

## PREFACE

The Standard Specifications and Special Provisions contained herein are intended as guidelines for the County's minimum requirements and shall apply to materials and construction methods for the construction of public and private improvements within County rights-of-way or easements.

Any use of these Standard Specifications and Special Provisions by any other person, persons, or entity other than San Joaquin County shall not create or imply the assumption of any liability or responsibility by the County of San Joaquin. Nor is it the intent to restrict Registered Civil Engineers' prerogative to use generally accepted good engineering practices in meeting the County's requirements.

The use of various Special Provision Alternates herein may be limited to certain types of projects and may only relate to specific construction applications. Additional provisions may be necessary on any given project to address special conditions and concerns.

SAN JOAQUIN COUNTY STANDARD SPECIFICATIONS  
AND SPECIAL PROVISIONS

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SECTION 1

1-1 GENERAL.--Unless otherwise stated herein or modified below, all sections of the Standard Specifications of the State of California, Department of Transportation dated July 1992, or revised thereafter, shall apply. The only section or portions of sections of the State Standard Specifications that shall not apply are those portions that make reference to measurement and payment.

Coordination and interpretation of plans, Standard Specifications and special provisions shall conform to the provisions of Section 5-1.04 of the Standard Specifications.

Whenever in the Standard Specifications, special provisions, Notice to Contractors, proposal, contract or other contract documents, the following terms are used, the intent and meaning shall be interpreted as follows:

State, or County.....	County of San Joaquin
Department.....	Department of Public Works, County of San Joaquin
Director.....	Director of Public Works, County of San Joaquin
Department of Transportation State of California.....	Department of Public Works, County of San Joaquin
Deputy Director of.....	the Director of Public Works
Transportation for Project	County of San Joaquin acting
Development and Construction	either directly or through properly authorized agent and consultants

1-2 DEFINITIONS AND TERMS.--Attention is directed to Section 1 of the Standard Specifications and to the following additional and qualifying definitions.

Board of Supervisors - Board of Supervisors of San Joaquin County, State of California.

Contractor - Any person or persons, firm, partnership, corporation or a combination thereof who have entered into a contract with any person, corporation, company, special district or the County of San Joaquin as a party or parties of the second part, or his or their legal representatives, for the construction of any improvement within the County of San Joaquin.

County - County of San Joaquin, a political subdivision of the State of California.

Civil Engineer - Any person or persons, firm, partnership or corporation legally authorized to practice civil engineering in the State of California who prepares improvement plans and specifications for any improvement or portion of any improvement within the County of San Joaquin.

Department - Department of Public Works, County of San Joaquin.

Developer/Subdivider - A person, firm, partnership, corporation, association, or agent thereof who causes land to be divided into a subdivision or causes existing property to be developed for himself or for others.

Director - The Director of Public Works of San Joaquin County acting either directly or through properly authorized agents, such agents acting within the scope of the particular duties delegated to them.

Engineer - Same as Civil Engineer.

Improvement Specifications and Standards - Improvement Specifications and Standards of the County of San Joaquin, Department of Public Works.

Laboratory - Any testing agency or quality control firm licensed to practice in the State of California.

Owner - Property owner of land being developed.

Project Plans - The project plans are specific details and dimensions peculiar to the work and are supplemented by the Standard Plans and Standard Drawings insofar as they may apply.

Special Provisions - The special provisions are specific clauses setting forth conditions or requirements peculiar to the work and supplementary to the Standard Specifications of the State of California, and Improvement Standards and Specifications of the County of San Joaquin.

Standard Plans - Standard Plans of the State of California, Department of Transportation (Latest Edition).

Standard Specifications - Standard Specifications of the State of California, Department of Transportation (Latest Edition).

Standard Drawings - Improvement Standards of San Joaquin County (Latest Edition).

SECTION 2  
CONTRACT BONDS

The Developer shall furnish Contract Bonds as security for the faithful performance and payment of all his obligations under the Contract Documents. The Bonds shall be in amounts at least equal to the Engineer's Estimate and in such form and with such sureties as are acceptable to the County.

SECTION 3  
LEGAL AND MISCELLANEOUS

3-1 CONTROL OF THE WORK.--Attention is directed to Section 5 of the Standard Specifications and these special provisions:

Final acceptance of the work shall be by the Board of Supervisors or Director of Public Works.

3-2 CONTROL OF MATERIAL.--Attention is directed to Section 6 of the Standard Specifications.

3-3 LEGAL RELATIONS AND RESPONSIBILITY.--Attention is directed to Section 7 of the Standard Specifications and these special provisions:

A. Highway Construction Equipment Requirements:

Pursuant to the authority contained in Section 591 of the Vehicle Code, the County has determined that within areas of the project which are open to public traffic, the Contractor shall comply with the lighting requirements of Section 25803, the brake requirements of Chapter 3, Division 12, and the requirements as to splash aprons of Section 27600 of the Vehicle Code. Attention is directed to the statement in Section 591 that this Section will not relieve him or any persons from the duty of exercising due care. The Contractor shall take all necessary precautions for safe operation of his equipment and the protection of the public from injury and damage from such equipment.

B. Property Damage:

The County of San Joaquin, Board of Supervisors, the Director, or his representatives, shall not be answerable or accountable in any manner for any loss or damage that may happen to the work, or any part thereof, or to any article or materials used; in performing the work, or for damage of any property that may occur in the prosecution of the work. The Contractor shall have complete responsibility for the safety of the public and of property appertaining to his operation, and he shall indemnify and save harmless the County of San Joaquin, the Board of Supervisors, the Director, or his representatives, from all claims, costs, suits or actions resulting, or claimed to have

SECTION 3  
(Continued)

resulted, from injuries or damages arising out of, or in connection with, the operations of the Contractor.

C. Contractor's Public Liability and Property Damage Insurance:

The Contractor shall procure and shall maintain, during the life of the Contract, Contractor's Public Liability Insurance in an amount not less than \$500,000.00 for injuries, including accidental death, to any one person, and subject to the same limit for each person, in an amount not less than \$1,000,000.00 on account of one accident, and Contractor's Property Damage Insurance in an amount not less than \$500,000.00. The Contractor shall also secure insurance covering owned, hired, or nonowned vehicles, the limits of which shall be equal to the limits specified above for public liability and property damage.

3-4 GUARANTEE.--The completed project, including all work, materials, devices and equipment, shall be guaranteed by the Developer against faulty workmanship and materials for a period of one year after final acceptance by the Director of Public Works. The Developer shall be responsible for all repair and/or replacements including all labor, materials, equipment, devices, plant and other items of work necessary. To secure this guarantee, a Bond or other security shall be provided in the amount of 20% of the value of work estimated by the Engineer. Said Bond shall continue in full force and effect for a period of one year from the date of the formal acceptance of the work by the Director of Public Works or Board of Supervisors.

3-5 INSPECTION DURING CONSTRUCTION.--Any improvements constructed to these Specifications and which it is intended that the County will assume maintenance responsibility, must be inspected during construction by an authorized agent of the Developer and Director. Each phase of construction must be inspected and approved prior to proceeding to the subsequent phases.

Any improvements constructed without inspection as provided above or constructed contrary to the orders or instructions of the authorized agent of the Developer and Director will be deemed as not complying with San Joaquin County Standards and Specifications, and will not be accepted by San Joaquin County for maintenance purposes.

The Developer will have compaction tests taken on all lots where the depth of fill is greater than seven (7") inches and within the streets. Re-tests that are the result of the Contractor's failure to compact these areas as required will be borne by the Contractor.

The County Department of Public Works will perform field inspection for this project.

The Civil Engineer, Director and Developer, or their agents, shall at all times, have access to the work during its construction, and shall be furnished with every reasonable facility for ascertaining that the materials and the workmanship are in accordance with the requirements and intentions of these specifications, special provisions, and plans. All work done and all materials furnished shall be subject to review. The review of the work or materials shall not relieve the Contractor and Developer of any of their obligations to fulfill their Contract as prescribed.

3-6 FINAL REVIEW.--Upon completion of any improvements which are constructed under and in conformance with these Standards and Specifications, and prior to requesting final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipment; and all portions of the work shall be left in a neat and orderly condition, satisfactory to the Director and the Developer.

Within ten (10) days after receiving the request for final inspection, the Director shall inspect the work. The Developer, or his authorized representative, will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor shall proceed to correct any such defects or deficiencies at the earliest possible date. At such time, as the work has been completed, a second inspection shall be made by the Director to determine if the previously mentioned defects have been repaired, altered and completed in accordance with these Standards and Specifications.

When the work has been completed in accordance with the approved Plans and Specifications, the Director will recommend acceptance of the work to the Board of Supervisors. The Director will notify, in writing, the Developer, or his authorized representative, as to the date of approval and final acceptance.

3-7 RECORD DRAWINGS.--The Civil Engineer shall keep an accurate record of all approved deviations from the Plans and shall provide a copy of these records to the Director upon completion of the work. These are to be utilized with the inspector's plans for preparing a complete and accurate set of "Record Drawings" for the permanent records of the County. Preparation of the "Record Drawings" is the responsibility of the Developer and his Civil Engineer. "Record Drawings" shall be submitted to the Director prior to acceptance of work as complete.

Approved deviations shall be recorded in red ink on the original approved plans, not reproducible copies. The original plans shall not be removed from the Department of Public Works for preparation of "Record Drawings". A work area will be available for making additions or corrections, as will the "Record Drawing" stamp and pen with red ink, if requested.

3-8 CHANGES ON PLANS AND SPECIFICATIONS.--Any changes to the approved Improvement Plans and Specifications must be prepared and certified by the Civil Engineer, and shall be submitted to the Director for approval prior to implementation.

3-9 INDEMNITY CLAUSE.--Contractor agrees to assume sole and complete responsibility for jobsite conditions during the course of construction of this project, including safety of all persons and property; this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold harmless, the County of San Joaquin, its elected officials, officers, employees, and agents from any and all claims, costs of litigation, damages, and attorney's fees, for personal injury or property damage of whatever nature which are claimed to have occurred during the term of this project.

3-10 TRAFFIC SIGNS AND MARKINGS.--Traffic signs and markings shall conform to the Manual of Traffic Controls (Caltrans), San Joaquin County Standards and as shown on the plans.

3-11 CONFLICTS, ERRORS AND OMISSIONS.--Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any California State Law, San Joaquin County Code or Resolution, Conditions of Approval, in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the Department of Public Works review of the plans.

#### SECTION 4

DETOURS--Detours shall conform to the requirements in Sections 4-1.04, "Detours," and 7-1.08, "Public Convenience," of the Standard Specifications.

SECTION 5  
ALTERNATE A

TRENCH AND EXCAVATION SAFETY PROTECTION SYSTEM.--  
Attention is directed to Sections 5-1.02A, "Trench Excavation Safety Plans," of the Standard Specifications and these special provisions.

The walls and faces of all excavations and trenches 5 feet or more in depth in which employees shall enter shall be effectively guarded by a shoring system, sloping of the ground, or other equivalent means. Excavations and trenches less than 5 feet in depth shall also be guarded when examinations indicate hazardous ground movement may be expected.

SECTION 5  
ALTERNATE B

5-1.03 PUBLIC SAFETY.--The Contractor shall provide for the safety of traffic and the public in accordance with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

The Contractor shall install temporary railing (Type K) between any lane carrying public traffic and any excavation, obstacle, or storage area when the following conditions exist:

(1) Excavations. Any excavation, the near edge of which is 12 feet or less from the edge of the lane, except:

(a) Excavations covered with sheet steel or concrete covers of adequate thickness to prevent accidental entry by traffic or the public.

(b) Excavations less than one foot deep.

(c) Trenches less than one foot wide for irrigation pipe or electrical conduit or excavations less than one foot in diameter.

(d) Excavations parallel to the lane for the purpose of pavement widening or reconstruction.

(e) Excavations in side slopes, where the slopes are steeper than 4:1.

(f) Excavations protected by an existing barrier or railing.

(2) Temporarily Unprotected Permanent Obstacles.--Whenever the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or whenever the Contractor, for his convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

(3) Storage Areas.--Whenever material or equipment is stored within 12 feet to the lane and such storage is not otherwise prohibited by the specifications.

The approach end of temporary railing (Type K), installed in accordance with the requirements in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications shall be offset a minimum of 15 feet from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15 foot minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications, except temporary railing (Type K) fabricated prior to January 1, 1993, with one longitudinal No. 5 reinforcing steel bar near the top in lieu of the 2 longitudinal No. 5 reinforcing steel bars near the top, as shown on the plans, may be used.

Except for installing, maintaining and removing traffic control devices, whenever work is performed or equipment is operated in the following work areas, the Contractor shall close the adjacent traffic lane unless otherwise provided in the specifications:

#### Work Areas

Approach speed of public traffic (Posted Limit)	Over 45	Within 6 feet of a traffic lane but not on a traffic lane.
(Miles Per Hour)	35 to 45	Within 3 feet of a traffic lane but not on a traffic lane.

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of traffic lane, the line of cones or delineators shall be considered to be the edge of traffic lane; however, the Contractor shall not reduce the width of an existing lane to less than 10 feet without written approval from the Engineer.

#### SECTION 7 ALTERNATE A

MAINTAINING TRAFFIC.--Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Construction area traffic control devices shall be in accordance with the current Manual of Traffic Controls (Caltrans) and supplemented by the current Work Area Traffic Control Handbook (Building News).

Through public traffic shall be permitted to pass through construction operations at all times with as little inconvenience and delay as possible.

The Contractor shall furnish, erect and maintain all construction area traffic control devices within the project and at all public road entrances to the project.

#### SECTION 7 ALTERNATE B

MAINTAINING TRAFFIC (MAJOR STREETS).--Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the Section entitled "Public Safety," elsewhere in these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor from his responsibility to provide such additional devices or take such measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications.

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulder.

A minimum of one paved traffic lane, not less than 10 feet wide, shall be open for use by public traffic at all times. When construction operations are not actively in progress, not less than two such lanes shall be open to public traffic.

Advance warning signs if any shall be furnished, installed and maintained by the Contractor.

The Contractor shall submit a construction area traffic control plan for approval by the Engineer before the commencement of any work.

During the progress of work, when so directed by the Engineer, the Contractor shall submit supplemental traffic control plans. Said supplemental plans shall be approved by the Engineer before the affected item of work is begun. Traffic control plans shall show the placement of all signs, barricades, delineators and other traffic control devices required by the Contractor's operation.

Traffic Control Systems and construction area traffic control devices shall be in accordance with the current Manual of Traffic Controls (Caltrans) and supplemented by the current Work Area Traffic Control Handbook (Building News). The traffic control system for lane closures shall be in accordance with

Standard Plans T-11, RSP T-12 and T-13.

If any component in the Traffic Control System is displaced or ceases to operate or function as specified, from any cause during the progress of the work, the Contractor shall immediately repair said component to its original condition or replace said component and shall restore the component to its original location.

When lane closures are made for work periods only, at the end of each work period, all components of the Traffic Control System, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder.

The Contractor shall furnish, erect and maintain all construction area traffic control devices within the project and at all public road entrances to the project.

#### SECTION 10

DUST CONTROL.--Dust Control shall conform to the requirements in Section 10, "Dust Control," of the Standard Specifications.

#### SECTION 12

FLAGGING.--Attention is directed to Section 12-2, "Flagging," of the Standard Specifications.

TEMPORARY CRASH CUSHION MODULE.--This work shall consist of furnishing, installing and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, specified in the special provisions or directed by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in accordance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety" and "Maintaining Traffic" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 15 feet or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions

shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either of the following types of equal:

Energite Inertial Modules

Manufacturer:

Energy Absorption Systems, Inc.  
One East Wacker Drive  
Chicago, IL 60601

Distributor:

Traffic Products Company  
Post Office Box 1030  
Rocklin, CA 95677-1030  
Telephone: (916) 624-9717

or Fitch Inertial Modules:

National Distributor

Roadway Safety Service, Inc.  
700-3 Union Parkway  
Ronkonkoma, NY 11779

Distributor (Northern)

Singletree Sales Company  
1533 Berger Drive  
San Jose, CA 95112  
Telephone: (408) 287-1943

Distributor (Southern)

Roadway Safety Service, Inc.  
700-3 Union Parkway  
Ronkonkoma, NY 11779

Traffic Control Service, Inc.  
1881 Betmor Lane  
Anaheim, CA 92805  
Telephone: (714) 937-0422

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified above may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in accordance with the manufacturer's directions, and to the sand capacity in pounds for each module as shown on the plans. Sand for filling the modules shall be clean washed concrete sand of commercial quality. At the time of placing in the modules, the sand shall contain not more than 7 percent water, as determined by California Test 226.

