MARIPOSA COUNTY

MARIPOSA, CALIFORNIA

PROPOSED IMPROVEMENT STANDARDS UPDATE

BOARD OF SUPERVISORS

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NOTE: These draft improvement standards are modifications of the standards adopted on August 9, 1988, by resolution No. 88-418.

Changes from the '88 standards are shown as follows:

Deletions: strikeouts

Added sections: italics
SECTION 7 - STRUCTURES
7.1 Reinforced Concrete Structures

SECTION 8 - SANITARY SEWERAGE
8.1 General
8.2 Design Standards
8.3 Sewer Line Location, Alignment, Cover and Size
8.4 Materials and Installation
8.5 Final Acceptance

SECTION 9 - DOMESTIC WATER SUPPLY AND DISTRIBUTION SYSTEM
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9.2 Distribution System
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9.5 Final Acceptance

SECTION 10 - STORM WATER DRAINAGE SYSTEM
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SECTION 1 - GENERAL

1.1 Introduction & Purpose

(A) The following standards shall govern, guide and control all engineering involved in planning, constructing, modifying or extending any:

(1) Sanitary sewage system

(2) Storm water drainage system

(3) Domestic water distribution system which eventually will be granted, or dedicated to, accepted by, and operated and maintained under any applicable jurisdiction of Mariposa County

(4) Concrete structures

(5) Road or street

(6) Erosion control

(B) The owner, developer, or his agent, and/or contractors, shall keep himself fully informed of all current state, national, county laws, ordinances, resolution, or regulations which in any manner affect the development or work contemplated. Strict compliance with these standards is required, in order to insure the orderly expansion of roads and utilities to the highest practical standards with a maximum efficiency for the greatest public benefit.

1.2 Definitions

(A) The following terms, when used, herein, shall have these stated respective meanings:

(1) "County" shall mean Mariposa County.

(2) "Board" shall mean the Board of Supervisors of Mariposa County.

(3) "State" shall mean the State of California.


(6) "Engineer" shall mean County Engineer of Mariposa County or his designated representative.
(7) "Consulting Engineer" - Any person, firm, or corporation legally authorized to practice civil engineering in the State of California who prepares or submits improvement plans and specifications (usually for an owner or developer) to the County Engineer for approval.

(8) "Contractor" - Any person, firm, or corporation holding a current valid license issued by the Contractors State License Board, Department of Consumer Affairs, State of California, covering the category of work being performed.

(9) "Standard Drawings" shall mean the current standard drawings of Mariposa County.


(11) Whenever, in these standards, or in any documents or plans where these standards govern, the abbreviations for the following organizations apply. All specifications shall be the latest edition.

AASHTO - American Association of State Highway & Transportation Officials

ACI - American Concrete Association

AISC - American Institute of Steel Construction

AITC - American Institute of Timber Construction

ANSI - American National Standard Institute

APWA - American Public Works Association

ASA - American Standards Association

ASCE - American Society of Civil Engineers

ASTM - American Society of Testing Materials

AWWA - American Water Works Association

AWS - American Welding Society

CRSI - Concrete Reinforcing Steel Institute

WEF - Water Environment Federation (formerly WPCF)

(11) Other Abbreviations:
psi - Pounds per square inch

MAV - Maintenance Access Vault (formerly manhole)

(12) Abbreviations for Pipe Types

ABS - Plastic Sewer Lateral Pipe
CIP - Cast Iron Pipe
CL & CP - Concrete Lined and Coated Cylinder Pipe
CSP - Corrugated Steel Pipe
DIP - Ductile Iron Pipe
HDPE - High Density Polyethylene Pipe (Plastic)
PE - Polyethylene Pipe (Plastic)
PMP - Perforated Metal Pipe
PVC - Polyvinyl chloride (Plastic)
RCP - Reinforced Concrete Pipe
S.P. - Steel Pipe
VCP - Vitrified Clay Pipe

1.3 Engineering and Construction Policy

(A) The engineering policy of the County requires strict compliance with the Professional Engineers Act of the State of California. All plans, specifications, reports and documents required by the County shall be signed and stamped with the seal of a registered civil engineer, currently licensed to practice in the State of California, if said engineering is so required by the County.

(B) All engineered facilities covered by these standards shall be constructed by:

(1) Contractors holding a currently valid license issued by the Contractors State License Board, Department of Consumer Affairs, State of California.

(2) The contractor must be licensed in one of the following classifications:

(a) General Engineering Class A

(b) Specialty license covering specialty work being performed

(C) Safety

(1) Compliance with California State Division of Industrial Safety - Labor Code and Construction Safety Orders.

(2) Compliance with O.S.H.A. (Federal Occupational Safety and Health Administration)

SECTION 2 - PLANS & SPECIFICATIONS
2.1 General Requirement

(A) Complete plans and specifications, when required, for all proposed streets, or roads, drainage facilities, sewerage and water distributions systems including necessary dedications and easements shall be submitted to the Engineer for approval. Approval must be substantiated by the signature of the Engineer prior to the beginning of construction of any proposed development. Plans will not be approved until all of the requirements of these standards are met as well as:

(1) All requirements of the Mariposa County Code are met.

(2) All required fees, bonds, agreements, etc. have been paid and/or posted, as per Board Resolution.

(B) 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, Mariposa County Ordinance or resolution, conditions of approval or generally accepted good engineering practice in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the review of the County Engineer or his representative.

2.2 Procedure

(A) Plans and specifications complete and in accordance with these standards shall be submitted in duplicate, including computations, test data and any other pertinent supporting information as required. No plans will be approved or construction authorized until all requirements are met. Non-conforming submittals will be returned to the Consulting Engineer for corrections and resubmittal. This procedure will continue until the plans have final approval by the Engineer.

(B) Any major changes which may become necessary during construction must be approved by the Engineer and noted on the plans. Minor changes which do not affect the basic design must be approved by the County Inspector (representative of the Engineer) and must be shown on the final "As Built Plans" when the project is completed.
2.3 Ultimate Development (Phased Development)

(A) Where the improvement plans submitted cover only a portion of the ultimate area to be developed, for a phased development, the plans submitted must be accompanied by the approved tentative map or a site plan if there is no approved tentative map, showing topographic features and area of the ultimate development to an adequate scale clearly showing the proposed improvements. Facilities proposed for partial development must be adequate for the future ultimate development where applicable.

2.4 Plan Details

(A) Title Sheet

(1) Title sheet dimensions shall be 24" x 36".

(2) Vicinity Map. Scale - 1" = 1000' or larger.

(3) Name of Project.

(4) Name and address of owner or developer.

(5) Name, address and signature of the civil engineer responsible for field work and preparation of plans.

(6) Approval of the plans does not release the developer of responsibility for correction of mistakes, errors or omissions contained therein. If during the course of construction of the improvements, public interest requires modification of or a departure from County specifications, or these improvement plans, the Engineer shall have the authority to require modification or departure and to specify the manner in which the same is made.

(B) Plans

(1) Plans

(a) All improvement plans shall be prepared on plan and profile sheets the dimensions of which shall be 24" x 36", drawn to a scale of 1" - 50' or larger. Storm drainage, sanitary sewer and water distribution systems may be shown on the street or road plans or separately.

(b) A complete set of plans shall consist of the following:

(i) Title sheet with vicinity map. Scale 1" = 1000' or larger.
(ii) Overall layout sheets showing complete storm drainage system, sanitary sewer system, and water distribution system, to a scale of 1" = 100' or larger. The layout sheet shall show all the line sizes, structures, valves, blow offs, loops, crossovers, tanks, wells, drop inlets, rodding inlets, etc. Each system shall be shown on separate sheets.

(c) Construction plans shall show all pertinent construction data such as:

(i) Elevation datum and bench marks.

(ii) Horizontal alignment, right-of-way lines, easements, boundary line and number of lots fronting on streets, road widths, sewer lines, water lines, culverts, and all appurtenant structures.

(iii) All horizontal curve information.

(iv) Typical structural section for each type of road improvement.

(v) Roadway centerline stationing at fifty-foot intervals.

(2) Profile

(a) Profile shall show:

(i) Finish roadway centerline elevations at fifty-foot intervals, rate of grade, and vertical curve information. Vertical scale shall be 1" = 10' (maximum).

(ii) Flow line and slope of ditches, curb and gutters, where applicable, invert elevation of all culvert inlets and outlets.

(iii) Invert elevation of all sewer MAVs, rodding inlets and sewer line slopes.

(iv) Depth of all water lines.

(3) Stationing and Orientation

(a) Stationing in plans shall read (increase) from left to right.
(b) Plans shall be so arranged that the north arrow points toward the top of the sheet or away from the viewer insofar as possible.

SECTION 3 - INSPECTION, COMPLIANCE AND ACCEPTANCE

3.1 Inspection

(A) Prior to any inspection, developer shall deposit inspection fees with the Public Works Department in accordance with PP 94-05. This requires 3% of estimated construction cost, with said cost estimate approved by the County Engineer.

(B) Any improvement constructed to County standards must be inspected during construction by a representative of the Engineer.

(C) The County will hold the owner, developer or his agent responsible for compliance with the County requirements for the whole project until final acceptance by the County.

3.2 Compliance

(A) All improvements covered by these standards shall conform to the following requirements:

(1) Prior to construction the Owner or Owner representative and the Contractor shall meet with the Engineer to determine if there are any compaction testing requirements for this project. If so, these tests shall be performed by a private civil engineer or geotechnical engineer, who shall submit a plan for the testing to the Engineer prior to the commencement of work. Tests, for example to determine R values for pavement design, must be conducted prior to completion of design and results presented when improvement plans are submitted for checking and approval.

(2) The contractor shall, by letter, request a final inspection by the Engineer or his representative.

(3) Any deficiencies noted during the final inspection shall be corrected.

(4) The consulting engineer shall prepare a complete and accurate reproducible set of Record Drawings, including a copy on electronic media, if available, in a format acceptable to the Engineer, when so required by the Engineer. These plans shall be signed by both the consulting engineer and the Engineer. These Record
Drawings are to be filed in the office of the Engineer as a permanent County record.

(5) When all of the above requirements have been executed, the Engineer, by letter, will inform the contractor and the developer that the improvements are ready for acceptance by the County as complete.

3.3 Acceptance

(A) Prior to final acceptance by the County of any improvements constructed in compliance with these standards, the following requirements shall be completed;

(1) The contractor shall, by letter, request a final inspection by the Engineer or his representative.

(2) Any deficiencies noted during the final inspection shall be corrected.

(3) "As Built" plans, in accordance with item 3.2.(A)(4) above, must have been filed in the office of the Engineer as a permanent County record.

(4) If compaction testing is required, the private civil engineer or geotechnical engineer shall certify in writing that compaction requirements have been met.

(5) When all of the above requirements have been executed, the Engineer, by letter, will inform the contractor and the developer that the improvements are ready for acceptance by the County as complete.

SECTION 4 - EARTH WORK-UNDERGROUND UTILITIES

4.1 Description

(A) Earthwork shall consist of performing all operations necessary to excavate all material, of whatever nature, required for the construction of sewer lines, storm drainage lines, culverts, water lines, and any other appurtenant structure as required; to place bedding and backfill material, under, around and over sewer lines, storm drainage lines, culverts, water lines and other appurtenant structures; to remove unsuitable material and replace with suitable material as required.

4.2 Trench Excavation, Tunnels, Bores and/or Jacked Pipes

(A) Excavation

(1) Excavation shall be made only after the material to be used in the work is delivered to the job site. In
public street areas, excavation and pipe laying shall be coordinated so that a minimum of interference with public traffic will occur. An encroachment permit, obtained from the Department of Public Works, is required for work to be done on any County road, County Property, or County right-of-way. Other permits may also be required and these are the responsibility of the developer or property owner. Other permits may be required by Caltrans, the County Building Department, and/or other utilities. Prior to any trenching in the County right-of-way, the contractor must notify and obtain clearance from Underground Service Alert (USA).

(2) The exposed ends of any pipe line under construction, including water and sewer mains, conduits, etc., shall be plugged at the end of each work day to keep out foreign material and the trench shall be barricaded or fenced. Where excavation occurs in paved areas, the pavement will be cut accurately and trimmed to neat lines parallel to the trench at the required width. Any pavement damaged outside the trench limits shall be neatly and accurately cut and trimmed and pavement replaced by the contractor.

(B) Trench Width and Shoring

(1) Safety is the contractor's responsibility. Attention is called to the "Trench Construction Safety Orders" of the California State Division of Industrial Safety which the contractor is required by law to obey. The contractor shall furnish, install and maintain all sheet piling, lagging, timbering or bracing as may be necessary.

(2) All lagging, sheet piling or any other timbering or bracing used in the trench construction shall be removed prior to, or during, backfilling operations in such a manner as not to create any excessive load on, or movement of the pipe.

(3) In the absence of detailed information on the plans, the minimum trench width shall be eight (8) inches wider than the greatest external diameter of the pipe, and the maximum trench width shall not be more than sixteen (16) inches wider than the greatest external diameter of the pipe. In all cases, the trench width shall be sufficient to allow mechanical compaction, if compaction is required.

(4) Trenches shall be excavated with full depth; vertical sides whenever possible.

(5) Where conditions require side sloping of trenches, the minimum vertical trench shall be from the bottom of the trench to one (1) foot over the top of the pipe.
(C) Unsuitable Material

(1) In advance of placing any underground pipeline, conduit or appurtenant structures, existing material which in the opinion of the Engineer is unsuitable as a foundation, including but not limited to, vegetal matter, garbage and junk piles either on the surface or buried shall be removed and disposed of and the over excavation backfilled and compacted to the required grade.

(2) In rock, or a mixture of rock and soil excavations, such material shall be excavated six (6) inches below the bottom of the pipe and the over excavation shall be filled to proper grade with properly compacted imported material, approved by the Engineer.

(D) Line and Grade Stakes

(1) Line and grade stakes conforming with the plans and profile for all underground utilities, including water, sewer, storm drain, electrical and telephone, will be set under the general direction of a licensed surveyor or civil engineer whose license allows him to practice land surveying, on an offset line parallel to the centerline of pipeline or structure to be constructed. These stakes shall be carefully maintained by the contractor in place until that portion of the work for which the line and stakes were set has been completed, inspected and accepted.

(E) Tunnels, Bores and/or Jacked Pipes

(1) Tunnels

(a) Where tunnels without conductor pipes are permitted, they may be drilled with approved equipment which will cut to true line and grade, or they may be excavated by standard tunneling methods using shoring.

