

COUNTY OF YUBA

DEPARTMENT OF PUBLIC WORKS

IMPROVEMENT STANDARDS

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SECTION 1

PURPOSE AND DEFINITIONS

2.1 PURPOSE:

- 2.2.1 The purpose of these Improvement Standards is to provide minimum standards to be applied to improvements and private works to be offered for dedication to the public which may be accepted by the County for maintenance or operation and for improvements to be installed within existing public or private rights of way and easements.
- 2.2.2 These standards shall apply to, regulate and guide the design, preparation of plans and construction of streets, highways, private roads, driveways, alleys, drainage, street lighting and related public or private improvements.
- 2.2.3 Any items or situations not included in these Improvement Standards shall be designed in accordance with accepted engineering practice, requirements of the Yuba County Ordinance Code, the State of California Standard Plans, Standard Specifications, Highway Design Manual, Traffic Manual and as specified by the Director of Public Works.

2.3 DEFINITIONS:

Wherever the following terms or titles are used in these standards, or in any document or instrument where these standards govern, the intent and meaning shall be as defined below.

- 2.4.1 **Approved Plans** -- Shall mean a complete set of approved improvement plans and specifications for the project to be constructed which have been signed by the Director of Public Works and all other appropriate agencies.
- 2.4.2 **County** -- Shall mean County of Yuba including special districts administered by County Board of Supervisors
- 2.4.3 **Consulting Engineer** -- Shall mean any person or persons, firm, partnerships or corporation legally authorized to practice civil, mechanical or electrical engineering in the State of California who prepares or submits improvement plans and specifications to the Department of Public Works of Yuba County for approval.

- 2.4.4 **Contractor** -- Shall mean any person or persons, firm, partnership, corporation, or combination thereof, licensed to perform the type of work involved, who has entered into a contract with any person, corporation, company, special district, or the County of Yuba a party or parties of the second part, or his or their legal representative, for the construction of any improvement or portions of an improvement within the County of Yuba.
- 2.4.5 **Department of Public Works (Department)** -- Shall mean the Department of Public Works of Yuba County including those persons employed by the Department acting within their authorized capacities.
- 2.4.6 **Developer** -- Shall mean any person or person, firm, partnership, corporation, or combination thereof, financially responsible for the work involved.
- 2.4.7 **Design** -- Shall mean (1) street alignments, grades and widths; (2) drainage and sanitary facilities and utilities, including alignments and grades thereof; (3) location and size of all required easements and rights of way; (4) fire roads and firebreaks; (5) traffic access; (6) grading; (7) other as may be defined by the Director.
- 2.4.8 **Development (Project)** -- Shall mean the act or process of any construction of improvements on single properties as well as subdivisions.
- 2.4.9 **Director** -- Shall mean the Director of the Public Works Department of Yuba County acting either directly or through the Deputy Director, or their authorized representatives.
- 2.4.10 **Inspector** -- Shall mean individual assigned by the Director to oversee and inspect on all aspects of work being performed by the Contractor for a Development.
- 2.4.11 **Laboratory** -- Shall mean any testing agency or testing firm which has been approved by the Department of Public Works.
- 2.4.12 **State Standard Specifications** -- Shall mean the latest edition of the State of California Department of Transportation Standard Specifications.
- 2.4.13 **State Standard Plans** -- Shall mean the latest edition of the State of California, Department of Transportation Standard Plans.
- 2.4.14 **Subdivision Ordinance** -- Shall mean Chapter 11.15 of the Yuba County Ordinance Code.

2.4.15 **Yuba County Standard Plans and Specifications** -- Shall mean the latest approved edition of the County of Yuba Department of Public Works, Standard Plans and Specifications.

SECTION 2

GENERAL REQUIREMENTS

1.1 PLANS BY AN APPROPRIATE ENGINEER

1.2.1 All plans and specifications which are to be approved by the County, for construction of improvements, private or public, including on-site drainage, structural and grading shall be prepared by a Consulting Engineer of the appropriate branch of engineering covering the work submitted.

1.3 APPROVED PLANS TO BE IN POSSESSION OF CONTRACTOR

1.4.1 Contractor shall have a complete set of approved plans and specifications for the improvement project in his possession while on the project site.