Modules damaged due to the Contractor's operations shall be repaired immediately by the Contractor at his expense. Modules damaged beyond repair, as determined by the Engineer, due to the Contractor's operations shall be removed and replaced by the Contractor at his expense.

INSTALLATION.--Temporary crash cushion modules shall be

placed on movable pallets or frames conforming to the dimensions shown on the plans. The pallets or frames shall provide a full bearing base beneath the modules. The modules and supporting pallets or frames shall not be moved by sliding or skidding along the pavement or bridge deck.

A Type P or Type R marker panel, as shown on the plans, shall be attached to the front of the leading module of each temporary crash cushion. The marker panel shall be firmly fastened to the module with commercial quality hardware or by methods approved by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in permanent work.

#### SECTION 14

DESTROY WELL.--The existing well shall be destroyed in accordance with San Joaquin County Public Health Services Environmental Health Division requirements.

The Contractor shall provide the County with a copy of the required permit.

SECTION 15  
ALTERNATE A

EXISTING HIGHWAY FACILITIES.--Attention is directed to Section 15, "Existing Highway Facilities," of the Standard Specifications.

SECTION 15  
ALTERNATE B

EXISTING HIGHWAY FACILITIES.--Attention is directed to Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Mailboxes inside the limits of work will be set in temporary locations prior to the beginning of work and will be relocated after the work is complete. Coordinate the relocation with the U.S. Postal Service.

SECTION 15  
ALTERNATE C

EXISTING HIGHWAY FACILITIES (REMOVING CONCRETE).-- Removing concrete shall conform to the requirements in Section 15-3, "Removing Concrete," of the Standard Specifications and these special provisions.

Concrete removed shall be disposed of outside of the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications, unless otherwise shown on the plans.

SECTION 15  
ALTERNATE D

EXISTING HIGHWAY FACILITIES (PLANING ASPHALT CONCRETE PAVEMENT).--Planing asphalt concrete pavement shall conform to the requirements in Section 15, "Existing Highway Facilities," of the Standard Specifications and these special provisions.

Existing asphalt concrete shall be planed at the locations and to the dimensions shown on the plans and in accordance with these special provisions.

Planing asphalt concrete pavement shall, at the option of the Contractor and subject to approval of the local Air Pollution Control Officer, be performed by either cold planing, milling or heater planing.

The cold planing or milling machine shall have a cutter head at least 30 inches wide and shall be operated so as not to produce fumes or smoke.

The heater planing machine shall have, in combination or separately, a means for heating and cutting the asphalt concrete surface and blading the displaced material into windrows in one continuous forward motion. The cutting width of the blade shall not be less than 3 feet.

Heat shall be applied uniformly to the area to be planed and shall be accurately controlled according to conditions and road surfacing being planed.

Heater planing operations shall not be carried on at any time where, if an open flame is used in the heater, there is danger of igniting entrapped gases from sewers or gas mains.

The depth, width and shape of the cut shall be as indicated on the plans or as directed by the Engineer. The final cut shall result in a uniform grading plane conforming to the typical cross sections and profile detailed on the plans. The grading plane at any point shall not vary more than 0.03 foot above or below the specified grade. The outside lines of the planed area shall be neat and uniform. Areas that fail to meet the tolerances shall be ground or filled and compacted with asphalt concrete to the required grade and tolerance before placing any subsequent layers of materials thereon.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be completely removed from the site of the work daily. Materials will not be salvaged unless otherwise shown on the plans. The waste material shall immediately be cleared from traffic lanes, intersections and driveways and contained until daily removal operations are completed.

SECTION 16  
ALTERNATE A

CLEARING AND GRUBBING.--Clearing and grubbing shall conform to the requirements in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

Tree branches extending over the roadway pavement and which hang within 15 feet of finished grade shall be cut off in a workmanlike manner.

Burning will be allowed when permitted by the San Joaquin Valley Unified Air Pollution Control District.

SECTION 16  
ALTERNATE B

CLEARING AND GRUBBING (MINOR).--Clearing and grubbing shall conform to the requirements in Section 16, "Clearing and Grubbing," of the Standard Specifications and these special provisions.

All trees shall be preserved unless otherwise designated on the plans or marked for removal.

Plants and lawn in front of residences shall be preserved adjacent to new shoulder construction where natural ground surface and finished grade are compatible, unless otherwise designated on the plans, and as directed by the Engineer.

Tree trimming will be required only where it is necessary to clear construction equipment unless otherwise shown on the plans.

Existing tree stumps inside limits of work shall be removed to a point one foot (1.0') below finished grade, unless otherwise shown on plans. Tree roots that interfere with construction shall be cut off in a workmanlike manner.

Grass and weeds may be thoroughly incorporated with the native soil by disking or other means. Materials containing grass and weeds shall be used outside the paved portion of the roadway.

Burning will be allowed when permitted by the San Joaquin Valley Unified Air Pollution Control District.

## SECTION 17

WATERING.--Watering shall conform to the requirements in Section 17, "Watering," of the Standard Specifications and these special provisions.

Water for use on this project shall be nonpotable water unless otherwise approved by the County in writing for use of potable water and shall be furnished and applied as required in the specifications.

The Contractor shall advise the County in writing of the intended source(s) to be used, prior to starting work on the project.

Nonpotable water supply, tanks, pipes and any other conveyances of nonpotable water shall be clearly and distinctly labeled:

NONPOTABLE WATER

DO NOT DRINK

## SECTION 19

ALTERNATE A (Clay Soil - Adobe, etc.)

EARTHWORK.--Earthwork shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

All relative compaction requirements of Section 19-5, "Compaction," of the Standard Specifications, shall be not less than 90 percent.

The requirement of the second paragraph of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, will be required only in those areas shown on the plans.

In lieu of the tolerance specified in Section 19-1.03B, "Grade Tolerance," of the Standard Specifications, the surface of the grading plane shall not be more than 0.05 foot above or below the grade established by the Engineer.

Before grade is approved by the County, all earthwork (including driveways and slopes) shall be compacted to grade. Unless otherwise shown on the plans, all surplus materials not to be salvaged, stockpiled or disposed of as provided in Section 19-2.06, "Surplus Material," of the Standard Specifications, shall become the property of the Contractor and disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Unless otherwise shown on the plans, the existing pavement, when used as embankment, shall be broken up into pieces not larger than 0.33 foot in greatest dimension.

SECTION 19  
ALTERNATE B (Sandy Soils)

EARTHWORK.--Earthwork shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

The requirement of the second paragraph of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, will be required only in those areas shown on the plans.

In lieu of the tolerance specified in Section 19-1.03B, "Grade Tolerance," of the Standard Specifications, the surface of the grading plane shall not be more than 0.05 foot above or below the grade established by the Engineer.

Before grade is approved by the County, all earthwork (including driveways and slopes) shall be compacted to grade. Unless otherwise shown on the plans, all surplus materials not to be salvaged, stockpiled or disposed of as provided in Section 19-2.06, "Surplus Material," of the Standard Specifications, shall become the property of the Contractor and disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Unless otherwise shown on the plans, the existing pavement, when used as embankment, shall be broken up into pieces not larger than 0.33 foot in greatest dimension.

SECTION 19  
ALTERNATE C

EARTHWORK (STRUCTURE EXCAVATION & BACKFILL).--Structure excavation and backfill shall conform to the requirements in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications and these special provisions.

All references to culvert excavation and culvert backfill on the plans shall be deemed to mean structure excavation and structure backfill, respectively, in the Standard Specifications and these special provisions.

Structure Backfill which is outside of the paved portions of the roadway, unless otherwise specified on the plans, shall be native material selected for its resistance to erosion.

Compaction Requirements: Unless otherwise shown on the plans, the compaction requirements within the limits of structure excavation for pipes and arches shall be as shown on Standard Drawings.

Ponding and jetting will be permitted only if a maintenance bond in the amount of twenty percent (20%) of the Engineer's Estimate with a corporate surety approved by the County is provided. Such a bond shall be provided before final acceptance of the project by the County and shall guarantee the repair of

all damage due to faulty materials or workmanship provided or done by the Contractor. The guarantee shall remain in effect for a period of three (3) years after the date of final acceptance of the project by the County or Board of Supervisors.

SECTION 19  
ALTERNATE D

EARTHWORK (DETOURS).--Earthwork for detours shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

All relative compaction requirements of Section 19-5, "Compaction," of the Standard Specifications, shall be not less than 80 percent.

The requirements of the second paragraph of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, will be required only in those areas shown on the plans.

SECTION 19  
ALTERNATE E

IMPORTED BORROW.--Imported Borrow shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Imported borrow shall have a dry weight of not less than 100 pounds/cubic foot when compacted at 100 percent relative compaction.

Material placed at outside edge of shoulders and embankment slopes shall be a cohesive material selected for its ability to resist erosion. The material shall be equal to or better than the native material upon which it shall be placed as determined by the Resistance (R-Value) and Sand Equivalent, unless otherwise shown on the plans.

SECTION 19  
ALTERNATE F

EARTHWORK (CONCRETE CURBS & SIDEWALKS).--Earthwork for concrete curbs and sidewalks shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

Excavation for concrete curbs and sidewalks along improved frontages shall be limited to six inches (6") behind new concrete construction adjacent to property line unless otherwise shown on the plans.

All relative compaction of Section 19-5, "Compaction," of the Standard Specifications, shall be not less than 90 percent, unless otherwise designated on the plans. The requirement of the second paragraph of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, will not be required.

Ground area to be used for landscaping purposes, which has

been excavated or is below finished grade, shall be backfilled with selected material or imported topsoil, free of stones, conforming to the provisions of Section 20-2.01, "Topsoil," of the Standard Specifications and these special provisions, unless otherwise shown on the plans. Backfilled material in ground areas shall be compacted equal to natural ground and may be compacted by ponding with water.

The ground area adjacent to new concrete or pavement construction shall be graded flush to match new improvements as shown on the plans. Backfill material in slope areas greater than six to one shall be selected for resistance to erosion.

Unless otherwise shown on the plans or specified in these special provisions, all surplus material not to be salvaged shall become the property of the Contractor and shall be disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

#### SECTION 19 ALTERNATE G

EARTHWORK (ROADWAY WIDENING).--Earthwork for roadway widening shall conform to the requirements in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

After clearing and grubbing has been completed, the existing native material and/or imported borrow shall be graded flush or to a constant dimension below the edge of the existing pavement as shown on the typical cross section for a minimum width of one foot outside of the new edge of pavement. The subgrade of the widened section shall be constructed to a two percent cross slope unless otherwise designated on the plans.

All relative compaction requirements of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, shall be amended to not less than 90 percent.

Subgrade compaction requirements will be waived for the area between the outside edge of the existing pavement and the outside edge of the new pavement whenever this area is one foot or less in width.

The requirement of the second paragraph of Section 19-5.03, "Relative Compaction (95 percent)," of the Standard Specifications, will not be required.

Unless otherwise shown on the plans, all surplus materials not to be salvaged, stockpiled or disposed of as provided in Section 19-2.06, "Surplus Material," of the Standard Specifications, shall become the property of the Contractor and disposed of as provided in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

SECTION 20  
ALTERNATE B

RELOCATE SPRINKLER SYSTEMS.--Relocate sprinkler systems shall conform to the requirements in Section 20, "Erosion Control and Highway Planting," of the Standard Specifications and these special provisions.

Existing sprinkler systems, or portions thereof, shall be relocated behind new construction as shown on the plans or as directed by the Engineer. Materials shall be compatible with the existing system, unless otherwise shown on the plans. Salvaged sprinkler heads not used on the relocated system shall be turned over, in good condition, to the property owner involved.

SECTION 21

SOIL STERILIZATION.--Soil sterilization shall conform to the provisions in Section 7-1.01H, "Use of Pesticides," of the Standard Specifications and these special provisions.

Soil sterilization shall be limited to the areas shown on the plans.

The areas shall be graded and compacted to a smooth and even surface, and a soil sterilant shall then be applied. The sterilant shall be the type shown on the plans or other product approved for the specific site by the San Joaquin County Agricultural Commissioner's office. The rate of application shall be according to manufacturer's directions with approval by San Joaquin County Agricultural Commissioner's office. The Contractor shall submit written evidence that the type of sterilant and the rate of application to be used have been approved by the San Joaquin County Agricultural Commissioner's office.

SECTION 22

FINISHING ROADWAY.--Finishing roadway shall conform to the requirements in Section 22, "Finishing Roadway," of the Standard Specifications.

SECTION 23

DRIVEWAYS.--Attention is directed to the Standard Specifications and these special provisions.

Paved driveways and frontages shall be sloped to drain.

SECTION 24

LIME TREATED SUBBASE.--Lime treated subbase shall conform to the requirements in Section 24, "Lime Stabilization," of the Standard Specifications and these special provisions.

Lime treated sections one foot, or less, in depth shall be mixed full depth in place; sections greater than one foot in depth may be mixed in two layers.

Construction joints will not be required.

The relative compaction of each layer of compacted Lime Treated Subbase shall be not less than 93 percent as determined by Test Method No. Calif. 216 or Test Method No. Calif. 231.

When the required thickness is more than 0.67 foot, the

mixture shall be compacted in two or more layers and the maximum compacted thickness of any one layer shall not exceed 0.67 feet; the maximum compacted thickness requirement may be waived, provided the Contractor can demonstrate to the Director that his equipment and method of operation will provide uniform distribution of the lime and the required compacted density throughout the layer.

Water shall be introduced into the mixing chamber during the mixing process until the water content of the mixture is approximately 2 percent above the optimum moisture content of the soil.

In lieu of a curing seal, the surface of the lime treated material shall be kept moist until covered by the next layer of structural section.

SECTION 25

AGGREGATE SUBBASE.--Aggregate subbase shall conform to the requirements in Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

Aggregate subbase shall be Class 4.

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

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
2-1/2 .....	100
No. 200 .....	2 - 35

Class 4 aggregate subbase shall also conform to the quality requirements shown in the following table:

<u>Tests</u>	<u>Test Method</u> <u>No. Calif.</u>	<u>Contract</u> <u>Compliance</u>	<u>Operating</u> <u>Range</u>
Sand Equivalent ...	217	18	21 Min.
Resistance (R-Value)..	301	50	

The R-Value requirement may be waived, provided the aggregate subbase has a sand equivalent value of 23 or more.

SECTION 26  
ALTERNATE A

AGGREGATE BASE.--Aggregate base shall conform to the requirements in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Aggregate Base shall be Class 2.

The combined aggregate shall conform to the grading specified for the 3/4-inch maximum aggregate.

The R-Value requirement may be waived, provided the aggregate base conforms to the specified grading and durability and has a sand equivalent value of 33 or more.

SECTION 26  
ALTERNATE B

AGGREGATE BASE.--Aggregate base shall conform to the requirements in Section 26, "Aggregate Bases," of the Standard Specifications and these special provisions.

Aggregate Base shall be Class 2.

The combined aggregate shall conform to the grading specified for the 3/4-inch maximum aggregate.

The R-Value requirement may be waived, provided the aggregate base conforms to the specified grading and durability and has a sand equivalent value of 33 or more.

Recycled asphalt concrete (R.A.C.) may be substituted for Class 2 Aggregate Base, provided it meets the specified gradation and R-Value requirements. Durability and sand equivalent requirements shall be waived.

If the results of the R-Value test on R.A.C. do not meet the requirements for Class 2 Aggregate Base, the aggregate base represented by the failing test shall be removed. No single R-Value test shall represent more than 2,000 cubic yards or one day's production.

The results of the R-Value test shall be known prior to placement of subsequent layers of material.

SECTION 36  
ALTERNATE A

SAND COVER.--Sand cover shall conform to the requirements of these special provisions.

Sand cover shall be applied after the final application of liquid asphalt (prime coat) to any area where the asphalt has failed to penetrate the surface.

Sand shall be free from clay or organic material and shall be of such size that not less than 90% will pass a No. 4 sieve and not more than 5% will pass a No. 200 sieve.

Sand shall be spread uniformly at the approximate rate of three to six pounds per square yard.

The treated surface shall be maintained in a smooth and satisfactory condition.