(2) Bores and Jacked Pipe

(a) Where designated on the plans, or permit, approved metal conductor pipes shall be placed in bored holes or jacked under the area to be crossed. The minimum interior diameter of the conductor pipe shall be eight (8) inches greater than the maximum outside diameter of the carrier pipe which is to be placed therein. All conductor or casing pipes shall be sealed at both ends in such a manner as to provide a water proof seal.
(b) When metal or concrete pipes are jacked with or without a carrier pipe, guide rails shall be accurately set to line and grade so that the pipe will be guided true to line and grade. Jacks and bearing plates of sufficient size, number and strength to jack the pipe true to line and grade shall be used.

(c) Any voids around the exterior of a jacked casing shall be pressure grouted. The voids inside a jacked casing between the casing and the pipe shall be filled with blown sand.

SECTION 5 - INSTALLATION, BEDDING & BACKFILL

5.1 Pipe Laying and Appurtenant Structures

(A) Installation

(1) All pipes, conduits, culverts, etc., and appurtenant structures shall be laid or constructed to the prescribed line and grade as shown on the plans. A grade line shall be established before any pipe is laid in the trench. Each length of pipe shall be checked for grade. Unless approved by the Engineer, all pipes shall be laid without break, up grade from the point of connection with the bell end upgrade.

(2) Unsuitable foundation material shall be excavated and replaced with compacted bedding material to the required grade, as required by the Engineer.

(3) All pipes, conduits, culverts, etc. shall be bedded with a minimum of four (4) inches of compacted bedding material to provide full length bearing of the pipe, conduit, etc. and adequate bell hole excavations shall be made. In an area of rock excavation, all pipes, conduits, etc. shall be bedded with a minimum of six (6) inches of compacted material to provide full length bearing of the pipe, conduit, etc. and adequate bell hold excavations shall be made as required.

(4) All pipes, conduits, culverts, etc. and any connections made to existing lines shall be inspected and approved, prior to any backfilling.

(5) All lines which are to be installed in conductor pipes or casing shall be laid on approved treated redwood skids, shaped so as to give full support to the pipe. The pipe shall be laid or jointed on the approved skids set to grade, then jacked or slid into place. Pre-manufactured skids made for installing pipe within
conductor pipe or casing are also allowed, and shall be installed in accordance with the manufacturer's recommendations.

5.2 Bedding Backfill Compaction

(A) Type I

(1) Whenever ground water conditions are encountered, drainage shall be provided if necessary at the direction of the Engineer. The trench shall be over excavated and all pipe, conduits, etc. and appurtenant structures shall be constructed on a minimum of six (6) inches of Type I bedding, or other bedding as directed by the Engineer. All pipe laying and concrete work for appurtenant structure foundation is to be "in the dry", the contractor at all times shall control the ground water level so as to enable all work to be executed "in the dry".

(2) Type I bedding material shall meet all of the quality requirements of Section 26 for Class 2 aggregate base of the State specifications.

The grading of Type I bedding shall be as follows:

<table>
<thead>
<tr>
<th>U. S. Standard Sieve</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-1/4&quot;</td>
<td>100%</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>5%</td>
</tr>
</tbody>
</table>

No material shall be used as Type I bedding unless it has been approved by the Engineer.

(B) Type II Bedding

(1) Type II bedding shall consist of all material returned to the trench from four (4) inches below the pipe, culvert, conduit, etc. to six inches, compacted, over the top of the pipe, culvert, conduit, etc. These dimensions shall be after compaction and not loose depths.

(2) Type II bedding material shall meet the following requirements:

<table>
<thead>
<tr>
<th>U. S. Standard Sieve</th>
<th>Percent Passing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/4&quot;</td>
<td>100%</td>
</tr>
<tr>
<td>No. 200</td>
<td>Not more than 10%</td>
</tr>
</tbody>
</table>

Sand equivalent to be of at least 35, as per Test Method No. Calif. 217, Department of Transportation. No material shall be used for Type II bedding unless it has been approved by the Engineer. Where required, Type I
bedding shall be used in conjunction with Type II bedding.

(C) Backfill

(1) Backfill shall include all material placed in the trench as backfill from the top of the Type II bedding up to the top of the roadway, or up to original ground when construction takes place outside the roadway. Material for backfill may consist of trench excavation or imported backfill, at the contractor's option. Material for backfill shall consist of no rocks greater than six (6) inches maximum dimensions and enough fines to adequately fill all voids.

(2) Backfill placed within a roadway shall be compacted to a relative density of ninety (90) percent, up to within two (2) feet of the roadway base material. The top two (2) feet shall be compacted to a final density of ninety-five (95) percent maximum density at optimum moisture content as determined by Test Method No. Calif. 216 or 231 as per State specs.

(a) Backfill placed within the roadway section, shall be compacted by mechanical means only.

(b) Backfill placed outside the roadway section, shall be compacted to a relative density of eighty (80) percent (or maximum density of surrounding soil, if less than 80%) at optimum moisture content as determined by Test Method No. Calif. 216 or 231 as per State specs. Outside the roadway section, backfill may be compacted by mechanical means, by jetting or by a combination of both, as long as the required results are obtained.

(D) Compaction

(1) All type I and II bedding material shall be mechanically compacted to a final density of ninety (90) percent of maximum density at optimum moisture content as determined by Test Method No. Calif. 216 or 231 as per State specs.

(E) Slurry Backfill

(1) The County Engineer may require slurry backfill for trenches within any County maintained asphalt roadway, or at other locations as he may direct. If slurry backfill is required, the slurry shall be a two sack mix. The trench shall be filled to within two (2) inches of the surface, and a two (2) inch asphalt top course placed over the slurry backfill not less than two
days after the slurry is placed. If not required by the County Engineer, the Contractor may use slurry backfill at his option. In some cases, the County engineer may require slurry backfill when an asphalt roadway is not involved. In this case, the trench shall be filled to the top, or as otherwise directed by the Engineer.

**SECTION 6 - MATERIALS (GENERAL)**

6.1 Portland Cement Concrete Mortar and Grout

(A) All Portland cement shall be Type II confirming to ASTM Designation: C 150.

(B) Portland Cement Concrete

(1) All grading of aggregate, proportioning, mixing, placing, finishing and curing of Portland cement concrete shall comply with Section 90 of the State standard specifications. Concrete classification shall also comply with State standard specifications.

(2) Combined aggregate grading limits shall be the one and one-half (1-1/2) inch maximum, or the three quarter (3/4) inch maximum as listed in Section 90 of the State specs.

(3) No admixture of any nature shall be used in the mixing of Portland cement concrete without the expressed approval of the Engineer.

(C) Mortar and Grout

(1) Mortar and grout shall be composed, proportioned and mixed in accordance with the State Standard Specifications. Any admixtures shall be approved by the Engineer.

6.2 Reinforced Steel and Wire Mesh

(A) Steel and/or mesh reinforcement shall be of the size shown and be placed in concrete structures in accordance with the plans or Standard drawings, or as directed by the Engineer.

(B) Bar reinforcement shall conform to ACI 318, latest edition. Tie wire shall be No. 14 or No. 16 steel wire.

(C) Mesh reinforcement shall be a standard type of electrically welded wire fabric as specified in ASTM Designation: A 185.

(D) All reinforcement steel and/or wire mesh shall be designed, fabricated, placed and supported in the forms, all in accordance with ACI 318 and ACI 315.
6.3 Gray Iron Castings

(A) Cast iron used in the manufacture of MAV frames and covers, rodding and flushing inlets, curb inlets, grates, etc., shall comply with ASTM Designation A 48 Class 30. All cast iron castings shall be coated in accordance with Paragraph 9 ASTM Designation: A 74. Covers and frame seats shall be machined to provide a true even fit, provide firm support and prevent rattling.

6.4 Miscellaneous Iron and Steel

(A) All steel used in the manufacture of grates, frames, plates, anchors, etc., shall conform to ASTM Designation: A 36. All metal castings and fabrications shall be constructed in accordance with the details on the plans or Standard Drawings. Finished members shall be true to line and free from twists, bends and open joints.

(B) All welding shall be done in accordance with the requirements of the American Welding Society.

6.5 Galvanizing

(A) Metal work which is to be galvanized, shall be galvanized by the hot zinc dipped process, after complete fabrication. Welding of members, after galvanizing, will not be permitted. All galvanizing shall be in accordance to ASTM Designation: 153.

SECTION 7 - STRUCTURES

7.1 Reinforced Concrete Structures

(A) All reinforced concrete structures shall be constructed to line, grade and detail, as shown on the plans or the Standard Drawings.

(B) Forms, Ties and Joints

(1) All forms shall conform to the shape, lines and dimensions of the members as called for on the plans. Forms shall be adequately braced, tied, and supported to withstand all of the imposed loads due to the placing of concrete.

(2) All concrete structures shall be formed on both sides, whenever practical. All reinforcing steel or embedded steel anchors or castings shall be firmly and accurately placed and supported in place with metal hangers, chairs or other satisfactory metal supports.
(3) Expansion and construction joints shall be located where shown on the plans or approved by the Engineer. Expansion joint filler materials shall be pre-formed, non-extruding bituminous fiber conforming to ASTM Designation: D 1751.

(4) All concrete shall be consolidated to the maximum density so that it is free from pockets of coarse aggregate and voids around embedded materials and form corners.

(5) Forms shall be removed in such a manner as to insure the complete safety of the structure and cause a minimum of damage to the finish. All transition channels, inverts or any area over which water is to flow shall be smooth finished so as to cause a minimum of resistance to flow.

(6) All repair of concrete structures such as rock pockets, voids or deformations shall be completed within twenty-four (24) hours after form removal. All material and methods of concrete repairs shall be in accordance with the procedures of the American Concrete Institute.

(C) Backfill against any concrete structure constructed below grade shall not take place until the concrete has attained adequate strength, and in no event before seven days after the pour.

SECTION 8 - SANITARY SEWERAGE

8.1 General

(A) Sanitary sewer lines and appurtenances within County jurisdiction shall be constructed in accordance with the details shown on plans and specifications approved by the Engineer. Where such sewer system is to be operated and/or maintained by any district, the plans, specifications and construction must be approved by that district.

(B) These standards are not applicable to individual on-site systems. Consult the Environmental Health Department for septic tank/leach field systems or other individual on-site systems.

8.2 Design Standards

(A) Sanitary Sewers

(1) The following guide lines shall be followed in computing contributing sewage:

(a) The average family unit shall be three (3) persons per residential unit.
(b) The average daily discharge of domestic sewage shall be one hundred (100) gallons per day per person. Design discharge shall be one and one-half (1-1/2) times this or one hundred and fifty (150) gallons per day per person for peak discharge.

(c) Sewage discharge for commercial and industrial facilities shall be based on fixture unit values contained in the latest version of the Uniform Plumbing Code. Total projected discharges for commercial and industrial facilities shall be approved by the County Engineer prior to construction.

(d) Infiltration allowances will be (600) gallons/acre served/day, or between two hundred fifty (250) and five hundred (500) gallons/day/inch diameter/mile of sewer.

(e) Main sewers up to fifteen (15) inches inside diameter shall be designed to flow five-tenths (0.5) full. Trunk or main sewers over fifteen (15) inches inside diameter may be designed to flow seven tenths (0.7) full.

(f) Under no circumstances shall a gravity sewer be designed to flow under a head, except for an approved siphon, approved by the County Engineer.

(g) To the maximum extent physically possible, sewer systems shall be designed for gravity flow. Systems which include pump stations are discouraged. Systems with pump stations must be approved by the County Engineer.

(2) Sewer Velocity and Quantities

(a) Minimum design velocity for any sanitary sewer shall be two (2) feet per second, for pipes flowing full or half full.

(b) Velocities in sanitary sewers shall be computed using Manning's formula with a constant "n" value depending on type of pipe used.

(3) Maximum Discharge

(a) Since sanitary sewers are to be designed with no head on the inlet, the maximum design discharge shall not exceed the flow at critical slope and velocity. Due to the unstable flow conditions at critical slope and critical velocity, sanitary sewers should be designed to avoid these
conditions. Maximum design discharge should not exceed flow under these conditions regardless of greater slope.

(B) Maintenance Access Vaults (MAVs)

(1) MAVs shall be placed at the intersections of all main sewer lines.

(2) MAVs shall be placed at all abrupt changes of alignment, either vertical or horizontal. Abrupt change is defined as a change greater than five (5) degrees.

(3) The maximum distance between MAVs shall be three hundred and fifty (350) feet.

(4) A one-tenth (0.1) foot energy drop shall be allowed for flow through MAVs.

(5) Invert elevations of varying size pipes leading into and out of MAVs shall be set by matching the total energy gradients of the pipes.

(C) Drop MAVs

(1) Whenever the vertical distance between the inverts of lines connecting at a MAV exceeds eighteen (18) inches, a standard drop MAV shall be constructed. All drop MAVs shall have an inside drop pipe for 6" lines, and outside drops for lines 8" and greater, as shown on the standard drawings.

(D) Rodding and Flushing Inlets

(1) Rodding and flushing inlets shall be constructed at the upstream end of all sewer mains.

8.3 Sewer Line Location, Alignment, Cover and Size

(A) Location

(1) All sanitary sewers and appurtenant structures shall be located as close to a line parallel to and five (5) feet from the roadway center line as practicable. In no case shall a sanitary sewer line be located closer than two (2) feet from an existing or proposed gutter lip. Sanitary sewer lines shall be laid out on the opposite side of the roadway centerline from the water lines. The entire sanitary system shall be located as mentioned above and shall be designed to clear all other existing or proposed utilities by six (6) inches. Sewers shall be separated horizontally from parallel water mains by a minimum of 10 feet. Water lines must be separated
vertically when crossing sewer lines by a minimum of one foot, with the water line above.

(2) Sewers may be designed with both horizontal and vertical curvature, since modern methods (TV) allow inspection.

(3) Whenever possible, sewers shall be placed in the public roadway. Where sewer lines cannot be placed in the roadway, they shall be located in easements and the easement shall:

(a) Be granted with Subdivision Map, or

(b) Be dedicated to and accepted by the County.

(c) The minimum width of any easement for sanitary sewer purposes shall be twenty (20) feet wide. In special cases of terrain, depth of sewer line, etc. the required easement width may be increased. All easements shall include right of ingress and egress over adjoining property for maintenance, replacement and operation.

(d) Any MAV constructed on an easement may be required to have a graveled access constructed from the nearest maintained and passable road. Said access shall be a minimum of eight (8) feet in width. Exceptions may be granted by the County Engineer to mitigate environmental concerns.

(e) It is desirable that easements be designated as Public Utility Easements (PUE) or as Unrestricted Easements including utilities.

(B) Cover

(1) Minimum cover for any sewer line shall be three (3) feet. Any deviation from this cover shall require approval by the Engineer.

(C) Size

(1) Minimum line size for any sewer main shall be six (6) inches inside diameter.

