reference to measurement and payment shall be excluded from the Standard Specifications.

Applicable Sections:

1. Definition and Terms
5. Control of Work
6. Control of Materials
10. Dust Control
15. Existing Highway Facilities
16. Clearing and Grubbing
17. Watering
18. Dust Palliative
19. Earth Work
20. Erosion Control and Landscaping
22. Finishing Roadway
24. Lime Stabilization
25. Aggregate Subbase
26. Aggregate Bases
27. Cement Treated Bases
37. Bituminous Seals
39. Asphalt Concrete
51. Concrete Structures
52. Reinforcement
53. Shotcrete
64. Plastic Pipe
65. Reinforced Concrete Pipe
66. Corrugated Metal Pipe
67. Structural Metal Plate Pipe
68. Sub-surface Drains
69. Overside Drains
70. Miscellaneous Facilities
72. Slope Protection
73. Concrete Curb and Sidewalk
80. Fences
83. Railings and Barriers

Applicable Subsections:

4-1.01	Intent of Plans and Specifications
4-1.04	Detours
4-1.05	Use of Materials Found on the Work laws, and shall hold the City of Ceres harmless from any breach of said laws.
7-1.02	Weight Limitations
7-1.04	Permits and Licenses
7-1.05	Patents
7-1.06	Safety and Health Provisions
7-1.08	Public Convenience
7-1.09	Public Safety
7-1.10	Use of Explosives
7-1.11	Preservation of Property
7-1.12	Responsibility for Damage
7-1.13	Disposal of Material Outside the Highway Right-of-Way
7-1.14	Cooperation
7-1.16	Contractors Responsibility for Work and Materials
8-1.10	Utility and Non-Highway Facilities

2. Dust Control

The contractor shall comply with the requirements of Section 10 of the Standard Specifications. It shall be the joint responsibility of the contractor and the developer to control the dust in the work area including nights, weekends and holidays. It shall also be their responsibility to provide such dust control as may be ordered by the City Engineer. If they fail to provide adequate dust control as determined by the City Engineer, the City engineer can have the dust control provided, and the contractor and/or developer shall pay the costs.

3. Earthwork

The earthwork shall conform to the requirements of Section 19 of the Standard Specifications and the following provisions:

a. General

All unsuitable or surplus material excavated shall become the property of the Contractor and shall be disposed of in accordance with the provisions in Section 7-1.13 of the Standard Specifications. Such material encountered during the construction of the subdivision improvements may be used to regrade lots within the subdivision with the approval of the developer and the City Engineer provided such regrading is done in a manner which shall not prohibit the proper drainage of lots within the subdivision, no unsuitable material is placed within the building pad, and the pad elevations are not raised excessively.

Selected material for use in subdivision improvements may be obtained from material excavated from a location outside the right-of-way but within the subdivision when specified in the special provisions or shown on the plans, and approved by the City Engineer.

b. Pipe Excavation

All pipe for the sewer and storm drain lines shall be laid to line and grade as shown on the approved plans. Contractor shall be responsible for verifying ultimate finish grade.

Pipe shall be laid on bedding such that the pipe is supported for the full length of the barrel except at joints which may be excavated as required. No wedging or blocking of the pipe shall be allowed.

The Contractor shall take care that no earth, sand, rocks, or other foreign matter enters or remains in the pipe during or after placing. At the close of each day's work, or whenever the work ceases for any reason, the end of the pipe shall be protected with a close-fitting stopper.

c. Backfill

When required by the City Engineer, backfill material below an elevation of 12 inches above the top of the pipe shall have a sand equivalent of 30 and shall meet the following gradation requirements:

Sieve Size	Percent Passing
3"	100
NO. 4	35 - 100

Backfill around the pipe and to an elevation of 12 inches above the pipe shall be placed carefully to provide uniform support for the pipe and in such a manner as not to injure or disturb the pipe, and shall be compacted to a relative

compaction of not less than 90%. Backfill material above an elevation of 12 inches above the pipe may be material from excavation, free from stones or lumps exceeding 3 inches in greatest dimension, vegetable matter, or other unsatisfactory material and shall be compacted to a relative compaction of not less than 90 percent. Backfill material placed below the roadway surfacing or other paved area shall be compacted to a relative compaction of 95 percent for the 6" below the roadway section.