SECTION 36  
ALTERNATE B

PENETRATION TREATMENT.--Penetration treatment shall conform to the requirements of these special provisions.

Liquid Asphalt shall conform to the provisions in Section 93, "Liquid Asphalt," of the Standard Specifications. Liquid asphalt shall be Grade SC-70 or SC-250 and shall be applied at the approximate total rate of 0.4 gallon per square yard in one application. The grade and exact rate of application will be determined by the Director. No hand spraying will be required.

At locations where public traffic is being routed over the roadbed to be treated, the penetration treatment shall not be applied to more than one-half the width of the traveled way at a time, and the remaining width shall be kept free of obstructions and open for use by public traffic until the treatment first applied is ready for use by public traffic.

The Contractor shall provide for the passage of public traffic through the work in accordance with the provisions in Sections 7-1.08, "Public Convenience," and 7-1.09, "Public Safety," of the Standard Specifications, and when directed by the Director, traffic shall be routed through the work under one-way control.

Immediately in advance of applying liquid asphalt, the surface to be treated shall conform to the compaction and elevation tolerances specified for the material involved and shall be cleaned of all loose or extraneous material.

Liquid asphalt shall not be applied when the atmospheric temperature is below 50°F.

After the application of liquid asphalt, any excess asphalt which has failed to penetrate the surface shall be covered with sand conforming to these provisions.

Sand shall be free from clay or organic material and shall be of such size that not less than 90% will pass a No. 4 sieve and not more than 5% will pass a No. 200 sieve.

Sand shall be spread uniformly at the approximate rate of three to six pounds per square yard.

All loose sand shall be removed from a treated area at the time directed by the Director.

The treated surface shall be maintained in a smooth and satisfactory condition.

#### SECTION 37

SLURRY SEAL.--Slurry Seal shall conform to the requirements in Section 37-2, "Slurry Seal," of the Standard Specifications and these special provisions.

The aggregate for slurry seal shall be Type II.

Before slurry seal is to be applied to any area, the Contractor shall cover or oil all utility covers and raised reflective markers located in the area to be surfaced. These covers and markers shall be cleaned as quickly as possible after application of the slurry seal and definitely prior to the final set.

The Contractor shall place temporary reflective raised pavement markers at not more than 24 foot longitudinal intervals in the same alignment as the existing striping, before the slurry seal is applied. Temporary reflective pavement markers shall be the same color as the lane line the markers replace. Temporary reflective raised pavement markers shall be, at the option of the Contractor, one of the following or approved equal:

<u>Type or Model</u>	<u>Manufacturer</u>
TRPM Chip Seal Marker Type 2-Way	Davidson Plastic Company 18726 East Valley Highway Kent, Washington 98032
Chip Seal Marker, Model Nos. 1280/1281 with Reflexite PC 1000 Polycarbonate reflector	Hi-Way Safety Inc. 13310 5th Street Chino, California 91710

Temporary reflective raised markers shall be placed in accordance with the manufacturer's instructions. Temporary reflective raised pavement markers shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used.

In areas without existing pavement striping, no temporary pavement markers will be required.

Maintaining traffic shall conform to the provisions of Section 7, "Maintaining Traffic," of these special provisions and as noted on the plans. Road closure, if allowed, shall be restricted to the hours of 8:00 A.M. to 4:00 P.M.

The Contractor shall distribute a written notification approved by the Engineer to all residents, businesses, emergency services, garbage collection services and schools at least 24 hours prior to beginning the slurry seal work. The notice shall detail streets and limits of work to be done as well as the hours of work. The Contractor shall be responsible for coordinating the schedules of these services and the slurry seal work.

The Contractor shall post "No Parking - Tow Away" signs at 100 foot intervals on the streets to be worked upon, at least 24 hours prior to placing the slurry seal. These signs shall state the day of the week and hours of no parking.

SECTION.36  
(SECTIONS 36 & 37)

SECTION 39  
ALTERNATE A

ASPHALT CONCRETE.--Asphalt Concrete shall conform to the requirements in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Asphalt concrete shall be Type "B". Aggregate shall conform to the 1/2-inch maximum, coarse or medium grading as determined by the Engineer and Director. At the Contractor's option, and with approval of the Engineer and Director, aggregate may be 3/4-inch maximum, medium grading with the exception of the final finish course.

Aggregate conforming to the 3/8-inch maximum grading will be permitted for use in driveways, dikes and other areas with approval of the Engineer and Director.

The amount of asphalt binder to be mixed with the aggregate shall be between 5% and 7% by weight of the dry aggregate. The exact amount of asphalt binder to be mixed with the aggregate will be determined by the Engineer. The AR viscosity grade of the asphalt binder shall be 4,000 unless otherwise shown on the plans. The provisions of paragraphs 5 through 8 of Section 39-3.03, "Proportioning," of the Standard Specifications, shall not apply to this project.

When the asphalt concrete is to be produced in a batch plant, the asphalt concrete shall be proportioned and mixed by the automatic method.

When shown in the Engineer's Estimate prime coat, liquid asphalt penetration grade shall be SC-70 or SC-250 as directed by the Engineer and Director. The placement of asphalt concrete shall not begin until 24 hours after the prime coat is applied.

Paint binder (tack coat) shall be applied at a rate of approximately 0.05 gallon per square yard, unless otherwise shown on the plans.

All steel-tired rollers shall be of the tandem type. The third paragraph of Section 39-5.02, "Compacting Equipment," of the Standard Specifications, shall be deleted.

The dumping of material in a windrow, in accordance with Section 39-6.01, "General Requirements," of the Standard Specifications, shall be limited to 750 feet in advance of the paving machine.

The sixth paragraph in Section 39-6.01, "General Requirements," of the Standard Specifications, shall be amended by deleting the second footnote, which reads, "At the option of the Contractor, [0.25' overlay] may be placed in one layer 0.25' thick."

The tenth paragraph of Section 39-6.03, "Compacting," of the Standard Specifications, allowing the use of "alternative compacting equipment" shall be deleted.

Unless otherwise shown on the plans, asphalt paver equipment used to place asphalt concrete shall be equipped with full automatic screed and grade sensing controls which shall control

the longitudinal grade and transverse slope of the screed. The controls shall be actuated by grade and slope references. Corrections on account of deviations from the references shall be automatic. Guides and references required to control the longitudinal grade and transverse slopes shall be furnished and installed by the Contractor.

Should the Contractor elect to use a ski device for longitudinal control, the minimum length of the device shall be 30 feet. The device shall be a rigid unit mounted on multiple supports. Each support shall act independently of others and the finished grade shall not be affected by the action of a single support.

When asphalt concrete gutters are designated on the plans, a stringline or wire grade reference shall be required to control longitudinal grade of the gutter. The gutter shall be water tested before acceptance. The maximum deviation from a true grade shall not result in ponding water for depth exceeding 0.04 foot.

Surfacing operations shall be conducted in such a manner that, at the end of each day's work, the distance between the ends of adjacent surfaced lanes shall not be greater than can be completed in the following day of normal surfacing operations.

Portable delineators in conformance with Section 12-3.04, "Portable Delineators," of the Standard Specifications shall be furnished and placed at a maximum spacing of 300 feet on tangents and 100 feet on curves along any edge of new surfacing which has a drop off of more than 0.10 foot. Delineators shall be staggered when required on both sides of traffic.

Existing pavement markers shall be removed and disposed of, unless otherwise shown on the plans.

During the removal of ceramic type pavement markers, screens, or other protective devices shall be furnished to contain any fragments as provided for in Section 7-1.09, "Public Safety," of the Standard Specifications.

#### SECTION 39 ALTERNATE B

ASPHALT CONCRETE BASE.--Asphalt concrete base shall conform to the requirements in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Asphalt concrete base shall be Type "B".

Aggregate for 3/4" maximum medium gradation asphalt concrete may be used in lieu of aggregate for asphalt concrete base.

The amount of asphalt binder to be mixed with the aggregate shall be between 5% and 7% by weight of the dry aggregate. The exact amount of asphalt binder to be mixed with the aggregate will be determined by the Engineer and Director. The AR viscosity grade of the asphalt binder shall be 4,000 unless otherwise shown on the plans. The provisions of paragraphs 5 through 8 of Section 39-3.03, "Proportioning," of the Standard Specifications, shall not apply to this project.

When the asphalt concrete base is to be produced in a batch plant, the asphalt concrete base shall be proportioned and mixed

by the automatic method.

When asphalt concrete base is to be placed on existing surfacing, the entire surface shall be cleaned by scraping with a metal edge of not less than 5 feet in length and all the loose material removed.

Paint binder (tack coat) shall be applied at a rate of approximately 0.05 gallon per square yard, unless otherwise shown on the plans.

The asphalt concrete base shall be spread with equipment that will provide a uniform layer. Equipment which requires drifting, spotting or otherwise shifting the material or which causes segregation of the material shall not be used.

Asphalt concrete base shall be placed in layers not to exceed 0.5 foot in compacted thickness. The layer placed on the basement material shall have a minimum thickness of 0.3 foot after compaction, unless otherwise designated on the plans.

The final course of asphalt base corresponding with the proposed traffic lanes shall be placed with an asphalt paver to the grade established by the Engineer, unless otherwise designated on the plans.

In addition to the rolling requirements of Section 39-6.03, "Compacting," of the Standard Specifications, the material shall be rolled until it reaches a minimum of 95% relative compaction, based on stabilometer briquet density.

Before placing asphalt concrete surfacing, the temperature of the asphalt concrete base shall be no higher than 150° F.

The finished surface of asphalt concrete base shall not vary more than 0.05 foot above or below the grade established by the Engineer after the material has reached a temperature of 150° F.

#### SECTION 39 ALTERNATE C

PAVEMENT REINFORCING FABRIC.--Pavement reinforcing fabric shall conform to the requirements in Section 39, "Asphalt Concrete," and Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The placement of the pavement reinforcing fabric shall be limited to 1,500 feet in advance of the paving machine.

#### SECTION 39 ALTERNATE D

ASPHALT CONCRETE DIKES.--Asphalt concrete dikes shall conform to the requirements in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

Asphalt concrete used for dikes shall be Type "B".

#### SECTION 39

## ALTERNATE E

LIQUID ASPHALT (PRIME COAT).--Liquid Asphalt (Prime Coat) shall conform to the requirements in Sections 39, "Asphalt Concrete," and 93, "Liquid Asphalts," of the Standard Specifications and these special provisions.

Liquid asphalt shall be grade SC-70 or SC-250 and shall be applied at the approximate total rate of 0.25 gallon per square yard in one application. The grade and exact rate of application will be determined by the Engineer and the Director.

Liquid asphalt shall not be applied when the atmospheric temperature is below 50° F.

At locations where public traffic is being routed over the roadbed to be treated, the prime coat shall not be applied to more than one-half the width of the traveled way at a time, and the remaining width shall be kept free of obstructions and open for use by public traffic until the treatment first applied is ready for use by public traffic.

Liquid asphalt shall not be applied until a minimum of 24 hours after the County has accepted the aggregate base for surface tolerances and compaction requirements.

## SECTION 49

PILING.--Piling shall conform to the requirements in Section 49, "Piling," of the Standard Specifications.

## SECTION 50

PRESTRESSING CONCRETE.--Prestressing concrete shall conform to the requirements in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

The first paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The Contractor shall submit to the Department of Public Works, San Joaquin County, Post Office Box 1810, Stockton, California 95201, for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings of the prestressing system proposed for use. For initial review, 7 sets of such drawings shall be submitted for railroad bridges and 5 sets shall be submitted for other structures. After review, between 6 and 12 sets, as requested by the Director, shall be submitted to the said Office for final approval and for use during construction.

The sixth paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

At the completion of each structure on the contract, one set of reduced prints on 60 pound (minimum) bond paper, 11 inches by 17 inches in size, of the corrected original tracings of all working drawings for each structure shall be furnished to the Director. Reduced prints of drawings which are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.

The seventh paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided as near to the upper left side of each page as is feasible within the original print to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

SECTION 51  
ALTERNATE A

CONCRETE STRUCTURES.--Concrete structures shall conform to the requirements in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

At the Director's option, the finished surface of bridge decks shall be tested for smoothness by either the Profilograph Method described in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications or by means of a straightedge 12 feet long. When the straightedge method is used, the surface shall not vary more than 0.02 foot from the lower edge of the straightedge when placed in any direction.

The Contractor shall allow two weeks after complete drawings and all support data are submitted for review of any falsework plan.

Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended by adding the following after the seventh paragraph:

Unless otherwise specified, removing falsework supporting any span of structural members subject to bending, shall conform to the requirements for removing falsework supporting any span of a simple span bridge.

SECTION 51  
ALTERNATE B

CONCRETE STRUCTURES.--Concrete structures shall conform to the requirements in Section 51, "Concrete Structures," of the Standard Specifications.

SECTION 51  
ALTERNATE C

CONCRETE STRUCTURES (PRECAST PRESTRESSED CONCRETE BRIDGE MEMBERS).--Precast prestressed concrete bridge members shall conform to the requirements in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Temporary lateral bracing shall be provided for girders. Such bracing shall be installed at each end of each girder, except notched ends, prior to the release of the erection equipment from the girder and shall remain in place until 2 days after the concrete diaphragms have been placed. Said bracing shall be adequate to prevent overturning of the girders prior to completion of the work and as a minimum shall be capable of resisting a lateral force of 15 pounds per square foot of girder side area applied laterally in either direction to the top of the girder. Girder erection shall not be started until the temporary lateral bracing proposed for use by the Contractor has been approved by the Engineer and Director.

## SECTION 52

REINFORCEMENT.--Reinforcement shall conform to the requirements in Section 52, "Reinforcement," of the Standard Specifications.

## SECTION 56

STREET SIGNS.--Attention is directed to Section 56 of the Standard Specifications, the Standard Drawings and these special provisions.

### A. Materials

The various materials or fabrications thereof shall conform to the following requirements:

1. Street signs shall have a horizontal dimension of 24 inches, 30 inches or 36 inches and a vertical dimension of 6 inches.
2. Street signs shall be completely reflectorized on a double face flat blade sign.
3. Street sign shall be anodized aluminum with a thickness of .080 inches.
4. The legend for street signs shall be white letters on a green background.
5. Street sign posts shall be long enough to provide a minimum height of 7 feet from the base of the post to the bottom of the lower sign, an overall maximum height of 10 feet and 30 inches embedment in the ground.
6. Posts shall be galvanized steel pipe, extra strong and 2 inches nominal diameter.

### B. Installation

The installation of street signs shall conform to the following requirements:

1. Posts shall be driven or set into the ground to a depth of 30 inches at locations shown on the plans or as directed by the Engineer and Director.
2. The bottom 10 inches of the posts shall be flattened to prevent them from turning in the ground.

### C. Block Numbers

1. Developer shall obtain block numbers from the San Joaquin County Development Department.
2. Block numbers shall be shown on the improvement plans.

SECTION 57

PUMP HOUSE.--This work shall consist of constructing a concrete floor and pump house in accordance with the requirements in Section 51, "Concrete Structures," and Section 57, "Timber Structures," of the Standard Specifications, as specified in these special provisions and as shown on the plans and as directed by the Engineer.

MATERIALS.--Materials shall conform to the requirements of the Standard Specifications and these special provisions.

Portland Cement Concrete. Portland cement concrete shall be Class B commercial concrete and conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Surface finish shall be smooth trowel finish.

Bar Reinforcing Steel. Bar reinforcing steel shall be grade 40 bars conforming to the requirements in Section 52, "Reinforcing," of the Standard Specifications.

Miscellaneous Iron and Steel. Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

The Developer shall submit detailed plans of the pump house for the County's review and approval. Upon approval by the County, the Developer shall secure all permits as required by the San Joaquin County Building Department.

The pump house shall be a conventional wood stud construction (Type V-N, M-1) with the following minimum requirements:

1. Wood frame building 14' long by 12' wide by 8' high, minimum. Contractor shall adjust size to meet all code and OSHA clearance requirements.
2. All wood-framed construction shall conform to UBC Chapter 25.
3. The roof shall be asphalt shingles, light brown color, and shall conform to UBC Sect. 3203. Roof shall be single-slope shed type with a pitch of 4:12.
4. Walls shall be covered on the exterior with APA rated 5/8" exterior plywood siding. Siding shall be "T1-11" with grooves 8" on center.
5. The door and jamb shall be 18 gage steel with fixed pin hinges and a heavy duty hasp bolted through the door.
6. Venting shall be provided as follows:
  - a. Four (4) square feet at each gable end.
  - b. One (1) square foot of vent for each six (6) lineal feet of wall, spaced equally along the

walls.