(D) Laterals and/or Side Sewer, Cleanouts, Backflow Preventers

(1) Minimum size of any sanitary lateral or side sewer to serve individual residences, commercial structures, etc. shall be four (4) inches. Actual size of laterals larger than four (4) inches shall be determined by
fixture unit requirements as per the current edition of the Uniform Plumbing Code.

(2) Each sanitary sewer lateral shall have a cleanout at the property line, or roadway or sewer main easement, as per Standard Drawings.

(3) Each structure with installed plumbing which is located at an elevation such that there could be a backflow of sewage from the main in the event of a main stoppage, shall be equipped with a backflow preventer or an overflow device installed in the lateral behind the property line. For any premises with installed plumbing at a lower elevation than the top of the first MAV on the sewer mainline upstream from the inlet of the sewer lateral, a backflow preventer shall be installed.

(E) Special Designs

(1) Special structures, such as pump stations, pressure lines and sags, etc., shall require review and approval by the Engineer.

(F) Sewage Treatment

(1) Sewage treatment shall have approval of appropriate governing agencies.

8.4 Materials and Installation

(A) General

(1) All material that is to become a permanent part of any sanitary sewer or appurtenant structure shall conform to the requirements for the particular material as set forth in these specifications. The contractor shall supply any and all certificates of compliance, certified test results or shall perform tests as required to assure the Engineer that the material being incorporated into the work has met the requirements as specified. Requests to use materials not listed in these standards shall require special consideration and approval of the Engineer.

(B) Pipe and Pipe Joining Material

(1) All pipe or conduits shall be of the size, material and strength as shown on the plans. All pipe fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied.
(2) Supporting strength of conduits as installed to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of Marston's formula, as per Chapter IX (Structural Requirements) ASCE Manual of Engineering Practice No. 37. All pipe or conduits shall be of the same material between structures, unless an exception is approved by the Engineer, for example for a stream crossing where a change to ductile iron might be appropriate because of minimum cover.

(3) Cast Iron Pipe and Fittings

(a) All cast iron pipe and fittings for main sewers shall be at least Class 150 and conform to AWWA Standards C 106-75. Joints shall be approved type mechanical joints, or approved bell and spigot joints. No lead joints will be allowed.

(b) Cast iron pipe and fittings for laterals within the public right-of-way shall be new, first quality and conform to AWWA Standards C 106-75, Cast Iron Soil Pipe and Fittings.

(c) Concrete Lined and Ductile Iron Pipe (CL and DIP) shall be cement mortar lined in accordance with AWWA standards C 104-74.

(4) Polyvinyl Chloride Pipe and Fittings

(a) PVC pipe and fittings shall conform to ASTM Designations: D 3034, D 2564, D 2665, D 2729, and F 679, and to SDR 35. Sun damaged PVC delivered to the site will be rejected. The contractor shall protect PVC pipe from sun damage after delivery to the site for pipe not yet installed. PVC pipe installed below a depth of 8 feet, shall conform to SDR 18. PVC pipe with approved bell and spigot joints will be allowed.

(5) Vitrified Clay Pipe and Fittings (VCP)

(a) VCP pipe and fittings shall conform to ASTM C700. VCP pipe with approved bell and spigot joints, with synthetic rubber joint seals will be allowed.

(C) Maintenance Access Vaults (MAVs)

(1) All MAVs shall be water tight structures. MAVs shall be constructed to grade, as shown on the Standard Drawings. Precast reinforced concrete MAV risers and tops shall conform to ASTM Designation: C 478. Precast tops shall be the eccentric cone type. All cement used in the
construction of concrete MAVs shall be Type II and conform to ASTM Designation: C 150.

(2) All precast barrels shall have flexible joint gasket bonding material between the grade rings, cone and barrels. Material shall be Ram-Nek, Kent Seal or equivalent as approved by the Engineer, installed between barrels and between the base and first barrel and between the top barrel and cone, before mortar grouting. Mortar grouting is required on both the interior and exterior of all joints.

8.5 Final Acceptance

(A) Cleaning

(1) Prior to acceptance of any sewer line by the County, the contractor shall clean all lines with a Wayne-type sewer cleaning ball under hydrostatic pressure. Any stoppage, dirt or foreign matter shall be removed from the lines. All cleaning and testing of sewer lines shall take place after all construction work is completed, up to but not including the final paving. The system will be inspected after final paving is completed and any damage to the system during final paving and cleanup will be corrected before acceptance.

(B) Testing

(1) Prior to final acceptance, all sewer lines shall be tested for leakage by use of the low pressure air test. The test shall be performed using the following procedures and under the observation of an Engineer’s representative. Prior to testing, all pipes shall be flushed clean, or other approved cleaning methods used, to assure that the pipe contains no debris of any nature (see (A) above).

(2) After a MAV-to-MAV reach of pipe has been backfilled and cleaned, the pneumatic plugs shall be placed in the line at each MAV and inflated to 25 psi. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psi. At least two minutes shall be allowed for the air to stabilize.

(3) After the stabilization period (3.5 psi. minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of the line being tested shall be termed acceptable if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psi. shall not be less than the time shown for the given diameters in the following table.
<table>
<thead>
<tr>
<th>Pipe Diameter* (Inches)</th>
<th>Minimum Time (Min&amp;Sec)</th>
<th>Length for Min. time* (feet)</th>
<th>Time for Longer lengths (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2:50</td>
<td>0-398</td>
<td>0.427 X Length</td>
</tr>
<tr>
<td>8</td>
<td>3:37</td>
<td>0-298</td>
<td>0.769 X Length</td>
</tr>
<tr>
<td>10</td>
<td>4:43</td>
<td>0-239</td>
<td>1.187 X Length</td>
</tr>
<tr>
<td>12</td>
<td>5:40</td>
<td>0-199</td>
<td>1.709 X Length</td>
</tr>
</tbody>
</table>

* Main line pipe diameter and main line length (MAV-to-MAV). Main line sections of pipe being tested shall also include all house service laterals for each section, but no additional length or time will be allowed for the house service lines.

(4) All PVC sewer lines shall be mandrel tested by the Contractor. A rigid eight-vane mandrel shall be pulled through all line segments that have an upstream and downstream MAV or flushing inlet. A line segment which has a deflection equal to or greater than 7-1/2% of the base inside dimension shall be replaced. The base inside diameter and maximum 7-1/2% deflection are as follows:

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>Base Inside Diameter</th>
<th>7-1/2% Deflection</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 in.</td>
<td>5.742 in.</td>
<td>5.31 in.</td>
</tr>
<tr>
<td>8</td>
<td>7.665</td>
<td>7.09</td>
</tr>
<tr>
<td>10</td>
<td>9.563</td>
<td>8.84</td>
</tr>
<tr>
<td>12</td>
<td>11.361</td>
<td>10.51</td>
</tr>
</tbody>
</table>

(5) If other tests indicate problems and at the direction of the Engineer, the contractor may be required to provide a TV inspection of the sewer lines and provide the County with a color VHS record or other acceptable method of testing. The record shall measure distance along the pipeline to the nearest foot, and be able to measure any water which accumulates in any sewer line sag to the nearest 1/2" and shall include:

(a) project identification, location, date, and name of equipment operator;

(b) location of the sewer section and identification of MAVs at the ends of each section;

(c) slope or grade of pipeline (i.e., steep, moderate, shallow);
(d) compass direction of flow, viewing, and camera travel;

(e) pipe size, type, pipe joint length, and overall footage of inspected sewer;

(f) description of each service connection observed and its distance from the point at which the viewing began;

(g) depth of water observed in a sag to the nearest 1/2", and its depth from MAV.

(6) All testing and cleaning equipment shall be supplied by the Contractor.

(C) MAV Tests Required

(1) Water test: A leakage test shall be made for each MAV. This test shall be made by plugging all the openings into the MAV and filling the MAV with water to an elevation not greater than one foot below a fixed point on the metal MAV rim. The water should be introduced into the test MAVs at least four hours in advance of the official test period to allow the MAV material to become saturated. The MAV shall then be refilled to the original water level at the start of the official test period. After a period of four hours, the water elevation shall be measured from the same point on the MAV rim and the loss of water during the test period calculated; enough water shall be measured into the MAV to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage.

The allowable leakage at a MAV during the four hour test period shall be 0.55 gallons per each foot of MAV depth as measured from the lowest point in the MAV to the original water level. Should an initial test show excess leakage in a MAV, the MAV shall be water-proofed by grouting and/or other approved waterproofing methods satisfactory to the Engineer and the test repeated until an acceptable total leakage is obtained.

(2) Alternate vacuum test: The contractor, at his option, may choose to vacuum test MAVs rather than following the water test described in (1) above. Vacuum testing requires the following steps:
(a) Each MAV shall be tested immediately after assembly and prior to backfilling.

(b) All lift holes shall be plugged with an approved non-shrink grout.

(c) All pipes entering the MAV shall be plugged, taking care to securely brace the plug from being drawn into the MAV.

(d) The test head shall be placed at the inside of the top of the cone section and the seal inflated in accordance with the manufacturer's recommendations.

(e) A vacuum of 10 inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to 9 inches. The MAV shall pass if the time is greater than 60 seconds for 48" diameter, 75 seconds for 60" diameter, and 90 seconds for 72" diameter MAVs.

(f) If the MAV fails the initial test, necessary repairs shall be made with a non-shrink grout while the vacuum is still being drawn. Retesting shall proceed until a satisfactory test is obtained.

(g) If vacuum testing is done, a final acceptance test of the MAV shall be made after the area around the MAV is back-filled and compacted.

(D) Acceptance of Sewer Lines

(1) If, as a result of TV testing, any sag is observed in which the standing water is 1" or greater, the line segment will be removed and replaced at the contractor's expense. For any systems to be maintained by the County or a Special District, the County shall have the right to perform an additional TV inspection of any or all line segments 11 months from the date of substantial completion at County expense, and require the Contractor to make all necessary repairs due to problems discovered during said TV inspection.

SECTION 9 - DOMESTIC WATER SUPPLY AND DISTRIBUTION SYSTEM

9.1 General

(A) Water systems and appurtenances, within the County jurisdiction, shall be constructed in accordance with the details shown on plans and specifications approved by the Engineer. Where such water system is to be operated and/or maintained by any District, the plans, specifications and
construction must be approved by that District. Where a district has not adopted standard specifications, the Mariposa County specifications shall be used.

(B) Fire flow requirements shall be in accordance with the Uniform Fire Code and PCR 4290.

9.2 Distribution System

(A) Flow Requirements

(1) For design purposes, the daily per capita use shall be one hundred and fifty (150) gallons per day, and the average family or residential unit shall be three (3) persons per unit.

(2) Flow requirements shall be in accordance with the Uniform Fire Code and PCR 4290.

(3) Commercial establishments, schools, etc., shall be studied on an individual basis.

(B) System Layout

(1) The distribution system shall be laid out in a grid form wherever possible, so as to attempt to equalize the pressures within the system under use. Sizes and depth of lines shall be in accordance with AWWA Standards.

   (a) Mains shall be laid out in the dedicated roadway, wherever possible, so as to keep easement requirements to a minimum. Mains shall be laid out on the opposite side of the roadway centerline from the sanitary sewer lines, preferably within five (5) feet of the roadway centerline. Mains shall be laid out a minimum of ten (10) feet from sewer lines which run parallel.

9.3 Design Standards

(A) Line size

(1) Minimum size of any main supplying both domestic and fire demand shall be six (6) inches inside diameter.

(B) Depth

(1) Minimum cover for water mains shall be thirty-six (36) inches. Minimum cover for services shall be twenty-four (24) inches. Any variations from these minimums shall have special approval of the Engineer. Wherever a water main crosses a sewer line, the water main shall be at least one (1) foot above the sewer line.
(C) Valves, Hydrants, Blow-offs, etc.

(1) Shut-off Valves

(a) At least three (3) valves shall be placed at crosses. At least two (2) valves shall be placed at tees, except that only one valve is required at the tee to a fire hydrant, on the hydrant service line.

(b) The systems shall be designed and valves placed so that not more than eight hundred (800) feet of line will have to be removed from service for repairs, maintenance, etc., unless exceptions or an alternate design are approved by the Engineer.

(2) Pressure Reducing Valves

(a) Whenever pressure reducing valves are installed within the system they shall be located within a concrete vault and be installed between shut off valves with flexible connections for quick removal for repair, as per Standard Drawings. Valved bypass piping shall be provided for all pressure reducing valves.

(3) Fire Hydrants and Blow-offs

(a) Fire hydrants shall be located at street intersections wherever possible and shall be spaced along the street frontage at maximum intervals of five hundred (500) feet. The minimum size main serving a fire hydrant shall be six (6) inches. Fire hydrants shall be installed as per Standard Drawings. Blow-offs or fire hydrants shall be installed on all permanent dead ends. Blow-offs and fire hydrants shall be installed as per Standard Drawings. Fire hydrants shall conform to the Mariposa County Fire Protection Ordinance, or in the absence of an adopted ordinance, to Fire Protection Ordinance #45 of the Mariposa Public Utility District.

(4) Service Lines

(a) Service lines from the water main to the property lines shall normally be installed when the distribution system is constructed. Services shall be installed with a corporation stop at the main and a curb stop at the property line. Services shall be installed as per Standard Drawings.
(5) Location Devices

(a) All non-metallic water mains shall have a bare single strand No. 10 soft copper wire laid over the water main during construction. The copper wire shall be spliced and brought up into the valve boxes. The copper detector wire shall be taped to top of pipe and installed as per Standard Drawings.

(b) Location type shall be required as specified by the Engineer.

9.4 Materials and Installation

(A) General

(1) All material that is to become a permanent part of any water system or appurtenant structure shall conform to the requirements for the particular material as set forth in these specifications. The contractor shall supply any and all certificates of compliance and certified test results, or shall perform tests as required to assure the Engineer that the material being incorporated into the work has met the requirements, as specified. Requests to use materials not listed in these Standards shall require special consideration and approval of the Engineer.

(B) Pipe and Conduits

(1) All pipe or conduits shall be of the size, materials and strength as shown on the plans. All pipe fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied.

(2) Supporting strength of conduits, as installed, to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of Marston's formula as per Chapter IX (Structural Requirements) ASCE Manual of Engineering Practice No. 37. All pipe or conduits shall be of the same material between structures unless an exception is approved by the Engineer, for example for a stream crossing where a change might be appropriate because of minimum cover.

(C) Pipe and conduits within the distribution system shall be designed to withstand all possible increased stresses due to "Water Hammer", etc.
Ductile iron pipe and fittings shall be at least Class 150 and conform to AWWA Standards C 151-76. Joints shall be approved type mechanical joints. No lead joints will be allowed. Ductile iron pipe fittings shall be protected from concrete thrust blocks with a polyethylene sleeve.

Concrete lined and coated steel cylinder pipe CL and CP shall conform to California Administrative Code Title 22 specifications. Gaskets shall be as designated in the above specification.