Surfacing, base or subbase removed during the trenching operations shall be replaced with material equal to or better than the material so removed. However, the asphalt section of the surfacing replaced shall have a minimum depth of not less than 2 inches.

Jetting is permitted. Mechanically operated tamping machines employing the impact principle shall not be permitted at locations where, in the opinion of the City Engineer, their use could cause damage to the pipe being backfilled.

d. Subgrade

Excavation for compaction of original ground as provided in Section 19-5.02 of the Standard Specifications shall not be required. This provision shall not preclude the necessity of compacting subgrade. The subgrade shall be prepared and compacted as provided in Section 19 of the Standard Specifications.

e. Embankments

The relative compaction of each layer of embankment beneath the surfacing to a depth of 1.5 feet from finished grade or to a depth of 0.5 foot below the lowest layer of pavement, base, or subbase, whichever is the greatest, shall not be less than 95 percent. The relative compaction of all other embankment material shall not be less than 90 percent.

4. Aggregate Subbase

Aggregate subbase shall conform to the requirements of Section 25 of the Standard Specifications and the following provisions.

Aggregate Subbase shall be Class 4 and the percentage composition by weight shall conform to the following grading when determined by Test Method No. Calif. 202:

Sieve Sizes	Percentage Passing
2½"	100
NO. 4	50 - 100
NO. 200	0 - 25

Class 4 aggregate subbase shall also conform to the following minimum quality requirements:

Tests	Test Method No.	Requirement
Sand Equivalent	217	20
Resistance (R-Value)	301	50

The R-Value requirement shall be waived provided the aggregate subbase conforms to the specified grading and has a Sand Equivalent of 25 or more.

Where the required thickness is 0.67 foot or less, the aggregate subbase may be spread and compacted in one layer. Where the required thickness is more than 0.67 foot, the aggregate subbase shall be spread and compacted in two or more layers of approximately equal thickness, and the maximum compacted thickness of any one layer shall not exceed 0.67 foot. Each layer shall be compacted in a similar manner.

5. Aggregate Base

Aggregate base shall conform with the requirements of Section 26 of the Standard Specifications and shall be Class 2, 3/4 inch maximum.

6. Asphalt Concrete

Asphalt concrete shall comply with the requirements of Section 39 of the Standard Specifications and the following provisions. The asphalt binder to be mixed with the aggregate shall be a paving asphalt grade AR 4000 or AS approved by the City Engineer.

Aggregate for asphalt concrete shall be Type B. The percentage composition by weight conforming to one of the following gradings:

3/4" Maximum (Medium)
3/4" Maximum (Coarse)
1/2" Minimum (Coarse)

All aggregate shall be clean, crushed aggregate.

A prime coat or paint binder meeting the requirements in Section 39-4.02 of the Standard Specifications shall be applied to all asphalt or concrete areas to be surfaced with asphalt concrete and other areas when required by the City Engineer.

When specified by the City Engineer, a Fog Seal complying with the requirements of Section 37 of the Standard Specifications shall be applied to the finished surface of the asphalt concrete. The combined mixture of asphaltic emulsion and water shall be applied at the rate of

0.10 gallons per square yard unless a lesser rate of application is required by the City Engineer. A fog seal coat shall be required where new pavement joins existing.