- c. Additional vents as required for installations of housing emergency backup generators.

Vents shall be equipped with 1/8" galvanized wire mesh screens for the exclusion of bugs and rodents.

7. Provide 3/4" AC exterior plywood as required on interior walls for mounting electrical panels and equipment.
8. Paint shall be supplied from Fuller Paint, Kelley-Moore or approved equal. Painting schedule shall be as follows:

<u>Item</u>	<u>Primer</u>	<u>Finish</u>	<u>Color</u>
Doors and frames	2 coats	2 coats exterior	Thistle
Other metal, vents	zinc oxide	enamel semigloss	Green
Wood trim fascias	--	2 coats of	Black
Exposed rafters		flat latex	
Exterior Douglas	--	2 coats of	Thistle
Fir plywood		flat latex	Green

## SECTION 60

PIPE CONNECTIONS TO STRUCTURES.--Pipe connections to existing manholes and other structures shall be made by carefully breaking an opening in the wall of the manhole or structure and inserting the end of the pipe through the opening flush with the inside wall. After insertion, the annular space shall be tightly packed with a "dry" cement mortar or concrete grout. Surfaces to be in contact with the mortar shall be thoroughly moistened and then scrubbed with Portland cement paste. The mortar shall be trowelled smooth and flush with the interior surface of the manhole or structure.

All sewer pipes shall be connected to structures and manholes by means of a flexible joint within one pipe diameter or two feet of the structure, whichever is greater, unless otherwise shown on the drawings or herein specified.

The Contractor shall notify the County 24 hours in advance before a connection is made to an existing structure. He shall schedule his work so that interruption of flow is held to a minimum.

## SECTION 62

ALTERNATIVE CULVERTS.--Alternative culverts shall conform to the requirements in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

The types and classes of Alternative Culverts allowed shall be as specified on the plans.

## SECTION 63

CAST-IN-PLACE CONCRETE PIPE.--Cast-in-place concrete pipe shall conform to the requirements in Section 63, "Cast-in-place Concrete Pipe," of the Standard Specifications and these special provisions.

Trench backfill shall not be permitted until the concrete has obtained a compressive strength of 1,500 psi and pipe has been in place a minimum of 48 hours and shall be as specified in Section 19C, "Earthwork (Structure Excavation and Backfill)" of these special provisions.

At the option of the Contractor, reinforced concrete pipe, Class III, may be substituted for cast-in-place concrete pipe.

## SECTION 64

PLASTIC PIPE.--Plastic pipe shall conform to the requirements in Section 64, "Plastic Pipe," of the Standard Specifications.

SECTION 65  
ALTERNATE A

REINFORCED CONCRETE PIPE.--Reinforced concrete pipe shall conform to the requirements in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications.

SECTION 65  
ALTERNATE B

REINFORCED CONCRETE PRESSURE PIPE.--Reinforced concrete pressure pipe shall conform to the requirements in Section 65, "Reinforced Concrete Pipe," of the Standard Specifications and these special provisions.

Joints for pressure pipe shall be rubber gasketed joints conforming to the provisions of Section 65-1.06, "Joints," of the Standard Specifications.

A hydrostatic test shall be conducted on pressure pipe conforming to the provisions of the second through the fourth paragraphs of Section 65-1.08, "Laying Siphon and Pressure Pipe," or the Contractor may at his option, conduct the following hydrostatic test:

The pipeline, prior to backfilling around joints, shall be filled with water at a hydrostatic head of 10 feet above the highest point of the pipeline. The pressure head shall be maintained for a period of not less than 1 hour and any visible leak or other defects which develop under test shall be stopped or corrected in a manner satisfactory to the Director. The test shall be repeated until all leaks or other defects are eliminated.

SECTION 65  
ALTERNATE C

DRIVEWAY PIPE.--Driveway pipe shall conform to the requirements in Section 65, "Reinforced Concrete Pipe," and Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Tongue and groove jointed concrete pipe or corrugated metal pipe shall be used for driveways at the locations shown on the plans. Sealing material for joints will not be required.

The installation of the pipe may precede the construction of the driveways. The flowline will be determined by the Director. Backfill may be of native material and the relative compaction requirement shall not be less than 90%.

If corrugated metal pipe is used, a minimum of one foot of cover is required.

SECTION 66

CORRUGATED METAL PIPE.--Corrugated metal pipe shall conform to the requirements in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

When specified on the plans, corrugated steel pipe shall have protective coatings.

#### SECTION 69

OVERSIDE DRAINS.--Overside drains shall conform to the requirements in Section 69, "Overside Drains," of the Standard Specifications.

#### SECTION 70 ALTERNATE A

MISCELLANEOUS FACILITIES.--Miscellaneous facilities shall conform to the requirements in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

#### SECTION 70 ALTERNATE B

AUTOMATIC DRAINAGE GATES.--Automatic drainage gates shall conform to the requirements in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

The gates shall be designed to operate under 10 feet of face pressure measured from the center of the gate cover to the highest water level. The gate shall provide for a free outflow, but shall prevent backflow. The gate shall be adaptable for attaching to the required pipe size or for anchoring to a concrete wall.

The gate shall be complete with cover, spigot-back seat, gate links, bushings, bolts and nuts.

The gate cover and spigot-back seat shall be manufactured of cast iron conforming to the specifications of ASTM Designation: A 126, Class B. The gate links shall be manufactured of steel conforming to the specifications of ASTM Designation: A 36. The bushings shall be manufactured of commercial quality bronze. The assembly bolts, anchor bolts when required, and nuts shall conform to the specifications of ASTM Designation: A 307, Grade A. The gate links, bolts and nuts shall be galvanized in accordance with the specifications of ASTM Designation: A 153.

The gate cover shall be ribbed or domed of ample section to withstand the face pressure. The seating surfaces of the cover and spigot-back seat shall be machined or ground to fit together within a tolerance of not more than 0.004-inch throughout their circumference.

The gate cover shall be hinged from the spigot-back seat by 2 supporting links, one on each side of the gate, pivotally connected to the top of the seat and at the bottom to the cover above its center of gravity. Bushings of suitable length and diameter shall be provided at the 4 hinge points.

The gate shall be assembled in the shop and all cast iron parts shall be given a shop coat of commercial quality asphaltic paint furnished by the manufacturer.

The cover of the gate, when installed, shall fit tight against the seat when there is no pressure on the cover face.

The cover shall be equipped with an eye bolt at the bottom

for opening the gate under pressure.

SECTION 65  
(SECTIONS 65, 66, 69 & 70)

SECTION 71  
ALTERNATE A

STORM DRAINS.--This work shall consist of laying storm drain pipe and constructing drainage structures in accordance with the details shown on the plans and as specified in these special provisions.

MATERIALS

Alternative drain pipe shall conform to the requirements of Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions. Alternative drain pipe will be designated by type on the plans and in the Engineer's Estimate. The equivalent kinds of pipe will be shown on the plans for each type. The kind of pipe to be installed shall be at the option of the Contractor.

The kinds of pipe for alternative drain pipe shall conform to the following provisions:

1. Reinforced concrete pipe shall conform to the requirements of Section 65, "Reinforced Concrete Pipe," of the Standard Specifications.
2. Bituminous lined and unlined corrugated steel pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications.
3. Plastic pipe shall conform to the requirements of Section 64, "Plastic Pipe," of the Standard Specifications and these special provisions.

Plastic pipe shall be smooth interior wall type.

4. Polyvinyl Chloride (PVC) drain pipe shall conform to the requirements in ASTM Designation: D3034 (SDR 35). Couplings and joints shall conform to the requirements in ASTM Designation: D3212.

Portland cement used in the production of concrete products set forth in these special provisions shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Cement mortar shall conform to the provisions in Section 65-1.06, "Joints," of the Standard Specifications.

Rubber gasketed joints shall conform to the provisions in Section 65-1.06, "Joints," of the Standard Specifications.

Joints shall be required to meet the watertightness requirements of Section 61-1.02, "Performance Requirements for Culvert and Drainage Pipe Joints," of the Standard Specifications.

Miscellaneous iron and steel items shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Concrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 90, "Portland Cement Concrete," of the Standard Specifications. Concrete for storm drain structures shall be Class A unless otherwise shown on the

plans.

#### INSTALLATION

Excavation and backfill shall conform to the provisions in Section 19C, "Earthwork (Structure Excavation and Backfill)," of these special provisions.

The pipe shall be laid in a trench excavated to the lines and grades designated by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling in with sand, gravel, or granular material under the body of the pipe, and not by wedging or blocking.

Trenches shall not be left open farther than 300 feet in advance of pipe laying operations or 200 feet to the rear thereof, unless otherwise permitted by the Director.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

Backfill or pipe trenches may be placed while the joint mortar is still plastic. Should the joint mortar become set before the backfill is placed, backfilling the pipe trenches shall not be commenced within 16 hours of jointing the pipe sections.

Pipe shall be protected during handling against impact shocks and free fall.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe, unless otherwise permitted by the Engineer with Director's approval.

Drain pipe shall be connected to existing facilities as shown on the plans and as directed by the Engineer with Director's approval.

Whenever the work ceases for any reason, the end of the pipe shall be securely closed with a tight fitting plug or cover.

Whenever existing pipes are to be cut or abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of concrete not less than 0.5 foot thick.

All joints shall be carefully cleaned on the inside.

Stoppers for pipes and branches left unconnected shall be made of the same material as the pipe or of resilient joint material conforming to the requirements of ASTM Designation: C425. After placing the stopper, it shall be covered with a layer of sealant. The sealant shall be sufficiently fluid to

ensure free flow around the stopper.

Where shown on the plans or directed by the Director, drain pipe shall be encased in concrete, reinforced with concrete, or backfilled with concrete, in accordance with the details shown on the plans.

Concrete for pipe encasement, pipe reinforcement, and backfill shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that the minor concrete shall contain not less than 470 pounds of cement per cubic yard.

New manholes and storm drain inlets for storm drains shall be constructed in accordance with the details shown on the plans, as specified in these special provisions and as directed by the Engineer.

Precast concrete pipe manholes shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications.

When the manhole is located in the pavement area, it shall not be constructed to final grade until the pavement has been completed.

No pipe shall project more than 0.17 foot into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

All concrete shall be cured for a period of not less than 10 days after being placed and shall be protected from damage.

Storm drain work performed in accordance with these special provisions will be designated in the contract item by size, type, thickness, quality, or whatever information is necessary for identification.

SECTION 71  
ALTERNATE B

SANITARY SEWERS.--This work shall consist of laying sanitary sewer pipe and constructing sewer structures in accordance with the details shown on the plans, as specified in these special provisions and as directed by the Engineer.

MATERIALS

Alternative sewer pipe shall conform to the requirements of Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions. Alternative sewer pipe will be designated by type on the plans and in the Engineer's Estimate. The equivalent kinds of pipe will be shown on the plans for each type. The kind of pipe to be installed shall be at the option of the Contractor.

The kinds of pipe for alternative sewer pipe shall conform to the following provisions:

1. Reinforced concrete pipe shall conform to the requirements of Section 65, "Reinforced Concrete Pipe," of the Standard Specifications.

The full three hundred and sixty degrees (360°) of the interior circumference of all reinforced concrete pipe shall be sealed and protected with a polyvinyl chloride resin lining. Copolymer resins will not be permitted.

The plastic liner shall be impermeable to sewage gases and liquids and shall not be conducive to bacterial or fungus growth. The lining shall be impact resistant, flexible, and shall have an elongation sufficient to bridge up to 1/8" settling cracks, which may take place in the pipe or in the joint after installation, without damage to the lining.

The lining shall be of a type that is permanently and physically embedded into the concrete pipe wall by the T-lock mechanism and shall not rely on an adhesive bond between the lining and pipe wall.

The lining at all pipe joints, and at all joints between individual sheets or sections of lines, shall be continuously heat welded by the use of welding strips of the same kind and equivalent thickness of the material as the lines.

The Contractor shall submit for the Deputy's consideration written information as to the type, size, workmanship and other specifications for the plastic liner he proposes to use on any installation. Approval of this submission by the Deputy shall be obtained prior to any material being delivered to the job site.

2. Vitriified clay sewer pipe shall conform to the specifications for extra strength pipe of AASHTO Designation: M 65 except that plain end pipe otherwise complying in all respects with the said specification may be used.

The requirements in the specification for scoring of the ends of the pipe, for the shape of the socket, and for the minimum dimensions for the inside diameter of the socket may be waived with the approval of the Engineer when such waiver is conducive to the proper application of the joint to be used.

The ends of the pipe shall be so formed that, when the pipes

are laid together and joined, the pipe will form a continuous line with a smooth interior surface.

At the option of the Contractor, clay sewer pipe shall conform either to the absorption requirements of AASHTO Designation: M 65 or to the permeability requirements as specified and as determined by California Test 672.

3. Polyvinyl chloride (PVC) pipe shall conform to the requirements in ASTM Designation: D3034 (SDR 35). Couplings and joints shall conform to the requirements in ASTM Designation: D3212.
4. Acrylonitrile - butadiene - styrene (ABS) pipe shall conform to the requirements in ASTM Designation: D2751-80 with minimum wall thickness determined by SDR 35 for 4 inch and 6 inch diameter pipe sizes.

Eight inch through 15 inch diameter pipe sizes shall conform to the requirements in ASTM Designation: D2680-80 with Type OR or Type SC joints.

5. High Density Polyethylene (HDPE) Pipe - pipe and fittings shall be made of high density, high molecular weight, Type III, Class C, Category 5, Grade P34 polyethylene meeting the requirements of ASTM D1248 and ASTM F894 unless specified otherwise herein. Wall configurations and thicknesses shall meet the deflection requirements of this section. Crushing and buckling strengths shall exceed that required from the loads anticipated. Pipe selection and deflection design shall also be based upon a pipe stiffness not less than 20 psi and a modulus of soil reaction no greater than 1400. Pipe stiffness shall be tested prior to installation in accordance with ASTM D2412 with a 5% deflection at a rate of 1/2 inches per minute.
6. Cast iron pipe and fittings shall conform to the specifications of ASTM Designation: A 74, or of Cast Iron Soil Pipe Institute Standard No. 301.

When joints are caulked with lead and packing, the lead shall be pig lead containing not less than 99-1/2% metallic lead.

Packing shall consist of long fibers of best quality jute or hemp, woven into strands of proper length, and kept clean. A packing consisting of a braided jacket and having a jute core may be used in lieu of jute packing.

In preparing the pipe for caulking, the pipes shall be seated and butted and the packing driven tightly to the base of the socket so as to entirely encircle the pipe for one-quarter the depth of the socket, in order to prevent joint compound flowing through into the pipe.

Portland cement used in the production of concrete products set forth in this Section shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Cement mortar shall conform to the provisions in Section 65-1.06, "Joints," of the Standard Specifications.

Prior to caulking vitrified clay pipe with cement mortar, not more than one-third the annular space shall first be caulked with jute pre-dipped in cement slurry.

Hot-poured compounds and primers consisting of bituminous or

coal tar products, and used for caulking bell and spigot type vitrified clay pipe, shall be of the type recommended by the pipe manufacturer for the purpose intended.

The primer shall be applied to the spigot and inside of the bell at least 24 hours before the joints are poured. The surfaces shall be dry before applying the primer.

The joints of vitrified clay pipe shall be caulked with dry jute prior to pouring the hot compounds. The compound shall be heated to the temperature recommended by the manufacturer.

Flexible compression joints in vitrified clay pipe and resilient joint materials to be used therein shall conform to the requirements of ASTM Designation: C 425.

Rubber gasketed joints shall conform to the provisions in Section 65-1.06, "Joints," of the Standard Specifications.

Miscellaneous iron and steel items shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications.

Concrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 90, "Portland Cement Concrete," of the Standard Specifications. Concrete for sewer structures shall be Class A unless otherwise shown on the plans.

#### INSTALLATION

Excavation and backfill shall conform to the provisions in Section 19 Alternate C, "Earthwork (Structure Excavation and Backfill)," of these special provisions.

The pipe shall be laid in a trench excavated to the lines and grades designated by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling in with sand, gravel, or granular material under the body of the pipe, and not by wedging or blocking.