1.4.2 The Director may order the Contractor to cease work on any project if a set of approved improvement plans and specifications are not in the possession of the Contractor on the project site.

1.5 WORK IN COUNTY RIGHT-OF-WAYS, EASEMENTS AND DRAINAGE EASEMENTS

1.6.1 The following shall govern work done within public properties, rights-of-way, easements, drainage easements and offers of dedication for such:

1.6.1.1 Except as provided in section 2.3.1.2 below, possession of a complete set of approved improvement plans and specifications and/or a valid County issued encroachment permit shall allow Contractor, to perform work as specified on the plans or encroachment permit.

1.6.1.2 In-lieu of the plans required in section 2.3.1.1 above, minor work projects may be performed with only a valid County issued encroachment permit and plan.

1.6.1.2.1 Minor work generally consists of such items as constructing asphalt concrete driveways; installing driveway culverts; utility related work, including that which requires cutting the road surface; constructing sidewalks adjacent to existing roadside curb and gutter; and constructing driveways in existing curb and gutter; etc.

1.6.1.2.2 Encroachment plans for minor work shall be in accordance with all of the requirements of these standards except that section 2.1 "Plans By An

Appropriate Engineer," will be waived for the preparation of encroachment plans.

- 1.6.1.3 Contractor(s) shall be insured as required by the Yuba County Department of Risk Management for any work performed within any County right of ways, easements or properties. The Director shall be provided an executed copy of the Certificate of Insurance in addition to the requirements of the Department of Risk Management.

1.7 CONFLICTS, ERRORS AND OMISSIONS

- 1.8.1 Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any Federal Law, California State Law, Yuba County Code or Resolution, conditions of approval, generally accepted good engineering practice, or in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the Department of Public Works' review of the plans.

- 1.8.2 Where conflicts may occur between State Standard Plans or Specifications and Yuba County Standards and Specifications, the Yuba County Standards and Specifications shall prevail.

1.9 CHANGE IN CONSULTING ENGINEER

- 1.10.1 If Developer elects to have a registered civil engineer or licensed land surveyor other than the Consulting Engineer, who prepared the plans, provide the construction staking, he shall provide the Director with the name of the individual or firm responsible, in writing, one week prior to the construction staking for the project. The Developer shall then be responsible for approving all construction, the preparation of revised plans for construction changes, and the preparation of "as built" plans upon completion of the construction.

- 1.10.2 In the Developer's notification of a change in the individual or firm providing construction staking, he shall acknowledge that he accepts responsibility for design changes and for providing the required "as built" information.

1.11 EXISTING UTILITIES

- 1.12.1 All existing utilities are to be shown on plans. If overhead utilities are to be relocated outside of a proposed paved or concreted area they shall be relocated prior to any such work.

1.13 OTHER AGENCY NOTIFICATIONS

1.14.1 The Consulting Engineer/Developer is responsible for obtaining the approval and necessary permits from the other governmental agencies involved.

1.15 SPECIAL NOTICES AND PERMITS

1.16.1 The Consulting Engineer shall be responsible for advising the Contractor of the following:

1.16.1.1 Contractor shall be in receipt of official County approved plans prior to construction.

1.16.1.2 Contractor shall notify all utility organizations involved in the development prior to beginning of work.

1.16.1.3 Contractor shall notify "Underground Service Alert" (phone 800-642-2444) two working days in advance of any digging.

1.16.1.4 Contractor shall be responsible for the protection of all survey monuments and shall notify the County Surveyor of any damaged or removed monuments. All damaged or removed monuments shall be replaced or referenced by reference monuments as directed by the County Surveyor.

1.16.1.5 The Contractor shall verify all street names with the Yuba County Address Coordinator in the Department of Public Works before ordering street signs.

1.16.1.6 The Contractor shall be responsible for conducting his operation entirely outside of any floodplain boundaries unless approved by the Director. Floodplain boundaries shall be clearly delineated by the Consulting Engineer in the field prior to construction.

1.16.1.7 Contractor shall be responsible for conducting his operation outside of any 'no grading' area. These areas shall be clearly delineated by the Consulting Engineer in the field prior to construction.