In lieu of the requirements in Sections 39-5.03A and 39-5.03B the minimum rolling equipment specified may be reduced to one 2-axle tandem roller, weighing at least 8 tons, when asphalt concrete is placed at a rate of 100 tons, or less, per hour at any location provided it is demonstrated to the satisfaction of the City Engineer that one roller can perform the work. Asphalt concrete shall be compacted to a relative compaction of not less than 95% and shall be finished to the lines, grades and cross section shown on the plans.

7. Concrete Structures

Concrete structures shall be constructed in accordance with the requirements in Section 51 of the Standard Specifications.

8. Slope Protection

Slope protection shall conform to the requirements in Section 72 of the Standard Specifications.

9. Concrete Curbs and Sidewalks

Concrete curbs, sidewalks, and gutter depressions shall conform to the requirements in Section 73 of the Standard Specifications.

10. Drainage and Irrigation Pipes

Pipe for use in drainage facilities shall conform to the requirements in Sections 63, 64, and 65 of the Standard Specifications and the following provisions.

The type of pipe specified for work governed by these Improvement Standards may be selected by the contractor or the design engineer provided the pipe is of sufficient strength to withstand the loading imposed, has a minimum service life of 50 years, meets the quality requirements specified in the above named sections of the Standard Specifications and is approved by these special provisions. Soil tests may be required by the City Engineer where the chemical composition of the soil may be detrimental to certain types of pipes proposed for use.

The strength of the pipe required within the road right-of-way shall be determined by the design procedure used by the State Division of Highways.

The hydrostatic test specified for siphon and pressure pipe in Sections 65-1.08 of the Standard Specifications may be waived by the City Engineer under field conditions that he determines makes the tests unnecessary or impractical to conduct.

11. Street Lights

Electroliers must be installed in accordance with the serving utility company and these Standards. All electrical equipment and installations shall conform to the applicable standards of the following:

(a) Electrical safety orders of the Division of Industrial Safety, Department of Industrial Relations, State of California;

(b) Rules for overhead electric line construction, General Order No. 95 of the California Public Utilities Commission;

(c) Standard Specifications of the serving utility company.

(d) Uniform Electric Code as adopted by the State of California.

C. PIPELINE CONSTRUCTION

1. Excavation and backfill shall be as per Section III, B-3 Earthwork.

2. Shoring, Bracing, and Sheeting

The contractor shall furnish, install and maintain such shoring, bracing and sheeting as required to conform to Federal, State and Local requirements to support sides of the trench and prevent movement which would cause injury to any person or structure. Any damage resulting from a lack of adequate shoring, bracing or sheeting shall be repaired at the Contractor's expense.

The Contractor shall comply with the requirements of Division 5, Part I of the State Labor Code and specifically with Sections 6705 and 6707 thereof. The Contractor shall use shoring, bracing, sloping, or other approved provisions for worker protection for all areas to be excavated to a depth of five feet or more. If the shoring, bracing, or sloping varies from the standards, a plan shall be prepared by a Registered Civil or Structural Engineer. When any excavation is over 5' feet deep, all necessary shoring materials shall be at the excavation site prior to starting any excavation work. No work shall be inspected if the required shoring is not in place.

After the pipe line has been installed and sufficiently backfilled to protect the pipe, all shoring, bracing and sheeting shall be removed. All voids left by the removal of such bracing shall be carefully filled with suitable material compacted in place.

3. Disposal of Seepage, Storm Water, or Surface Water

The contractor shall remove any seepage, storm water, or surface water that may be found or may accumulate in the excavation during the progress of the work. He shall furnish all pumps and other equipment necessary therefore and shall keep all the excavation free from water at all times during the construction of the work. When pipe laying is in progress, the open ends of the pipe shall be closed by approved means to prevent entrance of water or dirt into the line. Whenever water is excluded from the excavation, adequate backfill shall be deposited on the pipe to prevent floating. Any pipe which has floated shall be removed from the trench and relaid.