Trenches shall not be left open farther than 300 feet in advance of pipe laying operations or 200 feet to the rear thereof, unless otherwise permitted by the Director.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly compacted.

Backfill of pipe trenches may be placed while the joint mortar is still plastic. Should the joint mortar become set before the backfill is placed, backfilling the pipe trenches shall not be commenced within 16 hours of jointing the pipe sections.

Pipe shall be protected during handling against impact shocks and free fall.

When the new facilities interfere with the existing flow of sewage, the Contractor shall provide satisfactory bypass facilities at his expense.

The pipe shall be laid without break upgrade from structure to structure, with bell end upgrade for bell and spigot pipe, unless otherwise permitted by the Director.

Sewer pipe shall be connected to existing facilities as shown on the plans and as directed by the Engineer.

Whenever the work ceases for any reason, the end of the pipe shall be securely closed with a tight fitting plug or cover.

Whenever existing pipes are to be cut or abandoned, the open ends of said pipes shall be securely closed by a tight fitting plug or wall of concrete not less than 0.5 foot thick.

All joints shall be carefully cleaned on the inside.

Stoppers for pipes and branches left unconnected shall be made of the same material as the pipe, or of resilient joint material conforming to the requirements of ASTM Designation: C 425. After placing the stopper, it shall be covered with a layer of sealant. The sealant shall be sufficiently fluid to ensure free flow around the stopper.

Where shown on the plans or directed by the Engineer, sewer pipe shall be encased in concrete, reinforced with concrete, or backfilled with concrete, in accordance with the details shown on the plans.

Concrete for pipe encasement, pipe reinforcement, and backfill shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications, except that the minor concrete shall contain not less than 470 pounds of cement per cubic yard.

All concrete shall be cured for a period of not less than 10 days after being placed and shall be protected from damage.

New manholes, drop inlet connections, lampholes, service laterals, service cleanouts, terminal cleanout structures, and pipe chimneys for sewers shall be constructed in accordance with the details shown on the plans, as specified in these special provisions and as directed by the Engineer.

Precast concrete pipe manholes shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications, except for measurement and payment.

When the manhole is located in the pavement area, it shall not be constructed to final grade until the pavement has been completed.

The inside bottoms of existing manholes, where new connections are made, and of new manholes shall be shaped to provide channels conforming to the size and shape of the lower portion of the inlets and outlets of the manholes. The channels shall vary uniformly in size and shape from inlet to outlet.

No pipe shall project more than 0.17 foot into a manhole and in no case shall the bell of a pipe be built into the wall of a manhole or structure.

#### MANHOLE COATING

All new manholes, as defined below, downstream from hydrogen sulfide producing structures, to the point of connection into the

existing system, shall receive a protective coating. In addition, any existing manholes downstream from new hydrogen sulfide producing sewer systems that the Engineer determines may be affected by new sewer systems shall be coated. At a minimum, all sanitary sewer manholes downstream from all pump stations, drop manholes, and manhole pumping stations shall be coated. All manholes used for manhole pumping stations shall be coated. All manholes constructed on sewer lines 24-inches and larger, and any other structure where the Engineer determines that hydrogen sulfide gas may be a problem, shall be coated.

The coating material shall have a minimum pot life of 35 minutes at 70°F and a drying time (ASTM D-1640) of 4 hours. The flash point of the individual components and the fluid mixture shall be a minimum of 220°F (COC). The coating material shall have a low temperature total cure capability of 40°F, minimum.

The cured coating material shall have sufficient abrasion resistance to exhibit a weight loss of less than 92 mg when measured in accordance with ASTM D-4060. Adhesion (ASTM D-4541) shall be 400 psi, minimum, with a direct impact resistance (ASTM D-2794) of 18 inch-pounds. The cured coating shall be capable of repair at any time during its life.

The coating shall be resistant to attack from the following: Oxidizing agents such as bleaches, sulfuric, acetic, hydrochloric, phosphoric, nitric, chromic, oleic, and stearic acids; sodium and calcium hydroxides, ammonium, sodium, calcium, magnesium, and ferric chlorides; ferric sulfate, petroleum oils and greases, vegetable and animal oils, fats, greases, soaps, and detergents. The coating shall be impermeable to sewage gases and liquids and shall not be conducive to bacterial or fungal growth.

Surfaces to be coated shall be cleaned of all dirt, dust, corrosion, loose concrete, grease, oils and foreign matter. Surface shall be abrasive treated to achieve a finish conforming to ASTM D-4259. Surfaces shall be dry prior to receiving coatings.

Pre-cast concrete pipe sections shall be cored for the installation of pipe and other penetrations prior to being coated. Coating shall extend to the outside edge of all holes and joints.

The epoxy material shall be applied by high pressure airless spray equipment. The coating shall be applied using cross spray methods to eliminate pinholing and shadowing. The epoxy primer shall be applied to achieve an initial thickness of 3 to 6 mil. The epoxy coating material shall be applied in a single coat multiple pass application to achieve a dry film thickness of 60 mil, minimum.

All coating operations shall be performed in the presence of the Engineer. All coating work done in the absence of the Engineer is subject to rejection unless specifically approved, in writing, by the Engineer prior to the work being performed. The Engineer shall have access to the construction site and those areas involved with the performance of the coating work. All applicable safety equipment and suitable respirators shall be used during coating operations as recommended by the manufacturer and the material safety data sheets.

The coating shall be free of all blisters, pinholes, holidays and discontinuities. The finished coating shall be tested for pinholes and discontinuities using a high-voltage

spark tester. All testing shall be performed by the Contractor in the presence of the Engineer. The testing shall be performed at a minimum voltage of 125 volts per mil of dry film thickness. The Contractor shall verify the proper operation of the testing equipment as per the manufacturer's written instructions prior to spark testing. Spark tester shall be Tinker-Razor AP-W, or approved equal.

All areas required to be repaired as determined by testing and inspection, shall be first spot scarified and then spot recoated as per manufacturer's recommendations.

#### TESTING AND INSPECTION

Prior to performing tests, the pipe installation shall be thoroughly cleaned. Cleaning shall be performed by the Contractor by means of an inflatable rubber ball. The ball shall be of a size that will inflate to fit snugly into the pipe to be tested. The ball shall be controlled with a tag line. The ball shall be placed in the last lamphole or maintenance hole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall pass through the pipe with only the pressure of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first maintenance hole where its presence is noted. In the event cement or wedged debris or a damaged pipe shall stop the ball, the Contractor shall remove the obstruction.

Following the placement and compaction of backfill and prior to placement of permanent pavement, the Contractors shall perform a deflection test on the pipe. If the pipe should fail the deflection test, the Contractor shall uncover the pipe and make adjustments in the bedding and/or backfill conditions that will be necessary to achieve a passing test. The trench shall be backfilled and street subgrade shall be recompacted and the pipe retested. Any corrective measures found necessary to meet the deflection requirements, including recompaction and regrading of the street subgrade, shall be included in the unit price bid for the sanitary sewer pipe.

The Contractor shall furnish all equipment needed to complete this test. The cost for the deflection test shall be included in the unit price bid for the sanitary sewer pipe. Deflection test shall be conducted after the placement and densification of backfill.

The Contractor shall furnish properly sized mandrels for size and type of pipe installed. Certification of proper size shall be required and mandrel identified in a manner to identify with certification.

For ABS Pipe--All mainline pipe shall be cleaned and then mandrelled to measure for obstructions (deflection, joint offsets, lateral intrusions, etc.). A rigid mandrel with a circular cross-section having a diameter at least 96% of the specified average inside diameter shall be pulled through the pipe. The method of measuring the deflection shall be approved by the Engineer. Any pipe through which the mandrel will not pass shall be said to have failed and will be repaired by the Contractor at his expense.

For HDPE Pipe--Maximum long-term deflection for HDPE pipe shall be no more than 5%. Long-term deflection shall be calculated as the short-term deflection multiplied by a deflection lag factor based upon the average inside diameter of the pipe. In no case shall a deflection lag factor of less than 1.5 be accepted. Short-term deflection shall be measured with a mandrel no sooner than 30 days following installation. Mandrel

deflection tests may be required during installation to have an odd number of legs totaling no less than nine. Pipe sections not meeting the deflection requirements shall be excavated, reinstalled, and subject to an additional 30-day deflection test.

For PVC Pipe--The following table lists minimum pipe I.D. deflections: i.e., O.D. of mandrel:

Table of Allowable Deflections for PVC Pipe

<u>Pipe Size &amp; Type</u>	<u>Base I.D.</u>	<u>Min. Allowable I.D.</u>
4" PVC	3.966	3.66
6" PVC	5.742	5.36
8" PVC	7.665	7.18
10" PVC	9.563	8.98
12" PVC	11.361	10.69
15" PVC	13.898	13.08

At his option, the Engineer may require a sample of ten percent (10%) of the laterals randomly selected by the inspectors shall also be tested for deflection. If difficulty is encountered in passing the mandrel test, the inspector may direct that a larger sample of laterals be tested up to including one-hundred percent (100%) of all laterals.

At the Contractor's expense, all locations with deflection greater than allowable shall be excavated, repaired or replaced, backfilled and retested.

Any corrective work proposed shall be approved by the Engineer. No vibrating re-rounded devices shall be allowed to correct pipe deflections.

In addition to the deflection requirements, the Contractor shall furnish all equipment, materials and labor necessary to provide video inspection of all main line sewer pipes. The video log shall be recorded using VHS format and shall include an on-screen counter indicating the position of the camera, in feet, with respect to the length or stationing of the sewer main being televised. The County shall be provided with two copies of the completed video log.

The video shall be performed following the placement and densification of backfill, but prior to the placement of paving. Any defective pipe or conditions discovered by televising shall be corrected by the Contractor at his expense. Any corrective work proposed shall first be approved by the Engineer.

Defective work shall consist of the following: cracks or breaks in the pipe; joints offset by more than 3/8 inch or 1 percent of the inside diameter, whichever is greater; protruding, deformed or folded gaskets; standing water at a depth greater than 0.01 foot per inch of diameter (based on a loss of pipe area of 6.8 percent).

The County may also televise the sewer mains prior to the expiration of the one year warranty period. If a defective condition is unaccountably found, it shall be presumed to be caused by defective workmanship or materials. The Contractor shall be notified and shall correct the work in a manner approved by the Engineer.

Full compensation for furnishing all labor, materials, tools, equipment and incidentals for providing video inspection of the sewer pipes shall be considered as being included in the contract unit costs bid for the various sizes of sewer pipe installed and no additional compensation shall be made therefor.

When designated on the plans, sewers shall be tested by the Contractor for watertightness. Each section of sewer shall be tested between successive maintenance holes by closing the lower end of the sewer to be tested and inlet sewer of the upper maintenance hole with stoppers. The pipe and maintenance hole shall be filled with water to a point 4 feet (1.22m) above the invert of the sewer at the center of the upper maintenance hole; or if ground water is present, 4 feet (1.22m) above the average adjacent ground water level.

The allowable leakage will be computed by the formulae:

$$E = 0.0001 \text{ LD}/H \text{ for mortared joints.}$$

$$E = 0.00002 \text{ LD}/H \text{ for all other joints.}$$

Where:

L is length of sewer and house connections tested, in feet.

E is the allowable leakage in gallons per minute of sewer tested.

D is the internal diameter of the pipe, in inches.

H is the difference in elevation, in feet, between the water surface in the upper maintenance hole and the invert of the pipe at the lower maintenance hole; or if groundwater is present above the invert of the pipe in the lower maintenance hole, the difference in elevation between the water surface in the upper maintenance hole and the groundwater at the lower maintenance hole.

However, the maximum shall not exceed 200 gallons per inch of internal diameter per mile per day.

The Contractor shall, at his expense, furnish all water, materials and labor for making the required test. All tests shall be made in the presence of the Engineer.

Where the leakage of the sewer exceeds the above amount, it shall be corrected immediately and the amount of leakage reduced to a quantity within the specified amount. In any case, the Contractor shall stop any individual leaks which may be observed.

#### AIR PRESSURE TEST

The Contractor shall furnish all materials, equipment and labor for making an air test. Air test equipment shall be approved by the Director prior to the beginning of the test.

Each section of sewer shall be tested between successive maintenance holes by plugging and bracing all openings in the main sewer line and the upper ends of all sewer connections. 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 branching sewer connections shall be conducted in the presence of the Director or his representative in the following manner:

1. Clean pipe to be tested by propelling snug fitting inflated rubber ball through the pipe with water.
2. Plug all pipe outlets with suitable test plugs. Brace each plug securely.
3. If the pipe to be tested is submerged in ground water, insert a pipe probe by boring, or jetting, into the backfill material adjacent to the center of the pipe and determine the pressure in the probe when air passes slowly through it. This is the back pressure due to ground water submergence over the end of the probe. All gauge pressures in the test should be increased by this amount.
4. Add air slowly to the portion of the pipe installation under test until the internal air pressure is raised to 4.0 psig.
5. After an internal pressure of 4.0 psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.
6. When pressure decreases to 3.5 psig, start stop watch.
- 6a. The following applies to all pipes other than PVC and ABS (see 6b):

Determine the time in seconds that is required for the internal air pressure to reach 2.5 psig. Minimum permissible pressure holding times are indicated by the following formula and table in seconds:

$$t = k \frac{(d)}{g}$$

where t = minimum required time in seconds  
 k = constant 0.022  
 d = nominal pipe diameter in inches  
 g = allowable air loss rate per unit area, 0.003 cu. ft./min./sq. ft. of internal/surface area

MINIMUM HOLDING TIME IN SECONDS REQUIRED FOR PRESSURE TO DROP FROM 3 1/2 TO 2 1/2 PSIG

PIPE DIAMETER

	4"	6"	8"	10"	12"	15"	18"	21"	24"	27"	30"	33"	36"	39"
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L E N G T H  O F  L I N E  I N  F E E T	25	4	10	18	28	40	62	89	121	158	200	248	299	356	418
	50	9	20	35	55	79	124	178	243	317	401	495	599	713	837
	75	13	30	53	83	119	186	267	364	475	601	743	898	1020	1105
	100	18	40	70	110	158	248	256	485	634	765	851	935		
	125	22	50	88	138	198	309	446	595	680					
	150	26	59	106	165	238	371	510							
	175	31	69	123	193	277	425								
	200	35	79	141	220	317									
	225	40	89	158	248	340									
	250	44	99	176	275										
	275	48	109	194	283										
	300	53	119	211											
	350	62	139	227											
	400	70	158												
	450	79	170												
	500	88													
550	97														
600	106														
650	113	170	227	283	340	425	510	595	680	765	851	935	1020	1105	

NOTES: (1) TO BE USED WHEN TESTING ONE DIAMETER ONLY.  
(2) THE ABOVE AIR PRESSURE TEST PROCEDURE IS BASED ON ASTM C828. ANY SPECIAL SITUATIONS OR CONDITIONS SHALL CONFORM TO THIS ASTM STANDARD.

6b. For PVC and ABS lines, the following table lists the minimum times allowed for a pressure drop from 3.5 psi to 3.0 psi in excess of the ground water pressure at the top of the pipe.

1 Pipe Dia (in)	2 Min Time (min sec)	3 Lgth for Min Time (ft)	4 Time for Lngr Lgth (sec)	Specification time for Length (L) shown (min:sec)									
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft		
4	1:53	597	.190L	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53	1:53
6	2:50	398	.427L	2:50	2:50	2:50	2:50	2:50	2:50	2:50	2:51	3:12	3:12
8	3:47	298	.760L	3:47	3:47	3:47	3:47	3:47	3:48	4:26	5:04	5:42	5:42
10	4:43	239	1.187L	4:43	4:43	4:43	4:57	5:56	6:55	7:54	8:54	8:54	8:54
12	5:40	199	1.709L	5:40	5:40	5:42	7:08	8:33	9:58	11:24	12:50	12:50	12:50
15	7:05	159	2.671L	7:05	7:05	7:05	11:08	13:21	15:35	17:48	20:02	20:02	20:02

SAFETY NOTE:

The air test may be dangerous if, because of ignorance or carelessness, a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blow outs. Inasmuch as a force of 250 lbs. is exerted on an 8" plug by an internal pipe pressure of 5 psi, it should be realized that sudden expulsion of a poorly installed plug or of a plug that is partially deflated before the pipe pressure is released can be dangerous.

As a safety precaution, pressurizing equipment should include a regulator set at perhaps 10 psi to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the maintenance holes during testing.

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.