1.16.1.8 Contractor shall be responsible for protecting the project site during inclement weather utilizing proper erosion control devises and measures and by following the approved erosion control plan.

1.16.1.9 Where work is being done in an off-site easement, the Contractor shall notify the property owner 48 hours prior to commencing work.

SECTION 3

IMPROVEMENT PLAN REQUIREMENTS

1.1 IMPROVEMENT PLAN SUBMITTAL

1.2.1 The initial submittal of improvement plans to the Department of Public Works shall consist of the following:

1.2.1.1 Two sets of plans, complete and in accordance with these Improvement Standards, along with any required cross-sections, computations, specifications, test data, and other material requested by the Director.

1.2.1.2 Two copies of a watershed map and drainage calculations.

1.2.1.3 Two copies of a Preliminary Engineer's Estimate for the project costs.

1.2.1.4 Payment of a deposit for the plan check fees based upon the preliminary engineer's estimate. The amount of such fee is determined by Section 13.07.020 of the Yuba County Consolidated Fee Ordinance in effect at the time of submittal.

1.2.1.5 The name, address and telephone number of the developer and the Consulting Engineer.

1.2.1.6 Copies of any permits required by other agencies.

1.3 PARTIAL PLAN SUBMITTAL

1.4.1 Where the improvement plans submitted cover only a portion of the ultimate development, the plans submitted shall be accompanied by a copy of the approved tentative map or if there is no approved tentative map, a site plan drawn at an adequate scale to clearly show topographic features of the ultimate development and the proposed improvements.

1.5 PLAN CHECKING

1.6.1 Improvement plans and supporting material will not be reviewed until the required plan checking fees have been submitted.

1.6.2 Should there be required alterations or revisions to the plans as submitted or resubmitted, the Department of Public Works will return one copy with the corrections marked or indicated thereon.

1.6.3 If the plans submitted or resubmitted are not prepared in accordance with these Improvement Standards and the Standard Specifications or not in keeping with the standards of the profession, the Department of Public Works may return them unmarked and unapproved.

1.6.4 If, at the time of submittal or resubmittal, it is determined by the Public Works Department that it is unable to meet the time limits of Section 66456.2 of the Subdivision Map Act, upon the request of the subdivider for purposes of meeting the specified time limits, the Director will contract or employ a private entity or persons on a temporary basis to perform services necessary to permit the Public Works Department to meet such time limits. The subdivider shall be charged the amount necessary to defray any additional costs directly attributable to employing or contracting with entities or persons performing services pursuant to Section 66456.2.

1.7 IMPROVEMENT PLAN RESUBMITTAL

1.8.1 Plans or other information being resubmitted shall consist of two complete sets. Plans being resubmitted containing revisions or alterations other than those required by the Director, shall show the new revisions or alterations in a manner such that they are brought to the attention of the Department of Public Works.

1.9 FINAL IMPROVEMENT PLAN SUBMITTAL

1.10.1 At such time as the Consulting Engineer preparing the plans has made all necessary revisions, additions or corrections, the engineer shall submit the following items to the Director for approval:

1.10.1.1 The original complete set of the improvement plans, on polyester base film, and specifications signed and sealed by the Consulting Engineer. In the case where the improvement plans are for only onsite improvements in conjunction with a building permit or conditional use permit, the Consulting Engineer may submit the drawings on other material.

1.10.1.2 The plans and specifications shall also include the signature of each agency (other than Pacific Gas and Electric or Pacific Bell) which may govern facilities in conjunction with the project. The agency shall also indicate that the easement widths and locations are acceptable. It is the responsibility of the Consulting Engineer or Developer to negotiate with such agencies and to provide whatever plans and information they may require for their approval.

- 1.10.1.3 A final approved engineer's estimate for the project which has been signed and sealed by the Consulting Engineer.
- 1.10.1.4 Should the approved engineer's estimate vary from the preliminary engineer's estimate by more than 10%, a payment for the difference in the plan checking fees from that paid initially shall be submitted.
- 1.10.1.5 Construction on a project shall not commence or be authorized, nor shall inspections be made by the County, until such time as the improvement plans and specifications have been approved by the Director.