4. Preparation of Trench and Laying of Pipe

All pipe shall be laid to line and grade as shown on the approved plans. Without specific approval of the City Engineer, all pipes shall be laid at such depths as to provide thirty-six (36") inches minimum cover from the top of the pipe to ultimate finish street grade. The Contractor shall be responsible for verifying ultimate finish grade by requesting this information from the design Engineer.

5. Handling of Pipe and Accessories

Proper implements, tools and facilities, satisfactory to the City Engineer, shall be provided and used by the Contractor for execution of the work. All pipe, fittings, valves, and accessories shall be lowered into the trench in such manner as to prevent damage to pipe and fittings. Under no circumstances shall pipe or accessories be dropped or dumped into the trench. All foreign matter or dirt shall be removed from the interior of pipe before lowering into position in the trench. Pipe shall be kept clean by means approved by the City Engineer during and after laying. All pipe and accessories shall be inspected for defects prior to lowering into the trench. Any defective, damaged, or unsound pipe or accessory shall be repaired or replaced.

6. Jointing Pipe

A. P.V.C. Pipe - Joint compound and rubber packing rings shall be installed in strict accordance with the manufacturer's recommendations and ASTM standard D2321. Defective joints shall be completely cut out and replaced.

B. Ductile Iron Pipe - Joint compound and rubber packing rings shall be installed in strict accordance with the manufacturer's recommendations. Defective joints shall be completely cut out and replaced.

C. Corrugated Polyehtylene Pipe - Corrugated Polyethylene Pipe shall be installed in accordance with ASTM D2321 with the exception that the minimum cover over the pipe shall be not less than 1' (one foot).

7. Testing

Pipe shall be tested in accordance with the Standard Provisions as revised by Sections of these Standards.

D. FENCING

Fencing shall be required to protect all equipment, machinery, and appurtenances from damage and shall be capable of excluding unauthorized personnel from hazardous areas. Proposed fencing, including details for construction, shall be shown on the plans or in the Special Provisions.

Fencing shall comply with the requirements of Section 80-4 of the Standard Specifications, and these Special Provisions. The City Engineer must approve the plan prior to implementation.

E. CLEANUP

Surplus materials, tools and temporary structures shall be removed by the Contractor. All broken pavement, rubbish and excess earth shall be hauled to an approved dumpsite by the Contractor. The Contractor shall provide the City with a list of disposal sites. If required by the City, the Contractor shall provide the City with written approval for the disposal from the property owner prior to any materials being placed on the property. The construction site shall be left clean, to the satisfaction of the City Engineer.

SECTION IV

SIGNING PRACTICES AND TYPICAL SITUATIONS

A. GENERAL PLANNING

Where possible, all work on streets and highways shall be planned in advance so as to keep traffic obstruction, traffic congestion, etc., to a minimum, and to insure job safety. Construction zone traffic control shall be in compliance with Chapter 5 of the California Department of Transportation Traffic Manual and these Standards. Those responsible shall visit the neighborhood before starting work to note traffic conditions (including pedestrian traffic), access problems to private property, business activities, physical features, etc. The extent, location and timing of the work shall be considered. The Contractor shall develop a plan indicating the type, number and location of signs, barricades, lights, etc., including any specifically worded signs. The City Engineer may require a signing plan be prepared for major projects or extended interruptions of traffic.

B. WORKING AREA

In general, unless the section of street is to be completely closed to vehicular traffic, the work shall be done so that as few traffic lanes as possible are blocked. Where a traffic lane is blocked, as approved by the City Engineer, parking may be prohibited if required to expedite traffic. To close a street, City Council authorization must be obtained.

C. TIME OF WORK

1. On streets where stopping or parking is prohibited during peak traffic hours, work shall not be carried out during those hours without approval of the City Engineer.

2. Two or more contractors shall not be working at the same time on opposite sides of the same street unless the street is completely closed to traffic.

D. PLACING OF EQUIPMENT

1. No traffic control equipment shall be installed for street work except immediately prior to work commencing and shall be removed immediately when no longer required.