SECTION 72  
ALTERNATE A

SLOPE PROTECTION.--Slope protection shall conform to the requirements in Section 72, "Slope Protection," of the Standard Specifications.

SECTION 72  
ALTERNATE B

SACKED CONCRETE SLOPE PROTECTION.--Sacked concrete slope protection shall be placed in accordance with the details shown on the plans and as specified in these special provisions.

The portland cement and mixing shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications, and as specified in these special provisions.

The aggregate used may be pit-run material, at least 80% of which shall pass a 2-inch sieve. The aggregates need not be separated into primary sizes before batching. Washing will be required only to provide that the cleanness value of the portion passing a 1-inch sieve and retained on a No. 4 sieve shall not be less than 50 and the Sand Equivalent of the portion passing a No. 4 sieve shall not be less than 50. The relative mortar strength of the portion passing a No. 4 sieve shall not be less than 85% of the strength developed by Ottawa sand.

The mixed concrete shall contain not less than 376 pounds of portland cement per cubic yard.

The amount of water added at the time of mixing shall be such as will produce a mixture with a penetration of from 1-1/2 inches to 2-1/2 inches when tested in accordance with the method described in Section 90, "Portland Cement Concrete," of the Standard Specifications.

Sacks for concrete shall be made of at least 10-ounce burlap and shall be approximately 19-1/2 inch x 36 inch measured inside the seams when the sack is laid flat. The capacity of each sack shall be approximately 1.25 cubic feet. Sound reclaimed sacks may be used. The sacks shall be filled with approximately one cubic foot of plastic concrete loosely placed so as to leave room for folding at the top. The fold shall be just enough to retain the concrete at the time of placing. Immediately after being filled with concrete, the sacks shall be placed and lightly trampled to cause them to conform with the slope and with adjacent sacks in place.

The sacks shall be placed so that the face coverage per cubic yard of sacked concrete slope protection measured on the slope shall not be more than 27 square feet nor less than 26 square feet, exclusive of foundations, cut-off stubs and end returns. The slopes on which the sacked concrete is being placed shall be finished within 0.2 foot of the grade established by the Engineer. The first course shall consist of a double row of stretchers laid in a neatly trimmed trench. The second course shall consist of a single row of headers. The third and remaining courses shall consist of stretchers or headers as shown on the plans and shall be placed in such a manner that joints in succeeding course are staggered. All dirt and debris shall be removed from the top of the sacks before the next course is laid thereon. Stretchers shall be placed so that the folded ends will

not be adjacent. Headers shall be placed with the folds in toward the bank. Not more than 4 vertical courses of sacks shall be placed in any tier until initial set has taken place in the first course of any such tier.

When, in the opinion of the Engineer, there will not be proper bearing or bond for the concrete due to delays in placing succeeding layers of sacks or due to the work having been hampered by storms, or mud, or for any cause, a trench shall be excavated back of the row of sacks already in place, which trench shall be filled with fresh concrete before the next layer of sacks is laid.

Sacked concrete slope protection shall be cured as provided in Section 90-7, "Curing Concrete," of the Standard Specifications.

At the completion of slope protection work, the footing trench shall be filled with excavated material and compaction will not be required.

#### SECTION 72 ALTERNATE C

BROKEN CONCRETE SLOPE PROTECTION.--Broken concrete slope protection shall be placed in accordance with the details shown on the plans and as specified in these special provisions.

Broken concrete resulting from bridge removal shall be broken into pieces which can be readily handled and shall be used to construct the slope protection.

Prior to placing, all exposed reinforcing steel projecting from the broken concrete shall be cut off flush with the surface of the concrete.

Broken concrete slope protection shall be placed in conformance with the provisions for Method B placement specified in Section 72-2.03, "Placing," of the Standard Specifications.

#### SECTION 73 ALTERNATE A

CONCRETE CURBS AND SIDEWALKS.--Concrete curbs and sidewalks shall conform to the requirements in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications, the Standard Drawings and these special provisions.

"Handicap Ramp" shall be considered the same as "Curb Ramp" in the Standard Specifications and these special provisions.

In lieu of the requirements of Section 73-1.05; weakened plane joints shall be constructed at intervals shown on the Standard Drawings.

Where curb and gutter only is constructed, driveways shall be placed monolithically with the curb and gutter or shall conform to one of the following alternatives:

- (a) Dowels (5/8 inch diameter by 24 inches long) spaced at 4 foot intervals.
- (b) Keyway constructed as shown on Standard Drawings or 2 inches in height and one inch in depth minimum.

A uniform color shall be maintained by the addition of one pound of lamp black per cubic yard of concrete for curb,

gutter and sidewalk construction.

Walkway and driveway approaches providing access to private property that are constructed behind new sidewalk shall be colored and textured as required to match the existing facility.

All concrete gutters shall be water tested for drainage before acceptance. The maximum deviation from a true grade shall not result in ponding water for a depth exceeding 0.02 foot.

Ground area to be used for landscaping purposes, which has been excavated or is below finished grade shall be backfilled with selected material or imported topsoil free of stones conforming to the provisions of Section 20-2.01, "Topsoil," of the Standard Specifications and these special provisions, unless otherwise shown on the plans.

SECTION 73  
ALTERNATE B

CONCRETE CURBS AND SIDEWALKS (REPAIR).--Concrete curbs and sidewalks (repair) shall conform to the requirements in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Repairs to concrete curbs, gutters, sidewalks and driveways shall be made by removing and replacing the entire portions between joints or scores, excavating 6" below subgrade and 6" into existing curb, gutter and sidewalk at the joints, except as follows:

- (1) Curb and gutter shall be replaced between saw cuts so that the remaining or new curb and gutter will not be less than 4 feet in length;
- (2) The entire width of sidewalk shall be replaced between saw cuts for a length of not less than 4 feet provided the remaining sidewalk shall not be less than 4 feet in length;
- (3) Driveways shall be replaced either completely or partially by saw cutting in the joint of the driveway.

SECTION 75

MISCELLANEOUS METAL.--Miscellaneous metal shall conform to the requirements in Section 75, "Miscellaneous Metal," of the Standard Specifications.

SECTION 76

DOMESTIC WATER FACILITIES.--This work consists of furnishing and installing pressure water pipe, control valves, thrust blocks, fire hydrant tees, fire hydrants and service lines, all as shown on the plans or as directed by the Engineer, and as specified in the Standard Specifications and these special provisions.

MATERIALS.--In accordance with Section 6-1.07, a certificate of compliance shall be furnished with all materials listed herein. All pipes and fittings (except valves) shall have a minimum working pressure of 150 pounds per square inch (psi) and conform to these special provisions.

Alternative Pipe. Alternative water pipe shall conform to the requirements of Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions. Alternative water pipe will be designated by type on the plans and in the Engineer's Estimate. The equivalent kinds of pipe will be shown on the plans for each type. The kind of pipe to be installed shall be at the option of the Contractor.

The kinds of pipe for alternative water pipe shall conform to the following provisions:

1. Cast iron and ductile iron pipe for water shall be furnished in the sizes, classes, grades or nominal thicknesses, and joint types designated on the plans or in the special provisions.

Cast iron pipe shall comply with ANSI A21.6 (AWWA C106) for pipe cast in metal molds or ANSI A21.8 (AWWA C108) for pipe cast in sand lined molds.

Ductile iron pipe shall comply with ANSI A21.51 (AWWA C151).

Cast and ductile iron pipe joints shall comply with the following requirements for the types specified on the plans or in the special provisions:

<u>Type of Joint</u>	<u>Specification</u>
Rubber Gasket Push-on Joint	ANSI A21.11 (AWWA C111)
Mechanical Joint	ANSI A21.11 (AWWA C111)
Flanged Joint	ANSI B16.1, B.16.2 and A21.10 (AWWA C110)
Flanged Joint (Threaded Flanges)	ANSI B2.1

All rubber gasket, push-on, mechanical and flanged joint fittings for cast iron or ductile iron water pipe shall be manufactured in accordance with ANSI A21.10 (AWWA C110).

Unless otherwise specified, the internal surfaces of cast iron and ductile iron water pipe and fittings shall be lined with a uniform thickness of cement mortar then sealed with a bituminous coating in accordance with ANSI A21.4 (AWWA C104). The outside surfaces of cast iron and ductile iron pipe and fittings for general use shall be coated with a bituminous coating 1 mil (0.0254mm) thick in accordance with ANSI A21.6 or ANSI A21.51.

2. Polyvinyl Chloride (PVC) pipe shall be furnished in the classes, sizes, and grades designated on the plans and special provisions.

Polyvinyl Chloride pipe shall meet the requirements of AWWA C-900 "Polyvinyl Chloride (PVC) Pressure Pipe." Pipe sizes shall be four inches through twelve inches only - AWWA Class 150 minimum. All Class 150 pipe shall meet the requirements of DR 18 and Class 200 pipe shall meet the requirements of DR 14 with cast iron O.D.

All pipe shall be suitable for use as a pressure conduit. Provisions shall be made for expansion and contraction at each joint with an "o" ring elastomeric gasket seal meeting the requirements or ASTM D-1869 and F-477. solvent welded joints will not be permitted. The bell section shall be designed to be at least as strong as the pipe wall.

Fitting for PVC pipe shall be cast iron only.

3. When special construction of the water main is required for the separation of water mains and sanitary sewers or storm drains as set forth in Section 64630 of Title 22 of the California Administrative Code, Alternate Pipe shall consist of the following:
  1. Ductile iron pipe per AWWA C151;
  2. Welded steel pipe per AWWA C200, 1/4" thick and lined and wrapped per AWWA C203;
  3. Class 200 PVC pipe per AWWA C900;
  4. Reinforced concrete pressure pipe, steel cylinder type, per AWWA C300, C301 or C303.

Installation and clearances for water main crossings shall be in accordance with the requirements of Section 64630 of Title 22, California Administrative Code and these plans and special provisions.

Valves. This specification includes 4-inch through 12-inch diameter valves of all kinds for buried service in a domestic water system.

Gate valves shall be double disc type with parallel seats and nonrising stems, meeting or exceeding the latest revisions of AWWA C-500 with a design working pressure of 200 psi. Valve disc seats shall be Grade 1 bronze.

Resilient seated gate valves conforming to AWWA specifications C509-80 are acceptable and are required for fire hydrant installations.

Butterfly valves shall meet or exceed the latest revisions of AWWA C-504 with a design working pressure of 150 psi. Operators for butterfly valves 20 inches and smaller shall be Class 150; larger operators will be as specified in the special provisions and designed for actual line conditions as covered in AWWA C-504, Appendix A.

Valve ends shall be mechanical joint or flanged in accordance with AWWA C-500 unless otherwise specified.

Valves for use with flanged pipe shall be cast with Class 125 flanges, dimensions and drilling shall conform to ASA B16.1. Flange bolt holes shall be spot faced if flange fillets interfere with bolt heads and nuts.

Check valves on pump discharge shall be outside arm with counter weight and spring control.

The inlet flange for tapping gate valves shall be provided with Class 125 flange for attaching to tapping sleeve. The flange shall have a machined projection compatible with a

machined recess in the tapping sleeve. The outlet of the valve shall be provided with a flange for tapping machine mounting. Tapping sleeves shall be mechanical joint and flange unless deviation is permitted by the County.

All stem seals, gate valves and butterfly valves, shall be "O" rings only.

Wrench nuts shall be made of top grade cast iron, fitting the top of the valve stem and secured by nut or key. Wrench nuts shall be 1-15/16 inch square at the top and 2 inches square at the bottom.

Valves requiring operating wrenches exceeding 6 feet in length shall have extension and guides installed in valve boxes.

The open direction shall be left (counterclockwise) and the closed direction right (clockwise).

Cast Iron Fittings. Cast iron fittings shall be Class D fittings conforming to ASTM Designation 126 and shall be 150 pounds. All valves and fittings shall be flanged.

Valve Boxes. Valve boxes and covers shall conform to San Joaquin County Standard Drawings.

Gaskets. Gaskets for flanged joints shall be full-circle 1/16 inch composition gaskets.

Thrust Blocks. Thrust blocks shall be installed at all bends and fittings and shall conform to San Joaquin County Standard Drawings. Concrete for thrust blocks shall be Class B in accordance with Section 90, "Portland Cement Concrete," of the Standard Specifications.

Fire Hydrants. Fire hydrants shall conform to the requirements of the Fire Department of the County of San Joaquin as shown on the Standard Drawings and the following:

- a. All hydrants shall comply with AWWA C502, latest revision.
- b. All operating valves shall be located below grade and protected by "break-off" features so that no water flows if hydrant is knocked off.
- c. Hydrant main valve seat shall be a minimum 5-1/4 inches.
- d. Hydrant valve shall be molded nonswelling rubber.
- e. Hydrant main valve seat shall be threaded into a bronze to bronze subseat.
- f. Hydrant bury shall be 36 inches from connection to ground flange. Materials to extend the length of bury must be readily available.

Service Lines. Service lines up to and including meter connection shall be as detailed in San Joaquin County Standard Drawings, as applicable for the service intended and with the AWWA Standard C-800, except as hereinafter modified or as modified by the plans and these special conditions.

1. Type of service line pipe shall be limited to the following:
  - a. Copper water tube, Type K or ASTM B-88.
  - b. Ultra High Molecular Weight (UHMW) P.E. 3406, P.E. 3408, CS 255-63, Polyethylene as manufactured by Driscopipe, Orangeburg or an approved equal in one inch (1") iron pipe sizes only. Plastic pipe larger

than one and one quarter inch (1-1/4") and up to and including two inch (2") iron pipe sizes shall be PB 2110 Polybutylene. Connection of plastic pipe shall be made using Mueller 110 compression connections or approved equal.

Water Meters. All meters must equal or exceed the American Water Works Association Standard Specifications for Cold Water Displacement, Type A, AWWA C-700-77, or latest edition.

## 1. General

Meters shall be the latest models, must have been catalogued for more than 4 years, and must be manufactured by a company with a minimum of 10 years' experience in the manufacture of water meters.

Serial numbers shall be clearly and permanently imprinted on the dial lid or body.

All meters shall be of the positive displacement nutating and oscillating type. Meters shall be furnished without couplings or companion flanges.

Meter body shall be bronze, split case design, and shall be joined together by not fewer than four bolts. Bolts and washers shall be bronze or stainless steel.

Register chamber shall be bronze, stainless steel or plastic material. Provided that, if plastic material, the register chamber shall be protected by a brass or copper liner hermetically sealed to prevent incursion of moisture and dirt. Lens shall be glass sealed to liner. Register chamber shall contain a desiccating capsule.

All parts shall be designed so that they are interchangeable with comparable size meters of the same make.

Meters may be tested upon delivery and shall register in accordance with AWWA specifications. Any meter not meeting these specifications will be subject to rejection.

Meters furnished under these specifications shall be guaranteed to operate under a working water pressure of 150 pounds per square inch without leakage or damage to any part.

Dial shall be straight reading, with the last zero shown in white on black, and the preceding numeral or odometer wheel white on black, and all other preceding odometer wheels show numerals in black on white. Meters shall read in gallons.

Lens shall be of heavy glass material and shall withstand the effect of a 2-ounce steel ball dropped from a height of 10 feet.

All parts of the registers shall be made of nonferrous or corrosion-resistant materials.

## 2. Chambers and Discs

Meters equipped with discs of the flat type shall be provided with thrust rollers made of hard rolled phosphor bronze or equally suitable material. The thrust roller shaft shall be solidly attached to the thrust roller head, and rotate freely in the disc plate. In the 1-1/2-inch and 2-inch meters, only the part of the roller protruding from the disc plate shall be hard rubber mounted.

3. Original Meter Wear and Tear Allowance

Magnetic drive, gear train and dial shall be guaranteed for a period of 10 years. Should failure occur for any cause, vandalism and abuse excepted, during the period of the guarantee, the complete unit shall be replaced by the supplier at no cost to the water purveyor.

4. Measuring Chamber

Measuring chamber shall be guaranteed for a period of 8 years. Chamber shall be designed to allow passage of sand grains of not greater size than 50 mesh ASTM, without causing stoppage or causing incorrect reading of more than .5 percent per year tested at flows of 5 gpm.

5. Measuring Chamber Tolerance Allowance

An allowance of .5 percent loss of accuracy per year for wear and tear depreciation will be allowed. If stated tolerances are exceeded at any time within the period of guarantee, the supplier shall replace the entire measuring chamber, case and complete disc at no cost to the water purveyor.