Polyvinyl chloride pipe and fittings shall meet AWWA C 900 and all the requirements of ASTM designations: D 1784, D 2241, D 2152, D 1598, D 1599, D 790 and Commercial Standard CS 256-63.

Services

(a) Minimum size service lines from main up to water meter shall be one (1) inch polyethylene class 160.

(b) All service lines shall be installed as per Standard Drawings.

Gate Valves

(a) Gate valves shall be AWWA C 500 iron body, non-rising stem, resilient seat type.

Earthwork Installation and Backfill

Earthwork, installation and backfill involved in the construction and installation of any water supply and distribution system shall adhere to Section 4 and Section 5 of these standards.

Final Acceptance

(A) Prior to the final acceptance, the complete system shall be:

(1) Flushed and cleaned of all foreign material.

(2) Subjected to a hydrostatic pressure test for leakage at a minimum pressure of one hundred seventy-five (175) psi, and/or in accordance with current applicable AWWA standards.

(3) Disinfected and tested as per AWWA Standards. The contractor shall supply all equipment, labor and materials, and perform all tests, as required, prior to final acceptance.
SECTION 10 - STORM WATER DRAINAGE SYSTEM

10.1 General

(A) These standards shall govern the design and construction of any storm water drainage system to be dedicated or granted to Mariposa County for maintenance and operation.

(B) The drainage study and basis of design, for any proposed development, shall include the areas to be developed and all tributary areas draining to or through the proposed development. Drainage facilities shall be of adequate size to accommodate the whole tributary area as well as that portion of the drainage basin being developed. Data used in the design of storm water drainage facilities, including rain fall intensity and duration, concentration periods and coefficients of runoff, hydrographs, etc. shall be submitted to the Engineer for approval, along with development and construction plans.

(C) Changes or diversion of the natural drainage pattern will only be allowed within the development. Natural drainage channels, above and below the development, must be maintained in their original alignment both horizontally and vertically, unless special agreement, approved by the Engineer, has been executed with adjoining property owners.

10.2 Location, Capacity, Easements

(A) Location

(1) Drainage lines, structures, conduits and channels shall be located:

(a) In the public right-of-way whenever possible.

(b) In drainage easements dedicated by a map.

(c) In drainage easements dedicated to and accepted by Mariposa County.

(B) Capacity

(1) Inlet, outlet and flow line elevation and capacity of the proposed drainage system shall be designed so that the system may be extended, in the future to serve the entire drainage basin at the time of full development
and buildout with densities as allowed by the current General Plan.

(2) In general, storm water drainage systems shall be designed for a once in ten year return period storm. In specific cases, where flooding or washouts could pose a danger to downstream residents, the County Engineer may require design to a greater return period, up to a once in one hundred year storm.

(C) Easements

(1) Widths

(a) Minimum width of any drainage easement shall be ten (10) feet. Dedication of any easement shall include right of ingress and egress for operation, maintenance and replacement.

(b) For larger diameter and deeper conduits, easement widths may be increased, as required by the Engineer, to provide required width for maintenance.

(c) Easements for open channels, lined or unlined, shall be of adequate width to contain the channel, including side slopes and minimum maintenance access.

10.3 Design Standards

(A) Runoff frequency study method

(1) Can be used when peak flow records exist for a given stream near the location of the proposed structure.

(2) Data is usually obtained from the Department of Water Resources, State of California.

(3) Records usually only exist for a short period of years.

(4) Record data must be projected over the design return period using the methods of probability.

(5) All data and computations must be submitted to the Engineer for approval.

(B) Rational or Caltrans Method

(1) May be used when no peak flow records exist for a given stream, near the location of the proposed structure. However, the rational method shall not be used for areas greater than 640 acres.
(2) Submitted computations shall include a minimum of the following:

(a) Drainage area in acres with a copy of the map(s) used to obtain same.

(b) All data, coefficients, exponents, isohytel maps, etc., used to derive estimates of peak flows.

(3) The rational method is based on the equation, \( Q = C_i A \).

(a) Rainfall intensities in central Mariposa County (the vicinity of the town of Mariposa) for various design frequencies are as follows:

<table>
<thead>
<tr>
<th>Design Frequency</th>
<th>Intensity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year - 1 hour storm</td>
<td>0.31 inches</td>
</tr>
<tr>
<td>2 year - 1 hour storm</td>
<td>0.46 inches</td>
</tr>
<tr>
<td>5 year - 1 hour storm</td>
<td>0.61 inches</td>
</tr>
<tr>
<td>10 year - 1 hour storm</td>
<td>0.77 inches</td>
</tr>
<tr>
<td>25 year - 1 hour storm</td>
<td>0.92 inches</td>
</tr>
<tr>
<td>50 year - 1 hour storm</td>
<td>1.07 inches</td>
</tr>
<tr>
<td>100 year - 1 hour storm</td>
<td>1.15 inches</td>
</tr>
</tbody>
</table>

(b) The intensities shown in (a) above may be used throughout the County. However, for other areas of the County, the engineer may wish to present other intensities for consideration by the County Engineer. In this case, he must document their basis.

(c) Estimate the time of concentration, \( T_C \), based on length and slopes of the upstream drainage area, as shown in Drawing G-3.

(d) Correct the one hour design storm for a duration equal to the time of concentration, \( T_C \), using the graph, Drawing G-4.

(e) Appropriate runoff coefficients are described in Drawing G-5.

(4) The Caltrans method is based on regional flood-frequency equations of the form:

\[ Q_{rt} = C_{rt} \times A^C \times P^C \times H^C, \]

Where:

- \( Q = \) Flow in cubic feet per second (cfs)
- \( rt = \) return period (design storm recurrence)
- \( C = \) Coefficient for the Sierra region
- \( A = \) Drainage area in square miles
- \( P = \) Mean annual precipitation in inches. The 110 year mean annual rainfall for Mariposa is 31.4 inches.
H = Altitude index in thousands of feet. This is the average of the elevations at the locations 10% and 85% of the distance from the project site to the basin divide, measured along the main channel of the stream and the overland travel path to the basin divide.

The coefficients and exponents for the Sierra Region are as follows:

<table>
<thead>
<tr>
<th>(rt)</th>
<th>(C_{rt})</th>
<th>(c_1)</th>
<th>(c_2)</th>
<th>(c_3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0.24</td>
<td>0.88</td>
<td>1.58</td>
<td>-0.80</td>
</tr>
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<td>5</td>
<td>1.2</td>
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</tr>
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<td>10</td>
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<td>25</td>
<td>6.55</td>
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<tr>
<td>100</td>
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<td>0.77</td>
<td>1.02</td>
<td>-0.43</td>
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</tbody>
</table>

(4) All data and computations must be submitted to the Engineer for approval.

(C) Unit Hydrograph Method

(1) May be used when no peak flow records exist for a given stream near the location of the proposed structure, for areas greater than 640 acres.

(2) The Army Corps of Engineers' computer program, HEC-1, may be used, with the SCS method (Note that the SCS or Soil Conservation Service is now the NRCS, the Natural Resources Conservation Service). An equivalent computer model, approved by the Engineer, may be used.

(D) Other Methods

(1) The Engineer will consider other methods for design runoff, but they must have the Engineer's approval prior to their use.

(2) It will be the responsibility of the applicant to provide any data and/or computations to support the use of any other method.

(E) Manning's formula can be used to compute capacities, etc. of all conduits open or closed. The "n" values to be used are:

(1) Precast reinforced concrete pipe (RCP) 0.013
(2) Cast in place concrete (no joint) 0.015
(3) Smooth wall plastic pipe 0.011
(4) Corrugated plastic pipe 0.020
(5) Corrugated steel pipe (CSP)  
    no paving or lining  0.021
(6) Corrugated steel pipe (CSP)  
    fully lined  0.013
(7) Gunite or concrete lined open channels  0.016
(8) Unlined earth channel (minimum "n")  0.035

(F) Hydraulic Design

(1) Minimum velocity allowed in any conduit shall be two (2) feet per second.
(2) Maximum velocity allowed in any unlined earth channel shall be five (5) feet per second.
(3) Maximum velocity in any conduit, open or closed, shall not exceed ten (10) feet per second without special design and approval.
(4) All open channels shall be designed with a minimum of one (1) foot of freeboard.
(5) The total-energy line (energy gradient) shall be at least one-half (1/2) foot below the elevation of any inlet grate, gutter lip or any inlet structure or MAV cover.
(6) Maximum length of unlined roadside ditches in erodible soil shall be two hundred and fifty (250) feet.
(7) Minimum size of any drainage conduit shall be eighteen (18) inches inside diameter. The only exception shall be for access roadway culverts, or by the expressed approval of the Engineer.

(G) Full-flow Conditions

(1) All structures shall be designed to handle the flow rates obtained from the methods in this section.
(2) All structures shall be designed and installed to be structurally stable under the flow and traffic condition imposed on it.
(3) The Engineer may, at his discretion, require that any structure or part thereof, be designed by a registered Professional Engineer.

(H) Overtopping Flow Structures (Low Water Crossing, or Ford)
(1) All structures shall be so designed and installed to be structurally stable under the flow and traffic conditions imposed on it. Special attention shall be paid to the portion of the structure that will handle the flow under overtopping conditions. The design shall insure that the structure and/or roadway will not be damaged or require maintenance after overtopping occurs.

(2) All proposed overtopping structures of this type will require Planning Commission approval prior to the Engineer taking any action regarding their design or installation.

(4) The Engineer may, at his discretion, require that the structure or parts thereof, be designed by a registered Professional Engineer.

(I) Maintenance Access Vaults (MAVs) or Junction Boxes

(1) MAVs or junction boxes shall be constructed at all:

   (a) Abrupt changes of horizontal or vertical alignment.

   (b) Change in conduit sizes.

   (c) Junction points.

(2) MAVs shall be located at a minimum spacing of four hundred (400) feet along any drainage structure alignment. All curve information for drainage conduits shall be shown on the plans. The minimum radius of curvature and joint deflections for curved conduits shall be as recommended by the manufacturer and approved by the Engineer.

(J) Miscellaneous

(1) All of the following miscellaneous drainage structures shall conform in design and material to the State Standard Plans, State Standard Specifications and County Improvement Standards, and shall be designed by a Registered Engineer. Any special design problem such as storm water pumping stations, sags, etc., shall be designed and approved on an individual basis.

   (a) Catch basins

   (b) Drop inlets

   (c) Grates

   (d) Box culverts

   (e) Wing walls
(f) Head walls
(g) Flared inlet and outlet sections
(h) Overside drains
(i) Underdrains
(j) Arch culverts, concrete or metal
(k) Trash racks
(l) Fencing, including gates
(m) Rip rap

(K) Detention Facilities

(1) Detention facilities are intended to reduce the peak discharge of a watershed by storing the excess flow in a reservoir and slowly releasing it back into the system after the peak of the storm has passed. Reservoir size and outlet configuration shall be designed using an inflow hydrograph developed using HEC-1 or an equivalent method or program. The required storage volume and outflow requirements shall be determined using a flood routing method established in the engineering profession as being acceptable.

(2) All detention reservoirs shall be designed such that the water surface returns to its base elevation within 24 hours of the end of the storm.

10.4 Materials

(A) General

(1) Same as Section 6 of these standards

(B) Closed Conduits

(1) Reinforced concrete pipe shall meet all of the requirements of ASTM Designation: C 76.

(2) Cast in place monolithic concrete pipe shall conform to applicable portions of Section 63 State Specs.

(3) Corrugated metal and structural plate pipes and arches shall conform to the applicable portions of Sections 66 and 67 of the State Standard Specs.

(4) High Density Polyethylene Pipe (HDPE) used for storm drains shall comply with the Section 207 of the
Standard Specifications for Public Works Construction ("Green book"). All ends shall be covered with rock rip rap, or other-wise protected in a manner acceptable to the Engineer, to eliminate UV degradation.

(C) Lined Channels

(1) All lined channels shall be of adequate size and design to withstand all imposed loads and stresses.

(2) Lining shall consist of air blown mortar (gunite) or Portland cement concrete adequately reinforced with steel wire mesh or reinforcing steel.

(D) Open Ditches

(1) All open drainage facilities shall be adequately protected from erosion by the use of an appropriate lining or protection, and shall, at a minimum, meet the design criteria set forth in "Erosion and Sediment Control Guidelines for Developing Areas of the Sierra Foothills and Mountains", prepared by the High Sierra RC&D Council, October 1991 (or later).

10.5 Earthwork Installation, Bedding and Backfill

(A) All earthwork installation, bedding and backfill shall conform to Sections 4 and 5 of these standards.

10.6 Final Acceptance

(A) Prior to final acceptance, all drainage conduits and structures shall be cleaned of all foreign material and undergo a final field inspection.

SECTION 11 - ROAD STANDARDS

11.1 General

(A) These standards govern the construction of County roads and any road to be offered to the County for dedication. These standards may also be applied to other roads as required by the Planning Commission and the Board of Supervisors. The standards to be used will be based on the classification of the road, as delineated in the Mariposa County Road Improvement and Circulation Policy, the State SRA Fire Safe Standards (4290), the Mariposa County Subdivision Ordinance
(Title 16) and the Subdivision Map Act. In the event of conflict, the higher standard shall apply.

(B) The standards also apply to shoulder improvements such as sidewalks, driveways or other encroachments, and signing. Also included in the specifications are requirements for bikeways, paths and trails.

11.2 Definitions

(A) Terms used in this section have the following definitions: (some of these are repeated from Section 1)


(2) "Caltrans" shall mean state of California, Department of Transportation.


(B) Other definitions are as per Section 1.

11.3 Plans, Test Procedures and Inspections

(A) Plans

(1) A subdivision map will not be accepted for filing until all conditions of the Road Standards are met, and all other requirements satisfied, unless improvements are otherwise deferred.

(2) Road work shall not commence on any subdivision until an approved tentative map and, if required, approved construction plans are presented and approved by the Engineer.

(3) Roadways requiring engineered construction plans may be required to be slope staked prior to construction and inspected by the Engineer, using State of California, Department of Transportation Standard Practice.

(4) For commercial projects, traffic flow data giving estimate of daily traffic volumes and truck volumes, over a twenty year period for each road will be submitted.
(5) Subdivision roads shall be monumented in accordance with the Subdivision Map Act and County Code, whichever is the higher standard.

(6) Engineered construction plans for subdivisions will show plan, profile and typical section of the proposed improvement, along with all drainage and utilities, necessary details, on site and adjoining easements. The plan shall show the size and location of all engineered structures. Developers are reminded that drainage from culverts and overside drains crossing lots or between lots must be shown as drainage easements on the final or parcel map to be filed with the Mariposa County Recorder. Super-elevation diagrams for all curves will be required on profiles, as well as x-sections at a minimum 50' interval, for all roads of class III or greater class.