1.11 APPROVAL OF IMPROVEMENT PLANS BY DIRECTOR

- 1.12.1 Upon completion of the plan checking process, payment of all checking fees, and upon compliance with the requirements of the final submittal to the satisfaction of the Director, the Director shall approve the improvement plans with signature and seal.
- 1.12.2 Upon approval of the plans, the Consulting Engineer may use the set of approved improvement plans for reproduction. The original set of plans along with two (2) complete sets of prints of the plans shall be returned to the Department of Public Works for filing.
- 1.12.3 In the case that the improvement plans are for onsite improvements in conjunction with a building permit or conditional use permit, the Consulting Engineer may retain the original set of plans, but shall provide the Department of Public Works with a complete set of improvement plans.

1.13 EXPIRATION OF APPROVED IMPROVEMENT PLANS

- 1.14.1 Approved improvement plans shall expire after a period of twelve (12) months from the date the plans were approved by the Director if work has not commenced on the project. An extension of time may be granted by the Director for good and sufficient cause.
- 1.14.2 Where improvements are required by an approved Tentative Parcel Map, Subdivision Map, Conditional Use Permit, or other such permit, the approved improvement plans shall expire upon the expiration date of such map or permit or any Development or Improvement Agreement for such map or permit.
- 1.14.3 Once the approved improvement plans have expired, the improvement plans shall be resubmitted as a new submittal along with the appropriate plan checking fees.

1.15 IMPROVEMENT PLAN REVISIONS DURING CONSTRUCTION

- 1.16.1 Should changes to the design of the project become necessary during construction, the Consulting Engineer shall first obtain the consent of the Department of Public Works. Should such changes be consented to, the Consulting Engineer shall obtain the original signature sheet and all plan sheets affected from the Department of Public Works. All of the necessary changes shall be clearly shown and dated on the plans.
- 1.16.1.1 The original design shall not be eradicated from the plans, but shall be lined out.
- 1.16.1.2 In the event that eradication of the original design is necessary to maintain clarity of the plans, approval must first be obtained from the Director.
- 1.16.1.3 A revisions block shall be included on each sheet being changed, including the signature sheet. All entities affected by the change(s) shall sign signifying their approval.
- 1.16.1.4 The changes shall be identified by the revision number in a triangle delineated on the plans adjacent to the change and on the revision signature block.
- 1.16.2 Minor changes which do not affect the basic design or contract may be made upon the authorization of the Director, but said changes must be shown on the "as-built" plans when the contract is completed.
- 1.16.3 The Director may order the Consulting Engineer to make changes in the plans in order to complete the necessary facilities. Changes in the plans ordered by the Director shall conform to all of the above.

1.17 AS BUILT PLANS

- 1.18.1 The Consulting Engineer shall keep an accurate record of all approved changes to the plans and shall provide one copy of these records to the Director upon completion of the work before final approval of the completed improvements.

1.19 PLAN SHEET REQUIREMENTS

- 1.20.1 All improvement plans shall be prepared on 22" or 24" x 36" plan and profile sheets or special consulting engineer's sheets which have been accepted by the County.
- 1.20.2 All plans shall be prepared in a clear manner that will produce legible prints, even when photographically reduced. The horizontal and vertical scales shall be such to clearly and adequately depict the design. All line work must be clean, sharp

and heavy. Letters and numerals must be 1/8 inch minimum height, well formed and sharp. Numbers showing profile elevations shall not be bisected by station grid lines.

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page * arabic123.11 PLAN SHEET DETAILS