The County may remove meter on or before routine maintenance change and will test meter on test bench prior to any repairs to determine accuracy and condition of meter. Should removed meter not perform within the permitted tolerances, such meter shall be again tested in the presence of suppliers' representative, dismantled in his presence, and cause of failure determined to satisfaction of both the water purveyor and the supplier.

Unless otherwise specifically noted, water meters shall be purchased by Developer and delivered to Utilities Maintenance Division.

For meters larger than two inches, it will be the Contractor's responsibility to contact the County of San Joaquin prior to installation of meter boxes to ascertain the dimensions of the meters.

It shall be the Contractor's responsibility to set meter box and service fittings in such a manner that meter can easily be dropped in place.

Air Relief Valve. This work shall consist of installing air relief valves on the water mains and shall include the installation of the water main saddle tap, piping to the relief valve, valve housing assembly and all necessary fixtures, fittings and equipment to provide air relief valves complete and in place as shown on the plans and as specified in these special provisions.

Air relief valve shall be a universal type air and vacuum and pressure relief air valve, Crispin Model No. U10, or approved equal.

INSTALLATION.--The Contractor shall, unless specified otherwise, furnish all material, equipment, tools, and labor necessary to do the work required, and unload, haul and distribute all pipe, castings, fittings, valves, hydrants and accessories. The Contractor shall also remove pavement as stipulated; excavate trenches and pits to the required dimensions; excavate bell holes; construct and maintain all bridges for traffic control sheet, brace, and support and adjoining ground or structures where necessary; handle all

drainage or ground water; provide barricades, guards, and warning lights; lay and test the pipe, castings, fittings, valves, hydrants, and accessories; backfill and consolidate the trenches and pits; restore the roadway surface unless otherwise stipulated; remove surplus excavated material; clean the site of the work; and maintain the street or other surface over the trenches as specified.

Water Mains. The pipe shall be handled with care at all times and in a manner that meets the approval of the Engineer. Extreme care shall be exercised in the use of any mechanical devices used in laying the pipe to avoid scarring or other damage.

The County shall be the judge of whether a pipe is seriously damaged and any pipe so classified shall be permanently removed from the site of the work.

The inside of all pipes and couplings shall be free from dirt, grease, or other deleterious materials. The open ends of all pipe previously laid shall be adequately plugged water tight whenever pipe laying operations are suspended at the end of each work day, or for any other reason.

Select material shall be placed and thoroughly compacted across the bottom of the trench to provide full support of all the pipe. Bells and/or couplings shall have soil removed to provide a uniform bearing.

All connections to existing lines shall be made with flanged fittings with isolation plates. Connection details shall be subject to approval by the County.

Water Services. This work shall consist of installing water service connections consisting of water main saddle taps, service lines, meter boxes, meters and all necessary fixtures and fitting to provide water service connections as shown on the plans and as specified in these special provisions.

Excavation and Backfill. Excavation and backfill shall conform to the provisions in Section 19C, "Earthwork (Structure Excavation and Backfill)," of these special provisions.

The pipe shall be laid in a trench excavated to the lines and grades designated by the Engineer. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel.

Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to line and grade shall be made by scraping away or filling in with sand, gravel, or granular material under the body of the pipe, and not by wedging or blocking.

Trenches shall not be left open farther than 300 feet in advance of pipe laying operations or 200 feet to the rear thereof, unless otherwise permitted by the Director.

The excavation shall be supported so that it will be safe and that the ground alongside the excavation will not slide or settle, and all existing improvements, either on public or private property, will be fully protected from damage.

All supports shall be removed after construction is completed, unless otherwise directed by the Engineer, and shall be withdrawn in a manner that will prevent the caving of the sides of the excavation. All openings caused by the removal of supports shall be filled with suitable material properly

compacted.

Backfill materials shall be placed on both sides of the pipe simultaneously to prevent any undue strain on the pipe.

Compacting equipment or methods that may damage the pipe or cause excessive displacement shall not be used.

All pipe damaged during construction operations shall be replaced by the Contractor at his expense to the satisfaction of the Engineer.

Trench Resurfacing. Trenches in existing streets shall be resurfaced with the type and thickness of bases, surfacing or pavement shown on the plans and/or Standard Drawing.

The Contractor shall proceed immediately to resurface any part of any excavation upon notice from the County without waiting for completion of the full length of line.

Testing. The test for hydrostatic pressure shall commence no sooner than seven (7) days after the last concrete thrust block has been cast with standard cement or at least after thirty-six (36) hours with high early strength cement, and after backfilling and compacting the trench to the plane upon which the asphalt concrete surfacing is to be placed. The Contractor shall take the necessary precautions to ensure that the pipe fittings, couplings, valves, and other appurtenances are not displaced during the test. Twenty-four (24) hours prior to the time of the test, the sections of pipe to be tested shall be filled with water, and care shall be exercised to assure removal of all air from the pipe.

After the twenty-four (24) hour period, the completed pipe sections to be tested shall be subjected to a hydrostatic test pressure of one hundred fifty (150) pounds per square inch for two (2) hours. During this period the test pressure shall be maintained and the amount of make-up water measured. The leakage rate for this test shall not exceed 0.01 gallons for each inch of diameter for each pipe joint in the section being tested.

Any leaks, failures, or imperfect construction revealed during the test period shall be corrected by the Contractor at his own cost and expense. The Contractor shall repair all defects, fill and recompact the trench and retest the section of line until satisfactory results are obtained.

Interruption of Service. No valve or other control on an existing system shall be operated for any purpose by the Contractor. The Contractor shall coordinate with [ ]\* and San Joaquin County Public Works to operate any valve, hydrant, blowoff or curb stop. The Contractor shall give a minimum of 24 hours notice prior to the time of proposed interruption. Interruptions of service shall not exceed four hours.

DISINFECTING WATER MAINS.--The Contractor shall furnish all materials, equipment, tools and labor necessary to do the work required to disinfect the new water mains as specified in these special provisions and as directed by the County. The interior of all pipe, fittings, and other accessories shall be kept as free as possible from dirt, foreign material and bacteria at all times. During pipe laying operations, when bacterial contamination of interior pipe surfaces is obvious or suspected by the Director, he may order said surfaces to be swabbed with an approved bactericidal solution.

Disinfection of new water mains shall be accomplished by using either Method No. 1 or Method No. 2 as specified in these special provisions.

Isolation of New Mains.--All new water lines shall be completely isolated from all existing mains until they have been tested and disinfected to the satisfaction of the Director. New mains may be filled from existing mains, but only when using an approved temporary tap assembly. The temporary tap shall consist of a shut off valve and a State Department of Health Services approved reduced pressure backflow prevention device. Connection details shall be submitted to the Director for approval prior to installation.

When the new main is properly disinfected and the isolation dam is removed from connection flange or other type connection is made, extreme care shall be exercised to prevent the entry of contamination. Connection fittings shall be thoroughly swabbed with an approved bactericide immediately prior to their installation.

Flush the mains thoroughly at the end of the contact period. The orthotolidine test shall show no more chlorine in the water leaving the main than in the water entering the main.

The Contractor shall collect a sample for bacteriological examination in a sterile bottle provided by the laboratory. On the label, give date, address, and the name or number for the project. Where possible the sample should be taken from a

**\* Add name of CSA or Maintenance District**

service located near the end of the chlorination section, otherwise, it may be taken through the same blowoff used for flushing the heavily chlorinated water out of the main so that the blowoff is sterilized.

If the bacteriological tests are unsatisfactory, the main shall be resterilized using Method No. 2, and the sterilization repeated, if necessary, until satisfactory results are obtained.

1. METHOD NO. 1 - H.T.H. TABLET METHOD.--This method is preferred for short jobs and for small diameter pipe of any kind. It cannot be used where trench water has entered the main. The main cannot be flushed prior to sterilization, so the method requires that the pipe be kept clean during installation.

Using Permatex No. 1 as an adhesive, fasten the required number of tablets (see Table I) to the inside top of each length of pipe. The tablets may be fastened to the pipe before it is placed in the trench providing the top of the pipe is marked to ensure that the tablets are on the top of the pipe after installation.

When using dresser or similar couplings, an additional tablet shall be crushed and placed in the annular space between the coupling and the pipe. Fill the pipe very slowly and proceed as outlined under General Instructions of the manufacturer.

2. METHOD NO. 2 - H.T.H. SOLUTION WITH HAND PUMP METHOD.--This method is general in scope and must be used when it is necessary to rechlorinate an existing main. When this method is used on a main coupled with dresser or similar couplings, a pinch of H.T.H. powder shall be placed in each coupling as the main is laid.

Equipment required includes an ordinary hand test pump,

solution hose, and a five gallon can to contain the chlorine solution.

A compact and convenient assembly can be made by mounting the solution can and the pump on a suitable board with a pipe connection from the tank on the suction side of the pump.

H.T.H. comes as a powder which must be dissolved in water. Strong chlorine solutions should be handled with care according to manufacturer's instructions.

Make up chlorine solution according to Table II. The quantity required is estimated from Table II. An excess volume should be prepared so as not to empty the container before the job is complete.

Connect pump to main. Use a corporation cock for this purpose and make connection at or ahead of the inlet end of the new line.

After flushing the line thoroughly adjust flow by timing the period required to fill a five gallon can.

Pump chlorine solution into the line at a rate of one gallon of solution in three minutes.

Continue pumping until orthotolidine tests on a sample taken from discharge end of line being treated shows a red color, or until the odor of chlorine is noticed.

After finishing application of chlorine, close valve or blowoff. Disconnect and flush pump thoroughly with fresh water.

If the above procedure has to be varied because of some unusual condition, it will be necessary only to regulate the pump, control the water flow, or adjust the strength of the chlorine solution to give a dose of at least 50 ppm.

TABLE I  
NUMBER OF TABLETS REQUIRED FOR  
MAIN STERILIZATION

Length of Section	Diameter of Pipe					
	2"	4"	6"	8"	10"	12"
13' or Less	1	1	2	2	3	5
18'	1	1	2	3	5	6
20'	1	1	2	3	5	7
30'	1	2	3	5	7	10
40'	1	2	4	6	9	14

TABLE II  
CHLORINE SOLUTION STRENGTH  
HAND PUMP METHOD OF MAIN CHLORINATION

Amount of chemical in 5 Gallons of Solution	
Discharge Rate GPM	H.T.H.
10	0.25 lbs.

20	0.50 lbs.
35	0.75 lbs.
50	1.00 lbs.
75	1.50 lbs.
100	2.00 lbs.

Choose a suitable discharge rate and determine the time required to apply the chlorine from Table III.

Compare the gallons of solution required by dividing this time by 3.

Use the above table to determine the strength of solution required. Example: If the estimate time from Table III is 35 minutes, 11-2/3 gallons will be required; and if the discharge rate is 50 GPM, the solution should contain one pound of H.T.H. in five gallons. Prepare 15 gallons of solution so as to be sure of having an adequate amount.

Operate the hand pump at a rate of five gallons in 15 minutes, or one gallon in three minutes.

TABLE III

Time in Minutes to Apply Chlorine to 100 Feet of Pipe

Discharge Rate GPM	2"	4"	6"	8"	10"	12"
10	2	7	15	26	41	59
20		3	7	13	20	29
35		2	4	8	12	17
50			3	5	8	12
75			2	4	6	8
100				3	4	6

The above table is used to estimate the time required to apply chlorine. For example: 700' of 8" main can be filled with chlorine solution in 35 minutes with a discharge rate of 50 GPM.

REDUCED PRESSURE BACKFLOW PREVENTER.--The reduced pressure backflow preventer shall be a complete assembly, consisting of two separate spring loaded check valves and a differential relief valve. These devices shall automatically reduce the pressure in the "zone" between the check valves.

Both check valves and the differential relief valve shall be constructed so that they may be serviced without removing the device from the line. The devices shall be rated to 175 psi working pressure.

The reduced pressure backflow preventer shall be AWWA or USC approved and shall be installed so that flooding would not cause the relief valve to become submerged. It shall be installed a minimum of 12" above grade.

## SECTION 77

DOMESTIC WATER WELL.--This work shall consist of drilling, constructing, developing, disinfecting and testing a new well, to deliver [ ] gallons per minute (gpm). The well and its appurtenances shall consist of the items shown and shall be arranged on the well site as shown on the plans.

SCOPE - The Contractor shall construct a finished gravel-packed cased water well as herein specified and as shown on the plans.

A test hole was drilled to a depth of [ ] feet. The log data obtained is as follows:

**[enter boring log]**

No change in the specified depth of the well, casing, shutoff, or any other feature of the well system shall be made except when authorized by the Director.

GENERAL REQUIREMENTS - All work shall be in accordance with all applicable provisions of the American Water Works Association Standard No. AWWA A100-84, California State Department of Water Resources Bulletin No. 74-81 and 74-90, Ordinances of the San Joaquin County Public Health Services, Environmental Health Division, San Joaquin County codes, the Standard Specifications and these special provisions.

All equipment and test methods shall be subject to approval by the Director.

Nothing in these plans and specifications shall be construed to permit work not conforming to the most stringent of applicable codes.

The Contractor shall secure permits from the San Joaquin County Public Health Services, Environmental Health Division, as required for the drilling of a domestic water well. All permits shall be obtained at the Contractor's expense.

The Director and Environmental Health Division shall be notified at least 48 hours in advance of starting any drilling, testing, or developing of the well, to permit the presence of a representative from their office.

#### DRILLING OF WELL

Method of Drilling - Drilling shall be performed with approved reverse rotary well drilling equipment in good condition and adequate in all respects to drill successfully to the depths as required by the plans.

Construction Tolerances - The completed well shall be constructed round, plumb, and true to line as shown on the plans and as specified in these special provisions.

Test methods and procedures used for determining plumbness and alignment shall be submitted to the Director for approval.

Plumbness - The maximum allowable deviation (drift) of the well from the vertical shall not exceed two thirds of the smallest inside diameter of that part of the well being tested per 100 feet of depth. The test for plumbness shall be made with a plummet or other method approved by the Director.

Alignment - Alignment shall be tested by lowering into the well to a depth of at least 400 feet or as directed by the Director, a section of pipe 40 feet long or a dummy of the same length. The outer diameter of the pipe or dummy shall be not more than 1-inch smaller than the inside diameter of that part of the casing or hole being tested. The pipe or dummy, when lowered into the well, shall pass freely the entire depth of the well.

If a dummy is used, it shall consist of a single rigid spindle with a minimum of three truly cylindrical rings, each being a maximum of 12-inches wide. The rings shall be located one at each end and one in the center.

Should the section of pipe or dummy fail to move freely throughout the length of the well, the plumb and alignment of the well shall be corrected by the Contractor.

Construction Details - The well shall be constructed as shown on the plans, as required by Environmental Health Division's regulations and as specified in these special provisions. The Contractor shall take all necessary precautions to prevent contamination of the well during construction.

Water and Power for Drilling Purposes - Mud and water used in drilling shall be free from contamination and organic matter.

If the Contractor wishes to use electrical services for any part of his operation, he must make his own arrangements and do so at his own expense.

Capping Well - Except when work is actively in progress, the top of the well shall be kept securely capped, both night and day, in such a manner as to effectively prevent either tampering with the well or entrance of foreign matter. The gravel pack shall also be protected by capping.

Upon completion of the well, the top of both conductor and well casing shall be capped by means of a cap or steel plate of proper size securely fastened or spot welded in place.

Depth and Size of Well - The well shall be drilled to a diameter of [ ] inches to a depth of [ ] feet to provide for installation of the conductor casing. The [ ]-inch diameter casing shall be landed at or near this level in a clay strata when feasible. From the bottom of the conductor casing to a depth of approximately [ ] feet below the ground surface, the well shall be drilled to a diameter of [ ] inches after the conductor casing has been installed and grouted.

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Within 24 hours after the drilling has been completed, the driller shall submit to the Director two (2) copies of the drilling log.

Annular Grout Seal - The primary purpose of the grout seal is to prevent contamination, pollution and degradation of the water well and of the ground water by poor quality water.

The annular space between the conductor casing and the wall of the drilled hole shall be filled with cement grout from the ground surface to an impervious formation underlying the uppermost aquifer [ ] feet, minimum, below ground level.

In grouting the annular space, the grout shall be pumped to the bottom of the annular space with a tremie pipe. No free fall of grouting material will be allowed. The annular seal shall have a nominal thickness of 3 inches.