(7) Computations, when required for drainage structures, shall be submitted to the Engineer.

(B) Test Procedures

(1) Test procedures - State of California, unless otherwise approved by the Engineer.

(2) Prior to construction, an approved plan for compaction testing must be on file with the County Engineer. Compaction testing shall be performed by or under the direction of a private registered civil engineer or geotechnical engineer. Results shall be certified before final project acceptance.

(C) Inspections

(1) It is required that the contractor obtain inspections by the Engineer for each of the following steps of road construction.

(a) Preparation of existing ground, especially in the construction of fills.

(b) Preparation of subgrade and placing of base material.

(c) Curb and gutter forms before pouring where required.

(d) Curb and gutter pouring and finishing where required.

(e) Surface material before delivery to project, where required.
(f) Paving.

(g) Finishing roadway and erosion control.

(2) Engineer is to be notified twenty-four (24) hours in advance of each inspection to be made.

(3) The Contractor is to notify the California Department of Forestry (CDF) for a final inspection upon finishing the roadway.

11.4 Road Design

(A) When required, the design and construction shall be based on the Design Manual and these standards.

(1) Geometrics

(a) All horizontal and vertical alignment shall be governed by design speed, unless no design speed is required. (see also section 1273 of Fire Safe regulations, PRC4290).

(b) The minimum curve radius shall be governed by adequate sight distance for the design speed required as per the Design Manual (see also section 1273.04 of Fire Safe regulations, PRC4290).

(c) On inside turns where sight distance is not a factor, the minimum radius will be determined by using a maximum super-elevation of eight (8) percent and determining the radius from the Design Manual.

(i) No roadway shall have a horizontal radius curvature of less than 50 feet (inside radius); additional surface width of 4 feet shall be added to curves 50 - 100 feet radius and 2 feet added to those with 100 - 200 feet radius.

(ii) The length of vertical curves in roadways, exclusive of gutters, ditches, and drainage structures designed to hold or divert water shall be not less than 100 feet. (Section 1273.04 PRC 4290)

(d) All curves for class III or higher roads must conform to the proper super-elevation as determined by the Design Manual. Ice and snow conditions shall be taken into consideration, and will reduce the superelevation otherwise required.
(e) Broken back and reverse curves will not be acceptable unless approved by the Engineer.

(f) A tangent section should be placed between all curves.

(g) Curves with small deltas may require warning signs.

(h) On vertical curves, minimum stopping sight distance must be obtained for sags and crests. The minimum design speeds are shown on the Standard Drawings and must have the approval of the Engineer.

(i) Abrupt changes within a newly constructed section of road should be avoided, especially at the end of long tangents. Where it is necessary to change design speed, the maximum change shall not exceed ten (10) MPH.

(2) Grades

(a) The MAXIMUM grade below 3000 foot elevation will be twelve (12) percent, and above 3000 foot elevation will be ten (10) percent. The MAXIMUM grade, for Class I and II roads only, may be increased to sixteen (16) percent below 3000 feet or twelve (12) percent above 3000 feet where it can be demonstrated that twelve (12) percent or ten (10) percent is impractical due to topography. The approval to exceed twelve (12) percent and ten (10) percent is conditioned upon the concurrence of the Engineer and may require engineered plans and paving. Grades on previous divisions or easements will be considered on a case-by-case basis. Considerations of climate, exposure, etc. may be the basis for consideration by the County Engineer of exceptions to these grade standards.

(b) The MINIMUM tangent grade will be 0.5% on all roads. The developer's attention is directed to the problem of the effects of super-elevation on minimum grades. The minimum grade of 0.5% will be required on all ditches. Cross slope should equal two (2) percent minimum on standard sections.

(c) The MAXIMUM grade next to all stop intersections shall be five (5) percent. The minimum required length at this slope shall be twenty-five (25) feet. Intersections should also conform to Americans with Disabilities Act (ADA) requirements.

(3) Road Extension
(a) Roads which are extensions of existing roads or streets shall continue along the centerline of existing road or street as far as practical, either in the same direction or by adjusting curves.

(4) Intersections

(a) Intersections of roads shall be designed using good design practice. Intersections will be as close to ninety (90) degrees as possible. An intersection with an angle of approach of less than sixty (60) degrees will require approval of the Engineer. Intersections must have fifty (50) feet of tangent on both sides of the intersection and it must be shown that the intersection is safe, with adequate sight distance. Channelized intersections shall be designed in accordance with the requirements of the Design Manual.

(5) Right-of-way

(a) Road improvements shall be constructed in such a manner as to result in correspondence of the centerline of full road improvement width with the road easement centerlines unless an offset is specifically allowed by the Engineer.

(b) Rights-of-way width requirements shown on Standard Drawings are minimum. More space may be required to fit "Alternate cross-sections" or to accommodate large cuts and fills.

(B) Structural

(1) Road Width

(a) Road width shall be as shown in the Standard Drawings for each classification.

(2) Soil Testing

(a) Soil testing using current State of California, Department of Transportation methods will be required to determine the structural section of each road, where paving is required. Testing will be required during the design phase, with results presented with the submittal of improvement plans.

(b) "R" values by expansion, as well as extrusion, must be considered.

(c) A minimum traffic index of 4.0 will be used. See "R" value design chart, page G-1.
(d) Larger values of the traffic index will be required on a case-by-case basis for commercial areas and higher volume roads, as determined by the Engineer.

(e) Traffic studies on higher volume roads may require a higher traffic index based on the Design Manual.

(3) Earthwork

(a) All earthwork and clearing must conform to Standard Specifications. Erosion control shall be provided as required by the Engineer. (See Section 12 of these standards.)

(b) Generally, Cut slopes in earth or decomposed rock shall not be steeper than one to one (1:1). The cut slope ratio may be modified depending upon the nature of the material encountered, surface drainage on site or other criteria, as approved by the Engineer.

(c) Unless approved by the Engineer, fill slopes shall not be steeper than one and one-half to one (1.5:1). Flatter fill slopes may be required when soil conditions warrant.

(d) Fills constructed of material of high erosion potential, in the opinion of the Engineer, will require an additional two (2) foot shoulder.

(e) Rights-of-way lines and/or slope easements will be set back from the top of cut slopes and toe of fill slopes, a minimum of five (5) feet.

(f) Guardrails may be required on some fills, as designated by the Engineer.

(4) Drainage

(a) Hydraulic analysis and structural design of all drainage structures, estimated to be greater than thirty (30) inches in diameter (or of equivalent capacity), shall be certified by a licensed civil engineer, as per Standard Specifications, (use Standard Culvert Practice).

(b) Drainage pipes across roads shall be a minimum of 18 inches in diameter. Drainage pipes across driveway at road encroachments shall be a minimum of 12 inches in diameter. However, in both cases, drainage pipes shall be sized to handle a once in 10 year return period storm falling on the drainage area upstream of the pipe.
(c) Approved inlet structures are required in cut bank installations. (see Caltrans standard drawings)

(d) Head walls or inlet/outlet protection on culverts may be required by the Engineer.

(e) Earthen Berms and overside drains may be required above erodiable fill slopes by the Engineer.

(f) Culvert pipe placed for cross-road drainage shall be a minimum of eighteen (18) inches in diameter and location(s) shall be approved by the Engineer. Culvert pipe placed for driveway drainage shall be a minimum of twelve (12) inches in diameter. Paved depressions are preferred across driveways because of maintenance considerations, and should be installed if conditions permit, rather than a culvert. Refer to drawing R7.

(5) Road surface-paving not required

(a) Roads not requiring paving shall have the approval of the Engineer prior to the placement of any surface course. The type of surface must be to a thickness noted on the Standard Drawings and be Class II, not to exceed three-quarter (3/4) inch maximum, and be capable of supporting a 40,000 pound load. (Section 1273.02 PRC 4290). The Engineer will consider alternatives, but prior approval must be obtained.

(b) No road surfacing material containing asbestos shall be used. Lab analysis of representative samples will be required prior to placement of suspect materials. The County Air Pollution Control Officer may be contacted for information on how this testing is to be conducted.

(c) Construction dust control requirements must be approved by the Engineer prior to application with respect to material and application rates.

(d) Because of the hazardous nature of the substance, no waste oil or used oil (such as crankcase oil) is to be applied to any road surface.

(e) For Rural Class I roads, for shoulders, and for private driveways, Slate base may be used as an alternative to Class 2 gravel, provided that it shall not contain asbestos. Because this material has a lower durability index, dust is a concern. This is the reason for limit to Class I roads.

(6) Road surface-paving required
(a) The subgrade will be staked prior to laying of base course to ensure proper road shape and base thickness, as approved by the Engineer.

(b) Aggregate subbase will conform to Standard Specifications.

(c) Aggregate base shall conform to Standard Specifications.

(d) Asphaltic concrete surfacing shall conform to Standard Specifications.

(7) Bridges and Arch Culverts

(a) Bridges shall be designed in accordance with the requirements of State Specifications and AASHTO. The Engineer shall be consulted regarding requirements, prior to starting any design. Bridges and other structures shall be designed for the one-hundred (100) year flood.

(b) Bridge Design Loading shall meet Caltrans Standard Loading, HS20-44.

(8) Modified Cross-sections

(a) Reasonable alternatives to the standard drawings(s) may be considered. Each proposal shall be reviewed on a case-by-case basis by the Engineer.

(b) Split-level roads shall have geometrics of design, improvements and capacity provided in a normal street of the same classification, with each direction of roadway constructed at different locations and separated by a median. Surfaced width of roadbed shall be equal to the improved lane width for a standard street of the same classification. Traffic control devices and guard rail may be required by the Engineer.

(9) Cul-de-sacs

(a) The minimum traveled way radius of a cul-de-sac will be forty-five (45) feet, or as approved by CDF. Islands or obstacles in cul-de-sacs will not be accepted, unless prior arrangement is made with the Engineer. The slope of a cul-de-sac, in the direction of the entering road, shall not exceed six (6) percent from horizontal.

(10) Alternative Turnarounds
11.5 Shoulder Improvements

(A) Driveways

(1) In major subdivisions, for class IV or V roads only, as required by the Engineer, or commercial projects, all lots will have driveways constructed to the lot property line or road right-of-way. Driveways shall be constructed at the same time and surfaced at the same time as the adjacent roadway. Adequate sight distance must be provided for all driveways entrances. Sight distance must be governed by design speed. See also Standard Drawings for spacing of driveways.

(2) All driveways shall provide a minimum 10 foot traffic lane and unobstructed vertical clearance of 15 feet along their entire length. (Section 1273.10 PRC 4290)

(a) Driveways exceeding 150 feet in length, but less than 800 feet in length, shall provide a turnout near the midpoint of the driveway. Where the driveway exceeds 800 feet, turnouts shall be provided no more than 400 feet apart.

(b) A turnaround shall be provided at all building sites on driveways over 300 feet in length, and shall be within 50 feet of the building.

(B) Curbs and Gutters

(1) Standard Drawings shall apply where curb and gutter are required.

(2) Rolled curbs may be used along local residential roads where grades permit and at the discretion of the Engineer. See "Rolled Curb and Gutter" detail.

(3) Curb returns shall have a twenty-five (25) foot minimum radius.

(a) Handicap ramps are required at all intersections, and other locations, as required, for continuity with other pedestrian ways. Where existing conditions do not warrant pedestrian crossing, appropriate pavement and curb construction joints shall be provided to allow future ramp installation.
(b) The handicap ramps shown in Standard Drawings are the approved standard designs as set forth by the State Building Code (Title 24 of California Administrative Code) for handicap access onto sidewalks.

(c) Grooving: Where the ramp is located in the center of a curb return, it shall be grooved in a herringbone pattern. Also, the level edge at the top of the ramp required a groove detail as shown. Grooving shall be done with a pre-made tool meeting the groove specification. Ramps not located in a curb return do not require grooving on the ramp itself. In such cases, the surface of the ramp shall have a transverse broomed surface texture, rougher than the surrounding sidewalk.

(C) Sidewalks - see Standard Drawings

(1) Minimum unobstructed sidewalk width shall be four (4) feet as shown on drawing R-20. Sidewalks shall be a minimum of 4 feet in width. Some commercial sidewalks may be required to be a minimum of 6 feet in width, as shown on drawing R-18.

(2) No obstructions, such as power poles, signs, fire hydrants or surface mounted transformer boxes shall be placed within the normal sidewalk width.

(D) Signing and pavement markings

(1) Roads shall be properly signed. All signs shall be mounted on break-away posts. Signing shall meet the requirements of the approved improvement plans and the following:

(a) "Road Name" signs shall be placed at each intersection in a visible location. See Standard Drawings.

(b) "Traffic Control" signs of approved design shall be placed as delineated in the improvement plans, or as required by the Engineer. The need for such signs shall be determined on an individual basis in accordance with the latest edition of the State Department of Transportation Traffic Manual, or as determined by the Engineer. As a minimum, stop signs and intersection ahead signs shall be required at all intersections with County roads. The intersection ahead signs shall be placed on the County Road, on both sides of the intersection, as shown on drawing R-25.
(c) "This Road Is Not County Maintained" signs shall be placed at the beginning of all roads not maintained by the County, that are not "private roads". Size, colors and lettering shall be as shown on drawing R-27.

(d) Roads that are maintained through a County-administered Zone of Benefit shall not be required to have the signs designated in (c) above.

(e) Non County roads and roads that are not maintained through a County administered Zone of Benefit may also have a sign at the entrance to the road which reads "Private Road". These signs shall be metal, eighteen (18) inches high by eighteen (18) inches wide, yellow background with (4) inch black letters and a one half inch black border, mounted on a break away post.

(f) Break away posts shall have a base post which has been placed three (3) to four (4) feet in the ground, and which extends approximately 4 inches above ground. An eight foot break post will be bolted to the base as shown on the Standard Drawing. Any sign within any road right-of-way shall be placed on a break away post.

(2) On paved roads, the stop bar and "stop" legend shall be painted on the road.

(3) Center line striping or other pavement markings may also be required on paved roads.

(E) Parking Access

(1) The location of any on-site parking, on other than local residential streets, that may affect the safe operation of a public road, may be subject to review by the Engineer.

(2) All on-site parking except residential on-site parking shall have a controlled ingress/egress.

(3) On-site parking, excepting single-family residential along residential local roads, shall not allow vehicles to back out into any public right-of-way or pedestrian walk.

(4) Existing unsafe conditions are to be corrected at the design stage, whenever possible.

(F) Gate Entrances (Section 1273.11 PRC 4290)
(1) Gate entrances shall be at least two feet wider than the width of the traffic lane(s) serving that gate.

(2) All gates providing access from a road to a driveway shall be located to allow a vehicle to stop without obstructing traffic on that road, as required by PCR 4290 or other applicable codes.