2. Any traffic control equipment not required at any time during the job shall be removed from view during such period.

3. All traffic control equipment, and where practicable, all other equipment not in use, shall be stored clear of the traveled portion of the roadway or sidewalk.

4. No shed or other equipment shall be stored so as to create a view obstruction or other unnecessary obstruction to vehicular traffic.

E. OVERALL AUTHORITY

The City Council, acting through their Public Works Department, controls all work on City streets and highways, except State highways. Therefore, no work is permitted on such streets or highways without approval of the Public Works Department. Traffic control for all work on streets and highways shall be approved by the City Engineer, and all such work must conform to the appropriate sections of these Standards and the California Vehicle Code.

F. GENERAL RESPONSIBILITIES

Except where otherwise specified, all persons or agencies doing work in or on City streets and highways shall be responsible for:

1. Supplying, installing and maintaining traffic control equipment as outlined in these Standards. This includes all intersecting streets that would require information signs, restrictions to public traffic, and all the required detours.

2. Supplying their own flagmen.

3. Informing, where necessary, occupants of abutting properties; either orally or by circular notice of parking prohibitions or access limitations.

4. Removing traffic control equipment when it is no longer required.

5. Notifying the affected law enforcement, fire protection agencies, and school districts of all street closures and detours.

6. Obtaining all necessary permits and/or permission for doing work in streets and highways in the City.

   Where the City does not have jurisdiction over the authority doing the work, such as the County, State Government and the Federal Government, the City representative shall seek the agency's cooperation in following this manual.

   Sometimes two or more crews work together, or one after another, on the same section of street. Where their traffic control arrangements coincide or overlap, the first crew on the job shall install the necessary traffic control equipment and leave it in place until it is replaced by the next crew on the job. The intent of this section is to provide continuous protection. Coordination must be worked out between crews.

G. CLOSING STREETS

Permission from the City Council shall be obtained for all street closures. Once permission has been obtained, the City Engineer shall be notified at least two (2) weeks prior to the actual street closure. For all street closures, when required by the Public Works Department:

1. A detour shall be provided. A drawing showing the detour and the location and type of all signing shall be submitted for approval. The plan shall conform, as much as practical, with Chapter 5 of the California Traffic Manual.

2. The detour shall be as simple and direct as possible.

3. The fewest number of turns possible shall be used.

4. Streets less than 20 feet in width shall not be used for detouring.

5. California Standard C1 "DETOUR AHEAD" signs shall be posted, on the road to be detoured, a sufficient distance in advance to adequately warn motorist, and California Standard C5.

   "DETOUR" (with appropriate arrow) signs shall be posted in advance of all turns in the detour route. Where the detour route signs appear on another major street, the street name of the street being detoured shall appear on a sign placed above the DETOUR sign. Appropriate detour signs shall be placed on all cross streets.

6. Some detour routes may need to be protected by temporary stop signs.

7. When detouring a four-lane street on a detour route less than four lanes in width, parking may be prohibited on the detour route at the City Engineer's discretion.

8. The detour route must be clearly marked where it intersects other cross streets so that motorists shall not turn prematurely back into the construction area or closed portion of the street. These markings shall be in the form of additional detour signs or California Standard W53 "NOT A THROUGH STREET" signs or both.

9. C2, C3, and C3A ROAD CLOSED signs shall be used only when the road is impassable to traffic and not as a notification of construction activity.

10. All detour signs and barricades shall be maintained by the Contractor and adjusted as construction progresses.

11. All road closures, except where covered by a development agreement or contract with the City, shall require a cash deposit guarantee to insure that all requirements of the road closure conditions are met.

H. NOTICE OF SURFACE CONDITIONS

During such surface jobs as street paving, patching, or grading, where the street is kept open to traffic, freshly placed concrete, hot asphalt patches, sharp differences between the road surface and raised manholes, etc., must be clearly indicated by delineators or reflective barricades.