If a temporary conductor pipe is used to prevent caving in during placement of the seal or during drilling, it shall be removed as the seal is placed.

Grout placement methods and procedures shall be approved by

the San Joaquin County Environmental Health Division and the Director.

Grout for the annular seal shall consist of a mixture of Portland Cement (ASTM C150 Type II), sand, and water in the proportion of not more than 2 parts, by weight, of sand to 1 part of cement with not more than 6 gallons of water per one (94 lb.) sack of cement. A maximum of six percent (6%), by weight, bentonite and two percent (2%), by weight, calcium chloride may be added.

Sealing Off Strata - Aquifers penetrated that contain poor quality water shall be sealed to prevent contamination. These methods shall be reviewed by the Environmental Health Division. Sealing shall be done by one of the three methods approved by the Environmental Health Division.

Surface Seal - Upon completion of the well, the top of the casing shall be capped 18 inches above finished grade by means of a cap or steel plate of proper size securely fastened or spot-welded in place.

A monolithically poured concrete base shall be constructed around the top of the well on thoroughly compacted earth, as shown on the plans.

Sanitary Seal - A grout or mastic seal shall be provided to make a water tight joint between the discharge head and the concrete base.

All holes in the discharge head which open directly into the well shall be sealed and a sanitary seal shall be provided between the pipe column or other pipes or cables and the casing.

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The seal shall be shaped to prevent retention of water or other foreign materials.

Sounding Tube - A 4-inch diameter sounding tube or access pipe shall be installed through the surface seal and welded flush with the inside of the casing. The upper end shall be provided with a water tight screw cap. The sounding tube shall be provided with all necessary fittings including a screened vent.

Gravel Fill Pipe - The gravel packed well shall have one 4-inch diameter gravel fill pipe. The fill pipe shall be water tight at the ground surface and provided with a water tight screw cap. The fill pipe shall be installed through the surface seal and welded flush with the inside of the conductor casing.

#### STEEL CASING

General - Steel casing equal to or exceeding the specified thickness shall be used. Casing shall be manufactured in accordance to ASTM, API or AWWA Specifications for well casing.

Damaged or defective material shall not be used.

All casings shall be water tight except for the perforations.

Conductor Casing - The [ ]-inch diameter steel conductor casing shall have a [ ]-inch thick wall and shall be installed as shown on the plans. One 4-inch diameter galvanized pipe gravel chute shall be welded to the conductor casing as shown on the plans.

Well Casing - The [ ]-inch inside diameter well casing shall be installed for the full depth of the well to a height of

approximately 18-inches above the finished grade. The casing shall be manufactured of 1/4-inch carbon steel conforming to ASTM A139, Grade B or ASTM A211 and shall contain 0.20 percent copper, minimum. Welding shall be by the submerged arc process using at least one pass on the inside and at least one pass on the outside of the seam.

Perforated Casing - The intake screen shall be manufactured in accordance with the above casing requirements. The openings in the screen shall be machine made, horizontal to the axis of the casing and of a louver form with the aperture facing downward. The aperture size shall be [ ]-inch with [ ] openings per lineal foot. The minimum open area shall be [ ] square inches per lineal foot of screen. The screen shall be Roscoe Moss Co., [ ]-inch diameter "Ful-Flo" screen, or approved equal.

Screen Location - The exact location and footage of screening may be adjusted by the Engineer based on the actual drilling log produced during well construction.

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The anticipated locations of the intake screens are:

1. From [ ] feet to [ ] feet

Capacity - The screen capacity shall be [ ] gpm at an average through slot velocity of 0.1 foot per second, or less and a maximum velocity of 0.5 foot per second with a pressure drop through the screen surface of less than 0.1 pound per square inch (PSI).

Strength - The screen shall withstand a hydrostatic collapse pressure in excess of [ ] PSI of water.

Casing Assembly - For field assembly by welding, ends of sections shall be furnished with collars in accordance with the following standards: Collars shall be of the same thickness and have the same physical and chemical properties as the corresponding casing sections, shall be a minimum of 5 inches in width, shall be rolled to fit the outside diameter, and shall be welded to the casing section. The inside edge of the collars shall be ground or sufficiently scarfed to remove sharp edges or burrs.

Section ends shall be machined flat perpendicular to the axis of the casing and shall not vary more than 0.10 inch at any point from a true plane at right angles to the axis of the casing. Three 1-inch by 3/8-inch alignment holes shall be provided in each collar to ensure proper matching of the sections. All joints, shall be welded water tight with 3/16" fillet welds conforming to AWS standards. Welding shall be by the submerged arc process with electrodes matching the base metal.

Casing Installation - Spacer strips manufactured of the same material as the casing shall be welded to the casing at intervals not to exceed 40 feet to center the casing in the bore. The spacer strips shall be welded at both ends of the casing and so shaped as to form a guide about 4½ inches from the casing wall. Guide strips shall be 1/4-inch thick and 2 inches wide. At least 3 evenly spaced strips shall be provided for centering the casing. A 5/16-inch thick plate, manufactured of the same material as the casing, shall be welded to the bottom of the casing.

Casing shall be suspended above the bottom of the hole at a sufficient distance to ensure that none of the casing will be

supported from the bottom.

#### GRAVEL PACKING

General - The annular space between the [ ]-inch inside diameter steel casing and the [ ]-inch conductor casing and the [ ]-inch diameter hole shall be filled to within 2 feet of the top of the steel casing with clean, dense, well graded, water-worn gravel. The gradation and physical characteristics of the gravel shall be equal to [ ], or approved equal.

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Installation - The gravel shall be installed by the use of a gravel pump and a tremie pipe. Free fall of gravel in excess of 10 feet will not be allowed. During the pumping of the gravel, the drilling fluid shall be kept at low viscosity and weight, but sufficient to prevent the possibility of collapsing the well. A measuring device shall be used to ascertain the level of the gravel.

Prior to placing the gravel, a granular hypochlorite disinfectant shall be added to the gravel pack at the rate of one-half pound per cubic yard of gravel. This rate of addition is based on disinfecting material having a chlorine content of 70 percent. Alternative disinfectants shall be approved by the Engineer prior to their use.

Cleaning of Well - After the well has been completely constructed, including completion of the gravel pack, it shall be cleaned of all foreign substances including tools, debris, cement, oil, grease and scum. The casing shall be thoroughly swabbed using alkalies if necessary to remove oil and grease.

#### WELL DEVELOPMENT

General - This item shall consist of swabbing and airlift pumping the well following gravel packing; bailing the well of materials introduced into the casing during swabbing; the installation of an engine driven deep well turbine test pump; pumping and surging of the well until the well is fully developed and meets the requirements for sand production. The purpose of well development is to remove drilling fluids and cuttings and to develop the gravel pack and aquifer to maximize the yield and efficiency of each well.

Construction Materials - The Contractor shall provide sufficient drill pipe and a mechanical swab with a double rubber packer assembly designed to be run in the [ ] inch intake section of the well. The equipment will be assembled in a manner which will allow simultaneous pumping (by airlift methods) and swabbing to occur. Upon completion of the swabbing and airlift pumping operations, the Contractor shall furnish and install one engine driven deep well turbine pump, diesel engine, appropriate drive shaft, and incidental equipment for the safe operation of the pumping equipment. The diesel engine shall be equipped with a residential silencer muffler. The Contractor shall furnish and install the necessary discharge piping to transport the water pumped to the appropriate discharge point as described in these special provisions. The Contractor shall furnish at the discharge of the pump the necessary valving, flow meters, sand testing equipment, and other incidental equipment required to accurately measure the flow rate, pumping levels, sand production and time of pumping. The installation of the flow meter shall be according to the manufacturer's recommendations to provide accurate test information. The flow meter shall read directly in gallons per minute, and shall totalize gallons pumped.

The deep well turbine pump shall consist of up to [ ] feet of column tube and shaft and a bowl unit capable of producing [ ] gpm from [ ] feet, and [ ] gpm from [ ] feet, total dynamic head. The engine shall have a minimum continuous horsepower rating which will allow for the continuous pumping of the well at the maximum desired flow rate and pumping level.

Development Methods - After gravel placement has been completed, the gravel envelope shall be cleaned of all fluids, cake, and substances that would impair the flow of water into the well and the quality thereof. Cleaning shall be initially accomplished first by airlift pumping and swabbing in stages opposite the entire perforated section, until the gravel has been cleaned and consolidated. Gravel shall be added as necessary to keep the gravel within ten feet of the surface.

The pumping and swabbing will be done between a double rubber packer assembly with the closest packers no more than [ ] feet apart. The conductor pipe on the swab assembly shall be a minimum of 6 inches in diameter with a minimum 2-inch diameter air pipe. The air compressor and necessary equipment used for pumping shall be capable of pumping [ ] gpm during development. The swab and pumping operations will be conducted alternatively over no more than the length of one joint of drill pipe until that section of screen is fully developed.

During swabbing, a continuous stream of water shall be added to the gravel envelope from the surface and swabbing shall take place beginning at the bottom of the screen and progressing vertically until there is no circulation of sand, silt, and mud to the surface. Gravel shall be maintained within ten feet of the surface during this operation and upon completion thereof, the gravel envelope shall be a clean continuous column completely filling the annulus between the drilled hole and the casings.

Upon completion of the airlift pumping and swabbing operations, the deepwell turbine pump and piping assembly shall be installed. No foot valve shall be installed on the pump and the driver shall not have a non-reverse ratchet installed.

Development pumping shall commence at a low flow rate. The well shall be frequently surged during development pumping. Flow rates will be increased until the capacity of the well achieves a minimum of 150 percent of the design flow rate of the well.

Development records shall be maintained on at least a half hour basis showing production rate, pumping level, drawdown, sand production, and all other pertinent information concerning well development. Development shall continue until the following conditions have been met:

- a. There shall be no further settlement of the gravel pack.

- b. The specific capacity (gallons per minutes per foot of drawdown) no longer increases in value at the design pumping rate of the well.
- c. Sand content is acceptable as described below:

The equipment for sand testing shall be the Rossum Centrifugal Sand Sampler (see Journal of the American Water Works Association, Volume 46, No. 2, February, 1954). The test shall



1. Each minute, from  $t = 1$  to  $t = 12$ .
2. Each 2 minutes, from  $t = 12$  to  $t = 20$ .
3. Each 5 minutes, from  $t = 20$  to  $t = 50$ .
4. Each 10 minutes, from  $t = 50$  to  $t = 100$ .
5. At  $t = 130$ ,  $t = 160$ ,  $t = 200$ ,  $t = 250$ , and  $t = 300$ .
6. Each 100 minutes after  $t = 300$ .

- \*Note
1. Step:  $2/3 Q$ ,  $1.0 Q$ ,  $1.5 Q$
  2. Constant:  $1.0 Q$

Each recovery test shall be recorded according to the following applicable schedule:

- a. Turn pump off at the specified time.
- b. Contractor shall measure depth to water and record as follows ( $t'$  refers to time since pump shut off):
  1. Each minute,  $t' = 1$  to  $t' = 12$ .
  2. Each 2 minutes,  $t' = 12$  to  $t' = 20$ .
  3. Each 5 minutes,  $t' = 20$  to  $t' = 50$ .
  4. Each 10 minutes,  $t' = 50$  to  $t' = 100$ .
  5. At  $t' = 130$ ,  $t' = 160$ ,  $t' = 200$ ,  $t' = 250$ .
  6. Each 100 minutes after  $t' = 300$ .

In the case of failure of the pump operation for a period greater than one percent (1%) of the elapsed pumping time from  $t = 0$ , the test shall be suspended until the static water level has been attained.

After the pump test has been completed, the record of water level measurements shall be delivered to the Director. The test pump shall not be removed from the well until the Engineer has evaluated the data and authorized its removal.

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Upon completion of well testing, the Contractor shall arrange to have water samples taken for analysis as specified in Section 87 of these special provisions.

Records - The Contractor shall keep accurate records of the pumping tests on the approved forms and furnish copies of all records to the Director upon completion of the test. The records shall also be available to the Director for inspection at any time during the test. For each well test, the records shall additionally include physical data describing the construction features such as, but not limited to: well depth and diameter, complete screen description, length, and setting, a description of the measuring point and its measured height above land surface and/or mean sea level; the methods used in measuring water levels and pumping rates.

The Contractor shall also keep records on the type of pumping equipment used including engines, drive components, bowls, lineshafts and column assembly. The Contractor will keep records of operation of equipment during the test including engine rpm and horsepower, fuel use, and other essential information that will be useful in designing a pump system.

Disinfection - After the well has been completely constructed and developed, it shall be thoroughly cleaned of all foreign substances, including tools, timbers, rope, debris of any kind, cement, oil, grease, joint dope and scum. The well shall then be disinfected with a chlorine solution. In all cases the disinfection process shall conform to Environmental Health Division requirements.

After cleaning, but prior to disinfecting, the Contractor shall perform a video inspection of the well. A VHS recording

shall be made of the inspection and shall show the elevation in feet from top to bottom as the camera progresses down the well. The original copy of the tape shall be given to the County.

Providing the video shows no signs of any foreign materials, the Contractor shall proceed with disinfecting the well. Any foreign substances shown to remain shall be removed prior to disinfection of the well.

The chlorine solution used for disinfecting the well shall be of such volume and strength and shall be so applied that a concentration of at least 50 parts per million of chlorine shall be obtained in all parts of the well water. The chlorine solution shall remain in the well for at least 2 hours.

Abandonment of Hole - In the event the Contractor shall abandon a hole because of lost tools, or other causes which are his responsibility and thus prevents completion of the well as specified, the Contractor shall completely fill the hole with an impervious clay, bentonite, or neat cement to a depth of 50 feet below the ground surface. The remainder of the casing to grade shall be filled with grout or cement all in accordance with San Joaquin County Standards.

SECTION 80  
ALTERNATE A

CHAIN LINK FENCE.--Chain link fence shall conform to the requirements in Section 80-4, "Chain Link Fence," of the Standard Specifications, Standard Drawings and these special provisions.

The chain link fence shall consist of chain link fabric with plastic slats inserted vertically in the fabric. The wire used in the manufacture of the fabric shall be 9-gauge galvanized steel wire. The plastic slats shall be manufactured from a high density virgin polyethylene with ultraviolet inhibitors and shall be brown in color.

SECTION 80  
ALTERNATE B

FENCES.--Attention is directed to Section 80, "Fences," of the Standard Specifications and these special provisions.

The type of posts shall be as specified on the plans.

SECTION 80  
ALTERNATE C

TEMPORARY FENCES.--Temporary fences shall conform to the requirements in Section 80, "Fences," of the Standard Specifications and these special provisions.

The type of posts shall be as specified on the plans.

Corner, end and gate posts shall not be set in concrete in temporary locations.

Temporary fence shall be constructed before existing fence is removed. Temporary fence shall be removed after completion of other items of work and the permanent fence constructed.

SECTION 81

MONUMENTS.--Monuments shall conform to the requirements in Section 81, "Monuments," of the Standard Specifications, Standard Drawings and these special provisions.

The Contractor shall place protective monument frames and covers at the locations shown on the plans. The location of the monument frames and covers shall be established by the Engineer.

SECTION 83

RAILINGS AND BARRIERS.--Railings and barriers shall conform to the requirements in Section 83, "Railings and Barriers," of the Standard Specifications.

SECTION 84

TRAFFIC STRIPES AND PAVEMENT MARKINGS.--Traffic stripes and pavement markings shall conform to the requirements in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications.

SECTION 86

STREET LIGHTS.--Street lights shall conform to the requirements in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications, the San Joaquin County Improvement Standards and Standard Drawings.

SECTION 87

ANALYSES OF WATER SAMPLES

Within 24 hours after the well has been developed, water samples shall be collected using appropriate protocols and tested by a laboratory certified by the California Department of Public Health for analyses of drinking water. The results of the analyses shall be submitted to the County as soon as the results become available. All testing listed below shall be in conformance with applicable Environmental Protection Agency and California Title 22 Test Methods for the analysis of drinking water.

ANALYSES

Test in accordance with Title 22 of the "California Administrative Code" for the following, using applicable EPA methods from the 500 series:

- 1 - General Mineral
- 2 - Inorganics
- 3 - Organics (VOC'S)
- 4 - General Physical
- 5 - Radioactivity - Alpha and Radium
- 6 - Corrosivity

Additionally, analysis for the following shall be done using EPA Methods 504 and 507:

DBCP  
EDB  
Atrazine  
Simazine