(3) Where a one-way road with a single traffic lane provides access to a gated entrance, a 40 foot turning radius shall be used.

11.6 Bikeways

(A) The developer shall adhere to the requirements in "Caltrans Planning and Design Criteria for Bikeways." All bikeways shall be striped and/or signed as required by the Engineer.

11.7 Paths and Trails

(A) Right-of-ways

(1) Minimum pedestrian path right-of-way shall be ten (10) feet wide.

(2) Minimum equestrian trail right-of-way shall be twenty (20) feet wide.

(3) Lesser right-of-way widths shall be allowed in limited instances where it can be shown that safety will not be impaired, and that maintenance can still be performed.

(4) Rights-of-way shall be located to allow reasonable construction of trails or paths.

(B) Construction

(1) Trails shall be constructed in accordance with established trail construction guides and as approved by the Engineer.

(2) Grade of paths shall be maintained under five (5) percent where handicapped use is likely.

11.8 Encroachments

(A) Driveways

(1) County policy requires an encroachment permit for any driveway that enters a County Road or Zone of Benefit Road.
(2) If a Building Permit is issued for a new or additional residence or increase of 50% or more in living space, which causes an increase in usage to a paved County Road or paved Zone of Benefit Road, the driveway encroachment shall be upgraded and paved to meet current County Standards, before the Building Permit is finalled.

(B) Utility and other Encroachments

(1) Any work within the Public Right-of-way, Including County Roads and Zone of Benefit Roads, other than driveways as detailed above, requires an encroachment permit issued by the Department of Public Works. Encroachment Permits are issued on a project by project basis. Information and requirements for these permits should be obtained from the Public Works Department.

(2) Permits are required for trenching and installing underground utilities, including water, gas, sewer, telephone and electrical lines. Permits are also required for installation of signs and mailboxes. Any underground trenching and restoration shall meet the requirements of these Standards, and such other requirements as are or shall be established by the Director of Public Works.

SECTION 12 - EROSION CONTROL

12.1 Application

(A) For any construction area (disturbance) over 5 acres of actual construction disturbance, a storm water permit shall be obtained from the Regional Water Quality control Board, and evidence of the permit shall be provided to the Engineer.

(B) These standards shall apply to any project where, as determined by the Engineer, any of the following conditions exist:

(1) Erosion controls and/or vegetation are required by the Planning/Building Department.

(2) Erosion may cause undue environmental damage.

(C) These standards shall only be used to supplement and/or clarify any requirements enacted by Mariposa County. Erosion control and revegetation shall be consistent with the direction contained in EROSION AND SEDIMENT CONTROL GUIDELINES FOR DEVELOPING AREAS OF THE SIERRA FOOTHILLS AND MOUNTAINS, (Prepared by the High Sierra RC&D Council, October 1991, or update).
12.2 Requirements

(A) A plan shall be submitted to the Engineer for approval containing the following:

(1) Protective measures to be taken during construction to prevent erosion by surface or groundwater of cut and fill slope faces and any other surface area involved.

(2) Permanent methods of erosion control to be used following completion of the proposed grading or improvements. The methods shall consider, but are not limited to, the use of the following:

(a) Revegetation
(b) Straw or hydro mulching
(c) Berms (temporary or permanent)
(d) Interceptor
(e) Subsurface drains
(f) Terraces
(g) Sediment traps
(h) Geotextile or jute fabric or equivalent

(3) Approximate sequence and timing of grading and improvement increments, and/or subsequent revegetation and landscaping work.

(B) The Engineer may require that any or all of the above requirements be designed and/or supervised by qualified individuals.

(1) Acceptable qualifications of individuals shall be as determined by the Engineer.

12.3 Standards

(A) Permanent revegetation or landscaping, if required, is to be commenced on the construction site as soon as practical and in no case exceeding one (1) month after achieving final grades and utility emplacements, unless otherwise approved by the Engineer. Whenever practical, land is to be developed in increments of workable size which can be completed during a single construction season; erosion control measures are to be coordinated with the sequence of grading or improvements.
(B) All surfaces disturbed by vegetation removal, grading, haul roads, or other activity of construction which alters the natural vegetative cover, are to be prepared for expedient revegetation or otherwise maintained to control erosion, unless covered with impervious or other improved surfaces pursuant to approved plans within thirty (30) days following the completion of grading (or removal of vegetation, if no grading was involved.) Erosion control described in "California Interagency seeding Guide for Erosion Control Plantings", or "Seeding and Mulching for Erosion Control", provided by the Mariposa County Resource Conservation District, may be used as a guide. Both of these publications are included in the improvement standards as Appendix B.

(C) Topsoil removed from the surface in preparation for grading and construction is to be stored whenever possible on or near the site and protected from erosion while grading operations are underway, provided that such storage may not be located where it would cause suffocation of root systems of trees intended to be preserved. After completion of such grading, topsoil is to be restored to exposed cut and fill embankments or building pads so as to provide a suitable base for seeding and planting.

(D) Acceptable methods of revegetation include straw-mulching, hydro-mulching, and planting of protective ground cover as specified by the USDA Natural Resources Conservation Service Technical Guide. Where lawn or turf grass is to be established, lawn grass seed or other appropriate landscape cover is to be sown at not less than four (4) pounds to each one thousand (1,000) square feet of land area. Other methods or revegetation may be approved by the Engineer where equivalent protection is provided.

(E) All revegetation and landscaping is to be conducted within suitable growing periods. Native plant materials are specifically encouraged in order to reduce irrigation demands.

(F) See "EXHIBIT A" for types and planting rates suggested for our area. Contact Natural Resources Conservation Service and/or the Mariposa County Resource Conservation District for details.

(G) For all grading or improvements to be conducted during the rainy season, a sedimentation control plan is to be submitted including, where necessary, temporary sedimentation basins. Sedimentation control facilities, are to be installed in conjunction with initial grading operations and maintained throughout the construction period to remove sediments from runoff waters during development.

(H) Permanent sediment catchment basins or other types of sediment retention faculties are required wherever necessary
to prevent discharge of sediment to stream channels. Accumulated sediment is to be inspected and removed for disposal according to a regular maintenance schedule, by the appropriate entity.
Exhibit A, Vegetative Guide
SECTION 13 - PUMP TEST FOR MAXIMUM YIELD

13.1 Introduction

(A) This shall apply to systems to be accepted and maintained by the County.

(B) Water wells shall be progressively tested for yield versus drawdown and the maximum allowable yield shall be established, all in accordance with these Specifications and Sections A1-7, "Testing for Yield and Drawdown", of the AWWA A100-66 Standard for deep wells.

(C) The water wells shall be tested for water quality in accordance with these specifications.

(D) All wells, including test wells shall be constructed in accordance with State of California Department of Water Resources Bulletin No. 74 entitled "Water Well Standards" as approved by the Engineer.

13.2 Determination of Maximum Allowable Yield

(A) After a well has been completely constructed, developed and cleaned, including a bailer test to estimate the test pump capacity, the tentative maximum allowable yield for the well shall be determined by one or more specific pumping tests performed on predetermined dates. The exact dates shall be subject to approval by the Engineer prior to beginning any tests. The specific pumping tests shall conform to the requirements of Section 13.3 and Section 13.4 of these specifications and shall be planned and performed under the direct supervision of the Engineer, or his representative.

(B) After the specific pumping tests have been completed, the consulting engineer shall assemble and analyze the relevant data and submit, to the appropriate public agency, a report including said analysis and a recommendation for the maximum allowable yield for each well. The report shall include, but not be limited to, the following items:

(1) Recommended maximum allowable yield.

(2) Certified well driller's "Report of Completion".

(3) Well test "Stepped Time-Drawdown Curve" for initial pumping test.

(4) Well test "Time-Drawdown Curve" for final pumping test.

(5) Well test "Specific Capacity Curve".
(6) Information concerning the testing and performance of wells in the vicinity of the subject well.

(7) Analysis of precipitation coincidental to the test period in relation to the historical pattern of precipitation.

(8) Geological study of the well site and adjacent areas which contribute to the ground water supply.

13.3 Specific Water Well Pumping Test

(A) A specific water well pumping test shall be performed for each water well in order to determine a maximum allowable yield for the well. The specific test shall consist of two (2) phases; the initial pumping test and the final pumping test. The purpose of the initial test is to establish an ultimate yield for the well. The purpose of the final test is to establish a maximum allowable yield for the well.

1. Initial pumping test

(a) The initial pumping test shall be conducted as follows: After measuring the static water level in the well, the initial pumping shall be started at a rate equal to approximately thirty-three (33) percent of the anticipated ultimate yield of the well and shall be maintained until the water level in the well has stabilized. The water level and respective time increments shall be recorded, as required, by the following:

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Recordation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5 minutes</td>
<td>measurements recorded every 1/2 minute</td>
</tr>
<tr>
<td>5 - 60 minutes</td>
<td>measurements recorded every 5 minutes</td>
</tr>
<tr>
<td>60 - 170 minutes</td>
<td>measurements recorded every 20 minutes</td>
</tr>
</tbody>
</table>

(b) If observations of adjoining wells are available, the measurements shall be recorded as follows:

<table>
<thead>
<tr>
<th>Time Interval</th>
<th>Recordation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 60 minutes</td>
<td>recorded every 2 minutes</td>
</tr>
<tr>
<td>60 - 120 minutes</td>
<td>recorded every 5 minutes</td>
</tr>
<tr>
<td>120 - 240 minutes</td>
<td>recorded every 10 minutes</td>
</tr>
<tr>
<td>240 - end</td>
<td>recorded every 20 minutes</td>
</tr>
</tbody>
</table>
(c) The readings shall be continued until the water surface elevation has stabilized for sixty (60) minutes.

(d) In order to measure the pumping rate, the following methods are acceptable:

(i) time to fill a 55 gallon barrel

(ii) a commercial type meter

(iii) circular orifice weir (Note: good for turbine or centrifugal pumps, but not acceptable for a piston pump.)

(iv) orifice bucket (maximum limit of one hundred-fifty (150) gallons.)

(e) Measurement of the water level shall be made by one of the following procedures:

(i) electric sounder method,

(ii) wetted tape method, or

(iii) air line method

(f) The readings should be made to the nearest .10 of a foot.

(g) Alternate methods of measuring must be submitted to the Engineer for approval.

(h) Thereafter, the pumping rate shall be increased by steps approximately equal to the initial rate, achieving stabilization of the pumping level for each step before proceeding to the next step, until the rate is reached for which stabilization cannot be achieved. From this step the rate of pumping shall be gradually decreased until a certain maximum yield, having a stabilized pumping level, can be maintained for a period of not less than four (4) hours.

(i) Said maximum yield, after being successfully pumped, shall be considered the ultimate yield of the well. The water surface elevation should not be allowed to drawdown to a depth less than five (5) feet above the casing perforations, nor ten (10) feet above the test pump bowls. At the end of the pumping period, the pump shall be shut down and the well shall be allowed to recover until the original static water level, or a lesser stabilized level, has been established, at which time the
(j) A well test "stepped Time-Down Curve" and a "Specific Capacity Curve" shall be constructed, in accordance with Drawings P-1 and P-2, as included herein, for the initial pumping test.

(2) Final pump test

(a) The final pumping test shall be conducted as follows: Within two (2) hours of the stabilized water surface elevation recovery after the initial pump test, the final pumping shall be started and maintained, at a rate equal to the yield previously established, for a period of not less than ten (10) days commencing when the pumping rates and water surface elevation have stabilized at the ultimate yield rate.

(b) Measurements shall be as required in the initial pump test except that once the stabilized water surface is reached, the measurements shall be made every thirty (30) minutes for a duration of ten (10) days. Said rate, after being successfully pumped, shall be considered the maximum allowable yield of the well. At the end of the pumping period, the pump shall be shut down and the well shall be allowed to recover. Recovery shall be to the original static water level, or to a lesser stabilized level. When a stabilized level has been established, the final pumping test shall be considered complete and a maximum allowable yield, equal to the final pumping rate, will have been achieved. Measurements during the recovery period shall be as stated in the initial pump test.

(c) A well test "Time-Drawdown Curve" shall be constructed, in accordance with Drawing P-3, as included herein, for the final pumping test.

(d) After the specific water well pumping tests have been completed, the contractor shall reclean the wells and shall remove any sand, stones, rock, or any other deleterious materials that may have accumulated in the wells.

(e) In order to accomplish a valid specific water well pumping test, the continuity of the entire testing procedure shall not be interrupted or altered. If, for any reason whatsoever, the sequence of the varied rates of pumping is not strictly followed or
if the pumping is improperly terminated prior to completing said test, the test shall be regarded as void, shall be discontinued, and shall be initiated once again from the starting point unless, in the judgment of the Engineer, modifications to the testing procedure can be made which will accomplish a proper and acceptable test.

13.4 Equipment for Pump Test

(A) The contractor shall make the necessary arrangements for conducting the pumping tests and shall furnish and install the necessary equipment for pumping the maximum anticipated rate from the lowest anticipated water level of the well to the required point of discharge at ground level, but with satisfactory throttling devices so that the rate may be varied to suit the requirements of the test. The pumping equipment shall be complete with a motor having adequate power and controls, and shall be capable of being operated without interruption for a maximum anticipated period of continuous pumping.

(B) The required point of discharge shall be located where the water will not damage surrounding property or structures, will not trespass over, along, or into unauthorized routes or territories, and will not recirculate into the well.

(C) The contractor shall furnish devices for recording time, devices such as orifice weirs, orifice buckets, or meters for measuring the rate of water flow, and devices such as electric sounders, wetted tapes, or air lines for measuring the varying elevations of water level. Said devices shall be accurate and reliable for the uses contemplated, and the use of any device shall be approved by the Engineer prior to beginning the test.

13.5 Sampling and Quality of Well Water

(A) The water from wells coming under the jurisdiction of these standards shall be sampled and analyzed for bacterial, chemical, physical, and radiological quality in accordance with the procedures established by the County Health Department and the California Department of Public Health, and shall meet the requirements for bacterial, chemical, physical, and radiological quality established by the County Health Department, the California Department of Public Health and the United States Public Health Service Drinking Water Standards.

(1) Bacterial sampling

(a) Sampling of community water supply wells is covered by requirements of the State Board of Health and the County Health Department. For individual
domestic wells, technical assistance or advice regarding the collection of bacteriological samples may be obtained from the local County Health Department or from the laboratory that will examine the sample.

(b) If no technical assistance is available, the following procedure will suffice: A sterile sample bottle, preferably one provided by the laboratory that will make the determination, must be used. It is extremely important that nothing except the water to be analyzed come in contact with the inside of the bottle or the cap; the water must not be allowed to flow over an object or over the hands while the bottle is being filled. Do not rinse the sample bottle. The sample should be delivered to the laboratory as soon as possible and in no case more than twenty-four (24) hours after its collection. During delivery, the sample should be kept as cool as possible (but not frozen).