I. SUBSURFACE WORK

1. Excavations

   a. Reflective barricades with flashing warning lights shall be installed around the perimeter of all excavations. Very shallow excavations presenting a minimal hazard to the public may be considered as surface conditions. All pipe excavation in a public street shall be backfilled the same day excavated unless special arrangements are made and approved by the City Engineer.

   b. Excavations shall be filled in as soon as possible, or plated where it shall allow traffic.

   c. On busy streets, tunneling shall be considered instead of open cuts for deep excavations.

   d. When pipes must be installed across streets classified as major, the pipe shall be installed by boring. Only if the street is to be reconstructed in the near future or major safety problems exist with boring shall the City consider allowing an open trench.

2. Manholes

   Open manholes shall be considered similar to excavations.

   a. Manhole guards shall be placed around unattended open manholes.

   b. If an open manhole is in a portion of the roadway normally used by moving vehicles, signs and delineators shall also be used.

   c. Where possible not more than one traffic lane shall be blocked at one time.

   d. If an open manhole or excavation is at or near a pedestrian area, reflective barricades with flashing warning lights shall be placed around the opening in the most likely paths of pedestrian travel and complete ring around the opening shall be formed by affixing caution tape to the tops of all barricades surrounding the hole.

J. BLANK

K. COMPLETION OF WORK

All work on streets and highways shall be completed so as to disrupt normal street operation as little as possible. As soon as a street can be returned to normal, all equipment shall be removed.

L. EMERGENCY WORK

Emergency work shall be given priority over traffic insofar as is necessary until the emergency is over. Nevertheless, every effort must be made to protect the public, the workman, and the job, in accordance with the basic principles and practices set out in these special provisions. The requirements already specified, therefore, shall apply wherever possible.

M. EQUIPMENT

The following equipment is used to warn, regulate and guide the public. All of this equipment should be kept clean and in good condition.

1. Signs.

Except for approved special signs and supplementary signs, all signs must conform to the CalTrans Traffic Manual.

Signage shall be adequate but kept to a minimum to avoid confusion. All signs shall be placed so they can be clearly seen by approaching motorists or pedestrians. Supplementary signs may be used only if authorized by the City Engineer.

Sign lettering shall be clear, open capitals of the type approved by the Cal Trans. Traffic Manual.

Identification. Each owner shall identify each sign with his name or initials on the back of, or at the bottom of the sign.

2. Stop - R-1.

Where a permanently installed STOP sign is obscured by street work or has to be removed temporarily to permit street work, and the traffic flow which it regulates is still maintained, a portable STOP sign shall be placed in line with the permanent stop sign location and at the right-hand side of the roadway used by the traffic regulated by the sign. The person in charge shall notify the City Engineer prior to removing or relocating a STOP sign. If a permanent STOP sign does not exist, a temporary STOP sign shall not be installed unless authorized by the City Engineer.

3. No Parking - R-26.

A parking prohibition may be required. Signs shall be placed generally along the curb or ditch line and no more than 100 feet apart. Where parking is removed to provide a lane for moving vehicles, it shall be removed normally for at least 150 feet both prior to and beyond the road obstruction. A parking prohibition may only be used with the prior

approval of the City Engineer.

4. Keep Right - R-7 or R-7A.

The KEEP RIGHT sign shall be used where motorists must avoid an obstruction in the roadway by keeping only to the right of the obstruction. Where motorists can go only to the left, all of the roadway to the right shall be properly barricaded and the remaining open roadway properly delineated.

The KEEP RIGHT sign shall be placed within and at the approach end of the channeling cones and so it can be clearly seen by approaching motorists.

5. No Right Turn - No Left Turn - R16 & R17.

The NO RIGHT TURN and NO LEFT TURN signs shall be used at intersections where turns must be prohibited because of work in the roadway. Where both turns from a given approach must be prohibited, the NO TURNS sign shall be used.