2. Chemical (Mineral) Sampling

(a) Generally, a routine general mineral analysis (determination of the concentrations of the common minerals) will suffice, particularly where there is no prior knowledge of the chemical quality of the water in the area where the well is located. Where quality conditions in the surrounding area are known, a more selective analysis may be made. For certain uses it may also be desirable to make analysis for concentrations of the heavy metals (such as iron and manganese in the case of domestic water) or other constituents not routinely determined. Information or advice on chemical quality conditions may be obtained from the local agencies such as the County Farm Advisor's Office, County Health Department and Water Service Agency (irrigation or water district, for example).

(b) The sample should be collected after the well has been pumped long enough to remove standing water and development and disinfectant chemicals, and to insure that water from the producing formation(s) has entered the well. The water sample should be obtained in a chemically clean container, preferably one obtained from the laboratory which has been selected to perform the analysis. The container should be rinsed several times with the water to be sampled prior to collecting the sample. The laboratory performing the analysis should issue instructions regarding the quantity of sample required. However, one-half (1/2) gallon is usually sufficient for a routine mineral analysis;
one (1) gallon when analysis for heavy metals is also required.

(B) Any analysis shall be performed by a laboratory certified by the California Department of Public Health, and a copy of said analysis shall be forwarded to the County Health Department and, if required, to the California Department of Public Health.
NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE.
MARIPOSA COUNTY ENGINEERING DEPARTMENT
RURAL/TOWN SECTION - CLASS I

NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>DESIGN SPEED</th>
<th>CLASS II AGGREGATE BASE WIDTH &quot;W&quot;</th>
<th>THICKNESS &quot;T&quot;</th>
<th>SURFACE TYPE &quot;S&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NONE</td>
<td>9' MIN.</td>
<td>2&quot;</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>NONE</td>
<td>9' MIN.</td>
<td>3&quot;</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>NONE</td>
<td>9' MIN.</td>
<td>4&quot; MIN.*</td>
<td>2&quot; CLASS &quot;B&quot; A.C. MIN.*</td>
</tr>
</tbody>
</table>

* THESE DEPTHS MAY BE VARIED BY THE ENGINEER
BASED UPON AN ENGINEERED STRUCTURAL SECTION

NOTE: Rural Class I roads may use slate base in lieu of Class II Aggregate Base
NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE.

<table>
<thead>
<tr>
<th>CLASS</th>
<th>DESIGN SPEED</th>
<th>CLASS II AGGREGATE BASE WIDTH &quot;W&quot;</th>
<th>THICKNESS &quot;T&quot;</th>
<th>SURFACE TYPE &quot;S&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>NONE</td>
<td>10'</td>
<td>2&quot;</td>
<td>S</td>
</tr>
<tr>
<td>B</td>
<td>NONE</td>
<td>10'</td>
<td>3&quot;</td>
<td>D</td>
</tr>
<tr>
<td>C</td>
<td>NONE</td>
<td>10'</td>
<td>4&quot; MIN.*</td>
<td>2&quot; CLASS &quot;B&quot; A.C. MIN.*</td>
</tr>
</tbody>
</table>

* THESE DEPTHS MAY BE VARIED BY THE ENGINEER BASED UPON AN ENGINEERED STRUCTURAL SECTION
NOTES:

1. NO DRIVEWAY SHALL BE PLACED WITHIN 5' OF AN INTERSECTING ROAD CURB RETURN
2. DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.
3. A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100' OF FRONTAGE.
4. CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75' BETWEEN CENTERS
5. WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM OF 6" PAST THE TOE OF FILL OF DRIVEWAY.
6. TOP 2' OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION. 90% RELATIVE COMPACTION REQUIRED BELOW THE TOP 2' OF FILL.
NOTES:

(1) NO DRIVEWAY SHALL BE PLACED WITHIN 5’ OF AN INTERSECTING ROAD CURB RETURN
(2) DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.
(3) A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100’ OF FRONTAGE.
(4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75’ BETWEEN CENTERS
(5) WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM OF 6” PAST THE TOE OF FILL OF DRIVEWAY.
(6) TOP 2’ OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION. 90% RELATIVE COMPACTION REQUIRED BELOW THE TOP 2’ OF FILL.
NOTES:

(1) NO DRIVEWAY SHALL BE PLACED WITHIN 5' OF AN INTERSECTING ROAD CURB RETURN
(2) DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.
(3) A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100' OF FRONTAGE.
(4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75' BETWEEN CENTERS
(5) WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM OF 6" PAST THE
 TOE OF FILL OF DRIVEWAY.
(6) TOP 2' OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION. 90% RELATIVE
 COMPACATION REQUIRED BELOW THE TOP 2' OF FILL.
(7) CONCRETE SHALL BE 2500 LB MINIMUM COMpressive STRENGTH, MIN 5" SLUMP
(8) LIP OF DRIVEWAY MUST BE 1/4" BELOW EDGE OF COUNTY ROAD PAVEMENT
(9) A FACE FORM, ADJACENT TO THE EDGE OF THE COUNTY ROAD IS REQUIRED. UPON
 REMOVAL AND PRIOR TO RECEIVING A FINALED PERMIT THE APPLICANT IS REQUIRED
 TO REPAIR WITH ASPHALT PATCH, (2" MIN. THICKNESS), FROM THE EDGE OF CONCRETE
 TO THE EDGE OF COUNTY ROAD. PATCH WORK SHALL MATCH EXISTING ROAD GRADE.
NOTES:
(1) NO DRIVEWAY SHALL BE PLACED WITHIN 5’ OF AN INTERSECTING ROAD CURB RETURN
(2) DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.
(3) A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100’ OF FRONTAGE.
(4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75’ BETWEEN CENTER LINES
(5) WHEN CROSS CULVERT IS USED IT SHALL EXTEND A MINIMUM OF 6” PAST THE
TOE OF FILL OF DRIVEWAY.
(6) TOP 2’ OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACtion. 90% RELATIVE
COMPACtion REQUIRED BELOW THE TOP 2’ OF FILL.
NOTES:

(1) NO DRIVEWAY SHALL BE PLACED WITHIN 5' OF AN INTERSECTING ROAD CURB RETURN.
(2) DRIVEWAYS SHALL BE AT A RIGHT ANGLE TO THE STREET.
(3) A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100' OF FRONTAGE.
(4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75' BETWEEN CENTERS.
(5) WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM OF 6" PAST THE TOE OF FILL.
(6) TOP 2' OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION, 90% RELATIVE COMPACTION REQUIRED BELOW THE TOP 2' OF FILL.
(7) CONCRETE SHALL BE 2500 LB. MINIMUM COMPRESSIVE STRENGTH, MIN, 5" SLUMP.
(8) LIP OF DRIVEWAY MUST BE 1/4" BELOW THE EDGE OF COUNTY ROAD PAVEMENT.
(9) A FACE FORM, ADJACENT TO THE EDGE OF THE COUNTY ROAD IS REQUIRED. UPON REMOVAL AND PRIOR TO RECEIVING A FINALED PERMIT THE APPLICANT IS REQUIRED TO REPAIR WITH ASPHALT PATCH, (2" MIN. THICKNESS), FROM THE EDGE OF CONCRETE TO THE EDGE OF COUNTY ROAD. PATCH WORK SHALL MATCH EXISTING COUNTY ROAD CROSS SECTION AND VERTICAL GRADE.
NOTES:

(1) NO DRIVEWAY SHALL BE PLACED WITHIN 5’ OF AN INTERSECTING ROAD CURB RETURN.
(2) DRIVEWAYS SHALL BE AT A RIGHT ANGLE TO THE STREET.
(3) A MAXIMUM OF ONE DRIVEWAY FOR EVERY 100’ OF FRONTAGE.
(4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75’ BETWEEN CENTERS.
(5) WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM OF 6” PAST THE TOE OF FILL.
(6) TOP 2’ OF FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION, 90% RELATIVE COMPACTION REQUIRED BELOW THE TOP 2’ OF FILL.
MINIMUM 12" DIAMETER CROSS PIPE. LOCATION TO BE DETERMINED IN FIELD WHEN REQUIRED. (SEE NOTE 6)

MIN. 12" DIAMETER PIPE TO BE SET IN LINE WITH ANY EXISTING DITCHES AT ELEV. NOT TO DISRUPT SIDE DRAINAGE.

RURAL DRIVEWAY

<table>
<thead>
<tr>
<th>TYPE</th>
<th>W (MIN.)</th>
<th>W (MAX.)</th>
<th>A.B. (MIN.)</th>
<th>A.C. (MIN.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIDENTIAL</td>
<td>12'</td>
<td>20'</td>
<td>4&quot;</td>
<td>2&quot;</td>
</tr>
<tr>
<td>COMMERCIAL</td>
<td>15'</td>
<td>35'</td>
<td>6&quot;</td>
<td>2&quot;</td>
</tr>
</tbody>
</table>

NOTES:

1) AT ANY INTERSECTION NO DRIVEWAY WILL BE PLACED WITHIN 5' OF B.C.
2) DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.
3) ONE DRIVEWAY FOR EVERY 100' OF FRONTAGE.
4) CIRCLE DRIVEWAYS TO BE NO CLOSER THAN 75' BETWEEN CENTERS (RESIDENTIAL) OR 80' BETWEEN CENTERS (COMMERCIAL).
5) WHEN CROSS PIPE IS USED IT SHALL EXTEND A MINIMUM 0.5" PAST TOE OF FILL OF DRIVEWAY; ALL FILL TO BE COMPACTED TO 95% RELATIVE COMPACTION.
6) PIPES WILL BE CORRUGATED METAL.
TOWN CLASS II
MINIMUM REQUIREMENTS:
2" CLASS "B" ASPHALT CONCRETE
6" CLASS II AGGREGATE BASE
NO DESIGN SPEED

* per planning commission requirements

NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE
TOWN CLASS III

MINIMUM REQUIREMENTS:
2" CLASS "B" ASPHALT CONCRETE
6" CLASS II AGGREGATE BASE

DESIGN SPEED: 25 MPH (MIN.)

* per planning commission requirements

NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE
TOWN CLASS IV
MINOR COLLECTOR

MINIMUM REQUIREMENTS:
2" CLASS "D" ASPHALT CONCRETE
6" CLASS II AGGREGATE BASE

DESIGN SPEED: 25 – 35 MPH (MIN.)

* per planning commission requirements

NOTE: ALL SLOPES TO BE ROUNDED OFF AT TOP OF SLOPE
GRADE TO BE LEVEL UNLESS OTHERWISE APPROVED
BY COUNTY ENGINEER. GRADE MAY BE APPROVED UP TO 6%.
**NOTES:**

1. REINFORCING STEEL IN WALLS SHALL BE #4 BARS @ 18" CENTERS PLACED 1 1/2" CLEAR TO INSIDE OF BOX.
2. ALL MATING SURFACES BETWEEN GRATE & FRAME TO BE MACHINED.
3. GRATE & FRAME MAY BE APPROVED EQUAL.

4. CATCH BASIN TO BE USED WITH 18" PIPES. (INCREASE DIMENSIONS FOR PIPES > 18")

5. FINAL GRATE CONFIGURATION TO BE DETERMINED BY COUNTY ENGINEER.

6. TYPE "A" CATCH BASIN MAY ALSO BE CAL TRANS STANDARD AS SHOWN IN CAL TRANS STANDARD DRAWINGS D72, D73, D74, AND D74A. APPROVAL BY THE COUNTY ENGINEER SHALL BE REQUIRED.

7. GRATE MUST BE DESIGNED TO PREVENT INFALL OF BICYCLE TIRES.
MARIPOSA COUNTY ENGINEERING DEPARTMENT

CURB & GUTTER

DRIVEWAY SECTION – GUTTER

2'- 6" TRANSITION TO STANDARD SECTION
RESIDENTIAL (5'- 0" – COMMERCIAL)

NOTES:
1) 1/4" FELT EXPANSION JOINTS TO BE
   BRACED BY STEEL BACKING DURING POUR.
2) SAND TO BE PLACED WHEN DIRECTED
   BY ENGINEER AND COMPACTED TO 95%
   RELATIVE COMPACTION.
3) EXPANSION JOINTS TO BE PLACED
   AT 30' INTERVALS AND ONE AT EACH
   END OF PRIVATE DRIVEWAYS AND AT
   ENDS OF CURB RETURNS AND EDGES
   OF HANDICAPPED RAMP.
4) GUTTER WIDTH MAY BE REDUCED
   FROM 24" TO 18" IF FLOW CONDITIONS
   WARRANT AND AS APPROVED BY THE
   ENGINEER

* CURB & GUTTER INSTALLED SEPERATELY
  FROM SIDEWALK IN UNSTABLE SOIL.
  AND ALL COMMERCIAL DRIVEWAYS SHALL
  HAVE #4 STEEL BAR PLACED AS SHOWN.
1. DESIGNED FOR RESIDENTIAL AREAS ONLY.
2. REFER TO DETAIL R-16 FOR OTHER NOTES.
   * FOR UNSTABLE SOILS
SIDEWALK SEPARATED FROM CURB

SIDEWALK ADJACENT TO CURB

1) CONCRETE SHALL BE CLASS "B".
2) 1/4" FELT EXPANSION JOINTS SHALL BE AT 30' INTERVALS AND AT EDGE OF EACH DRIVEWAY.
3) WHERE HANDICAPPED RAMPS ARE NOT IMMEDIATELY REQUIRED, PLACE FELT EXPANSION JOINTS AT STREET CORNERS.
4) WHEN SIDEWALK IS ADJACENT TO CURB, EXPANSION JOINTS SHALL MATCH THOSE IN CURB.
5) SIDEWALK SCORED, 1/4" DEEP AT 5' INTERVALS.
6) SAND TO BE COMPACTED TO 95% RELATIVE COMPACTION.
ADJUST R.O.W. CONFIGURATION TO MAINTAIN 4' MIN. LANDING AREA

GROOVES

12' MIN.

LANDING AREA

4' MIN.

RAMP AT CORNERS (PLAN)

GROOVES IN RAMP AREA ARE TO BE PLACED PARALLEL TO CROSSWALK MARKINGS FOR USE OF THE BLIND.

3/4" DN LANDING
1 1/2" ON RAMP

1/4"

GROOVES (SECTION)

4' MIN.

RAMP AT MIDBLOCK (ISOMETRIC)

6'

(1:12)

6'

1/4"

4' MIN.

4' MIN.

TRVERSE ROUGH BROOM FINISH BOTH SIDES

TRVERSE ROUGH BROOM FINISH
DRIVEWAY SLAB SHALL BE 6" THICK. INSTALL NO EXPANSION JOINTS WITHIN DRIVEWAY.
USE CLASS "A" P.C. CONCRETE.
RESIDENTIAL DRIVE:
PLACE 4" AGG. BASE OR SAND AS DIRECTED BY COUNTY ENGINEER.
*COMMERCIAL DRIVE:
INSTALL 6X6, 10-10 WWF IN ENTIRE SLAB AND SUPPORT AT 3' O.C. WITH 6" AGG. BASE BELOW, PER ENGINEER.

WHERE SIDEWALK IS SEPARATE FROM CURB

TOP OF CURB
ROUGH BROOM FINISH
1" LIP

PLAN

2'- 6' (RES.)
20' MAX. (RES.)
35' MAX. (COM.)
5'- 0' (COM)*
BACK OF SIDEWALK
6' CURB FACE
1" LIP
6' MIN.

SECTION - ONE PIECE GUTTER & DRIVE
AGG. BASE OR SAND

4" RESIDENTIAL
6" COMMERCIAL

SECTION - NEW DRIVEWAY AT EXISTING CURB

1 1/2" MIN. SAWCUT

STANDARD DRIVEWAY SLAB

6' MIN.
6' MIN.
DRIVEWAYS SHALL BE AT RIGHT ANGLE TO THE STREET.

JOINT DRIVEWAY WIDTHS WILL BE CONSIDERED ON A CASE BY CASE BASIS.

NOT MORE THAN 60% OF LOT(S) FRON'TAGE IN ANY ONE DRIVEWAY OR COMBINATION OF DRIVEWAYS.
ALUMINUM PLATES
MIN. THICKNESS 0.08

1/4" BOLT (TYP.)

DRIVE RIVET OR
5/16" BOLT (TYP.)

TELESPAR 2" X 2" OR
APPROVED EQUIVALENT

NOTES:
(1) LETTERING ON ROAD NAME
SIGNS ARE TO BE 5" HIGH;
SUPPLEMENTARY LETTERING TO
INDICATE STREET TYPE 2" HIGH.

(2) STREET NAME SIGNS ARE
TO BE REFLECTORIZED, AND
SHALL HAVE A WHITE MESSAGE
ON A GREEN BACKGROUND.

SIGN HARDWARE

ROAD NAME SIGN

VARIED

5'

1 1/2" R

MAIN ST

SIGN PLACEMENT

ANCHOR DETAIL

2" I.D. PIPE

P.C.C. BASE

2" X 2" X 8" X 1/4"
ANGLE IRON
WELDED TO
THE PIPE

2'- 0"

8'- 0"

6'

8" DIAMETER

* PLACE SIGN IN A VISIBLE LOCATION

SIDEWALK SEPARATED
FROM CURB

SIDEWALK ADJACENT TO CURB

2'/ 0'
ALUMINUM PLATES
MIN. THICKNESS 0.08

1/4" BOLT (TYP.)

DRIVE RIVET OR
3/8" BOLT (TYP.)

TELESPAR 1 3/4" X 1 3/4"

NOTES:
(1) LETTERING ON ROAD NAME
SIGNS ARE TO BE 4" HIGH;
SUPPLEMENTARY LETTERING TO
INDICATE STREET TYPE 2" HIGH.

(2) STREET NAME SIGNS ARE
TO BE REFLECTORIZED, AND
SHALL HAVE A WHITE MESSAGE
ON A GREEN BACKGROUND.

SIGN HARDWARE

ROAD NAME SIGN

VARIED

5'

1 1/2" R

MAIN ST

1 3/4" 14 GA. TELESPAR
OR EQUAL

6'-0"

2'-0" 4

2" 14 GAUGE TELESPAR
MIN 36" LONG

ANCHOR DETAIL

SIGN PLACEMENT

SIDEWALK SEPARATED
FROM CURB

SIDEWALK

CURB

SIDEWALK ADJACENT TO CURB

* PLACE SIGN IN A VISIBLE LOCATION

MARIPOSA COUNTY ENGINEERING DEPARTMENT

STANDARD ROAD SIGN

Drawn BG
Checked
Date 12/19/95
Sheet 1 of 2
Scale = none

Approved By
Engineer

Dwg. No. R-23
ALUMINUM PLATES
MIN. THICKNESS 0.08

1/4" BOLT (TYP.)

DRIVE RIVET OR 5/16" BOLT (TYP.)

STEEL GALVANIZED
PIPE: 2" I.D. 10' - 0"

NOTES:
(1) LETTERING ON ROAD NAME
SIGNS ARE TO BE 4" HIGH;
SUPPLEMENTARY LETTERING TO
INDICATE STREET TYPE 2" HIGH.

(2) STREET NAME SIGNS ARE
TO BE REFLECTORIZED, AND
SHALL HAVE AN IVORY MESSAGE
ON A BROWN BACKGROUND.

(3) ORNAMENTAL TOP FINIAL:
HEAVY DUTY ALUMINUM WITH
THEFT PROOF ALLENHEAD
SET SCREWS.

(4) SEE "STANDARD ROAD SIGN"
FOR ANCHOR DETAIL AND SIGN
PLACEMENT.

(5) WHERE EXISTING BUILDINGS
FRONT DIRECTLY ON THE R.O.W.
LINE – SIGNS MAY BE
SUSPENDED FROM BUILDING –
SUBMIT INSTALLATION PLANS
TO COUNTY ENGINEER FOR
APPROVAL.
## STANDARD STOP SIGN

**DIMENSIONS (INCHES)**

<table>
<thead>
<tr>
<th>SIGN</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>STD.</td>
<td>30</td>
<td>3/4</td>
<td>10</td>
<td>10C</td>
<td>5</td>
<td>12 1/2</td>
</tr>
</tbody>
</table>

**COLORS:**

- LEGEND - WHITE (REFL)
- BACKGROUND - RED (REFL)
THIS ROAD IS NOT COUNTY MAINTAINED

ALL DIMENSIONS ARE IN INCHES

<table>
<thead>
<tr>
<th>SIZE</th>
<th>BORDER</th>
<th>LINE 1</th>
<th>LINE 2</th>
<th>LINE 3</th>
<th>LINE 4</th>
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</thead>
<tbody>
<tr>
<td>24&quot;X24&quot;</td>
<td>1/2&quot;</td>
<td>3 1/2&quot;</td>
<td>3 1/2&quot;</td>
<td>3 1/2&quot;</td>
<td>3 1/2&quot;</td>
</tr>
</tbody>
</table>

BACKGROUND COLOR: YELLOW REFLECTIVE (STD. GRADE)
LETTERING COLOR: BLACK
BORDER COLOR: BLACK

MARFAPOSA COUNTY ENGINEERING DEPARTMENT

Drawn Chas
Checked
Date 10/29/96
Sheet 3 of 4
Scale = none

ROAD SIGN – NOT COUNTY MAINTAINED

Approved By
Engineer _________________
Dwg. No. R-27
PRIVATE ROAD

ALL DIMENSIONS ARE IN INCHES

<table>
<thead>
<tr>
<th>SIZE</th>
<th>BORDER</th>
<th>LINE 1</th>
<th>LINE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>18&quot;X18&quot;</td>
<td>1/2&quot;</td>
<td>4&quot;</td>
<td>4&quot;</td>
</tr>
</tbody>
</table>

BACKGROUND COLOR: YELLOW REFLECTIVE (STD. GRADE)
LETTERING COLOR: BLACK
BORDER COLOR: BLACK
For Roads with Speeds Below 35 m.p.h.
Minimum Length to be 100’
Plus Tapers

For Speeds Above 35 m.p.h.
Recommended Length
200 to 500 ft.
Actual Length to be Determined by County Engineer

Minimum Recommended Sight Distance 250 ft.
Actual Sight Distance to be Determined by County Engineer

MARIPOSA COUNTY ENGINEERING DEPARTMENT

Drawn krp
Checked
Date 9/2/05
Sheet 1 of 1
Scale = none

TURNOUT DIMENSIONS

Approved By
Engineer

Dwg. No. R-29
Provide 8”–12” mound for settlement

Existing ground

Compacted to 12” min. over top of pipe

Bedding 4” min.

Type 1 bedding when required (6” min.)

90% compaction

O.D. + 16” max.

O.D. + 8” min.

Type II bedding & backfill material

80% compaction

Backfill material

90% compaction

MARIPOSA COUNTY ENGINEERING DEPARTMENT

TYPICAL TRENCH SECTION OFF ROAD R/W

Approved By

Dwg. No. S-3

Drawn

Sheet 3 of 3

Scale = none

BG

Date 10/26/93

Checked

Engineer
NOTE: IF SURFACE NOT PAVED, INLET SHOULD BE ABOVE GROUND LEVEL

1'-0"

3'-0" DIA.

2'-0"

2" A.C.

STANDARD RODDING INLET FRAME & COVER

NOT REQUIRED IN PAVED ROADWAY

CLASS "C" CONCRETE

CONC. FULL WIDTH OF TRENCH

VARIABLE

45°

NOTE: EXTRA CARE MUST BE TAKEN FOR PROPER REPLACEMENT & COMPACTION OF ALL DISTURBED OR EXCAVATED EARTH IN THIS AREA

45°

3" MIN.

6"

VERTICAL SECTION of RISER PIPE

MARIPOSA COUNTY ENGINEERING DEPARTMENT

Drawn BG
Checked
Date 10/4/93
Sheet 1 of 2
Scale = none

STANDARD RODDING INLET INSTALLATION 6" OR 8" MAIN

Approved By Engineer

Dwg. No. S-9
SANITARY SEWER

BLIND PICK HOLE

SIDE PRY HOLE

SKID RESISTANT

ALL SURFACES TO BE MACHINED

10 1/2" TAPER

PHOENIX P-1090-R-G OR APPROVED EQUAL
INSTALL CONCRETE COLLAR WHEN REQUIRED

SEAL

2" A.C.

1'-0" MIN.

1'-0"

MIN.

2'-0" MAX ON RISER

3'-0" MAX

5 3/4"

ECCENTRIC CONE

TEE

SEAL

TRACER WIRE (WHEN REQUIRED)

SLOPE

BASE

WALL

SLOPE SHELVES TO DRAIN

NOTE: ALL JOINTS SHALL BE SEALED & FINISHED INSIDE AND OUT AS APPROVED BY THE ENGINEER

STAINLESS STEEL BANDS ANCHORED TO WALL 12" O.C. TWO BANDS MIN.

GROOVED & MORTAR

INSTALL SEAL RING (NEOPRENE OR RUBBER TYP.)

4 1/8"

4 1/8"

4'-0" I.D.

12" MAX

3" MIN.

2"

12" MAX

3" MIN.

ELBOW EMBEDDED IN CONCRETE @ 45° WITH SEWER FLOW

#4 BAR AT 12" O.C. BOTH WAYS

NOTE: PRECAST MAINTENANCE ACCESS VAULT BOTTOMS WILL BE CONSIDERED ON AN INDIVIDUAL BASIS

CAST IN PLACE ON UNDISTURBED SOIL. BASE IS TO BE CONTINUOUS POUR. (NO COLD JOINTS)
* MANHOLES SHALL COME WITH STEPS INSTALLED BY MANUFACTURER

NOTE: ALL JOINTS SHALL BE SEALED & FINISHED INSIDE AND OUT AS APPROVED BY THE ENGINEER

INSTALL CONCRETE COLLAR WHEN REQUIRED

SEAL

2" A.C.

2'–0" MAX ON RISER

1'–0" MIN.

3'–0" MAX

ECCENTRIC CONE

5 3/4"

GROOVED & MORTAR

4 1/8"

4'–0" I.D.

12" MAX

3" MIN.

2"

INSTALL SEAL RING (NEOPRENE OR RUBBER TYP.)

3" MIN.

8" MIN.

#4 BAR AT 12" O.C. BOTH WAYS

NOTE: PRECAST MAINTENANCE ACCESS VAULT BOTTOMS WILL BE CONSIDERED ON AN INDIVIDUAL BASIS

MARIPOSA COUNTY ENGINEERING DEPARTMENT

Drawn BG
Checked
Date 2/10/98
Sheet 1 of 3
Scale = none

STANDARD PRECAST MAINTENANCE ACCESS VAULT INSTALLATION

Approved By
Dwg. No. S–6
Engineer
PLAN

SECTION A-A

NOTE:
THE CAST IRON FRAME & COVER
FOR 6" LINE IS THE SAME
EXCEPT FOR DIMENSIONS.

PHOENIX #P-7104
OR APPROVED EQUAL

MARIPOSA COUNTY ENGINEERING DEPARTMENT

Drawn BG    Sheet 2 of 2
Checked      Scale = none
Date 10/5/93

6" CLEANOUT INLET RISER FRAME & COVER
(RODDING & FLUSHING INLET)

Approved By
Engineer

Dwg. No. S-10
NOTE:

- WATER METERS 11" & OVER SHALL BE COMPOUND
- METER MUST BE LOCATED 8x THE PIPE DIAMETER FROM ANY ELBOWS & VALVES ON DELIVERY SIDE.
- IF METER BOX LOCATED OUTSIDE OF TRAVELED WAY, MAY BE FIBERGLASS CONSTRUCTED METER BOX.
NOTE: GATE VALVES AND LINE TO BE ANCHORED TO WITHSTAND LINE PRESSURE WHEN PRESSURE REDUCING VALVE IS REMOVED FOR SERVICE.

CAST IN PLACE VAULT SHALL BE A MIN. OF SIX INCH REINFORCED CONCRETE (MIN. REINFORCEMENT: #4 BARS • 12" LENGTH & WIDTH)

FLEXIBLE PLANNED COUPLER (FOR QUICK COUPLER REMOVAL)

GATE VALVE

REJECT VALVE & COVERS TO WITHSTAND H-20-44 TRAFFIC LOADS

PLATE CONCRETE

6" MIN. CLEARANCE

TRACER WIRE

VARIEABLE DEPTH

VARIABLE DEPTH

6" MIN. CLEARANCE
BROOKS – NO. 37–T
CONCRETE BOX & CAST
IRON TRAFFIC COVER.
(OR APPROVED EQUAL)

MALE ADAPTER
FOR 1 1/2" NST HOSE

INSULATION REQUIRED
IN BOX IN AREAS
SUBJECT TO FREEZING

2" BRASS GATE VALVE

20" (x 12" WIDTH)

2" GALVANIZED
PIPE

WATER MAIN

THRUCE BLOCK MIN.
OF
3 SQUARE FEET OF
CONCRETE BEARING

FIRM UNDISTURBED
EARTH

90° GALVANIZED
ELBOW

STANDARD TAPPED
END CAP

MARIPOSA COUNTY ENGINEERING DEPARTMENT

Drawn BG
Checked
Date 11/2/93
Scale = none

Sheet 5 of 5

PERMANENT BLOW–OFF INSTALLATION

Approved By
Engineer
Dwg. No. W–5