For a multi-lane approach, the NO LEFT TURN sign shall be placed on the left side and the NO RIGHT TURN sign on the right side of approaching traffic at the near side of the intersecting street. If both turns are prohibited, a NO TURNS sign shall be placed at each of the two positions instead of the NO LEFT TURN and NO RIGHT TURN signs. For a one-lane approach, only one NO TURN sign is required and it shall be placed on the right side.

6. Detour - C5 (Left or Right).

Detour signs shall be installed as follows:

a. One DETOUR sign shall be placed at every intersecting street for each direction of flow of the traffic detoured.

b. A combination DETOUR sign with STREET NAME SIGN (use name of detoured street) immediately above it shall be placed wherever a detour intersects a major street.

All detour signs shall be placed so that they are easily seen for an adequate distance by detoured motorists.

7. Reduction in the Number of Lanes (Left or Right) W-11.

Lane reduction signs shall be used when a regular route is kept open, but the number of traffic lanes available for a given traffic movement is reduced. If only one lane remains open for use by opposing traffic, it shall be controlled by either one or two

flagmen, depending on the length of such one lane section.

8. Detour Ahead - C-1.

DETOUR AHEAD signs shall be used where a street is completely closed to traffic and such traffic must be detoured.

9. Road Closed - C2, C3, (or) Bridge Out - C15.

ROAD CLOSED signs shall be used when a section of road is closed to public travel. It shall be placed along with a line of Type III barricades at the point of closure. The sign and barricades must be placed so as to be seen plainly by approaching traffic. Provision must be made to allow traffic access to their respective properties, if access is possible, between the closure point and the point of impassability.

N. BARRICADES

Barricades shall be used to close streets temporarily and for the protection at excavations, new pavement and other street work.

Light weight Class II barricades are not physical obstructions, merely a warning device. They should not be used as signs and certainly do not replace them. Their purpose is to define a line of closure or to outline an excavation or construction area in the street. Barricades must be reflectorized when used at night.

When Class II barricades are used in closing a road they shall be placed so there is no gap in the roadway area large enough for a vehicle to pass. Where certain vehicles engaged in the work must pass the barricades, or where local access is permitted, an opening in the barricades shall be to the side(s) of the Class II barricade fence.

O. DELINEATORS

Delineators must conform to the State of California Traffic Manual. Generally, they shall consist of post and paddle type guide markers or cylindrical or cone shaped objects 18 inches to 48 inches in height. The type of delineator should be chosen with regard to the severity and duration of exposure.

Delineators placed in close proximity to the edge of a traffic lane should be of a material that shall withstand impact without damage to themselves, the striking vehicle or passing traffic. Due consideration must also be given to the necessity for stability against knockdown from wind or from the backwash from passing traffic.

All delineators used during night time conditions shall be reflectorized in all directions, or internally illuminated.

P. FLAGGING

The equipment required and the procedures to be used in flagging traffic through the work area shall be in accordance with Section 5-07 of the California Department of Transportation Traffic Manual.

Q. ILLUMINATION

Lights for use at night (from at least from ½ hour after sunset until ½ hour before sunrise or when atmospheric conditions seriously impair visibility) shall consist of the following:

1. Electrical illumination of signs.

2. Flasher lights (Type A, Type B, or Type C)

All of these devices are regarded only as aids against poor visibility. They may not be used alone, but are required to supplement other specified equipment. All equipment must be reflectorized where specified in case the lights used stop functioning.

All obstructions remaining at night or during periods of poor visibility such as fog shall be adequately indicated by reflective barricades or delineators as appropriate.

Normally flasher lights shall not be placed along a line of delineators.

R. SPECIAL EQUIPMENT

For special cases, such as intermittent crossing of a street by earth moving vehicles, special traffic control may be required. The traffic control for such projects shall be submitted in writing prior to being discussed with and approved by the City Engineer well in advance of such work being started.