- 1.22.1 The following details shall be shown on plans submitted for approval. This does not in any way exempt the Consulting Engineer preparing the plans from the responsibility of preparing neat, accurate and comprehensive plans in keeping with the standards of the profession.
- 1.22.2 Title Sheet - For improvement plans exceeding three sheets in the set, a title sheet shall be prepared showing the entire subdivision or project complete with subdivision or assessment district limits, street names, section lines, grant lines and corners, and the location within the County. The title sheet shall also include an index of the sheets; the Consulting Engineer's name, license number and signature; the date and scale of the drawing; north arrow, legend and signature block(s) for the approval of the Director, other officials, or affected utilities. All plans showing piped water systems shall include signature blocks and shall be approved by the responsible water and fire district. A letter from such district indicating their approval may be substituted for the its signature on the improvement plans.
- 1.22.3 Improvement plans consisting of three or less sheets shall not be required to provide a title sheet, but shall include the required signature blocks on the first sheet.
- 1.22.4 Title Blocks - Each sheet, except for the Title Sheet, within the set of drawings shall show the sheet title, number, date, and the Consulting Engineer's name, signature and seal; the name of the improvement or road and the subdivision, developer, project, governmental agency or district.
- 1.22.5 Right of Way - Right of way lines, the boundaries of all adjacent lots, drainage easements, utility easements, landscaping and lighting easements, section lines and corners, land grant lines, and temporary construction easements, both existing and proposed, shall be shown on the plans. All pertinent right of way and easement lines shall be properly dimensioned.
- 1.22.6 Topography - All pertinent topographic features shall be shown such as street lines, curbs, gutter flow lines, sidewalks, shoulders, location and size of storm and sanitary sewer lines, high water and frequent inundation levels, water lines, gas lines, telephone conduits, other underground utilities, existing structures, houses, trees (nine (9) inches and larger), traffic signals, street lights, pull-boxes,

underground electrical conduits, drainage ditches, utility poles, fire hydrant, retaining walls, masonry structures, and all other features of the area which may affect the design requirements for the area.

- 1.22.7 Contours and Elevations - Existing contours and/or supporting spot elevations shall be shown on all plan and profile or special detail sheets. The basis of the vertical datum, and the contour interval shall be shown on each sheet where applicable. A minimum of one benchmark shall be established for each project or one-thousand (1000) feet of improvement length.
- 1.22.8 Profiles - The plans shall show the profile of the existing ground, existing roadway centerlines, the flow lines of gutters, drainage ditches, underground storm and sanitary sewers. All finished grade profiles of proposed improvements shall state centerline elevations at fifty (50) foot intervals and rate of grades, vertical curves and other vertical alignment data. The elevations of any warped surface or vertical curves shall be stated at twenty-five (25) foot intervals. The plans shall also show the existing ground profile for a minimum distance of fifty (50) feet beyond temporary street endings to facilitate setting proper vertical alignment within the proposed improvement limits. The fifty (50) foot minimum shall be increased when requested by the director.
- 1.22.9 Plans shall show the finish grade elevations of the flow line of gutters, of roadside ditches and/or edge of pavement location through return curves at road intersections and cul-de-sacs, and around cul-de-sacs. Spacing of such elevations shall be a maximum of quarter points or 45°.
- 1.22.10 Stationing and Orientation - The stationing on plan and profile shall read from left to right. Plans shall be so arranged that the north arrow points toward the top or upper 180 degrees, insofar as practical.
- 1.22.11 Bench Marks - Bench marks shall be clearly pointed out on the plans both as to location, description and elevations. The datum shall be U.S.G.S. or U.S.C. & G.S., if available. Consulting Engineer shall contact the County Surveyor for the location and elevation of the nearest official bench mark.
- 1.22.12 Street lighting - The improvement plans shall show and identify, as to type and wattage/or lumens, all street lights to be installed and all existing lights in the immediate vicinity of the project. Any new street lights to be installed shall have a minimum wattage of 70 watts. Light poles shall be constructed of galvanized steel or aluminum in accordance to the State Standard Plans and Specifications.

- 1.22.13 The Director may require that the boundary of the proposed development and the location of the improvements be tied into the California Coordinate System if monumented coordinate points are available within a reasonable distance of said improvements as determined by the Director.
- 1.22.14 Typical Sections - A typical section for each type of facility within the improvement, setting out the structural features shall be a part of the plans. Typical sections shall be oriented so view is towards increasing stations.
- 1.22.15 Cross Sections - Cross sections shall be included with the initial submittal of the improvement plans. When, in limited areas, unusual topographic features or special conditions occur that would affect the work, individual cross sections may be required by the Department of Public Works to be shown on the pertinent plan sheet.
- 1.22.16 Details - Details depicting a county or state Standard shall be shown within the plan set rather than referenced by the plans. Other details shall be provided such that all improvements are clearly represented to the satisfaction of the Public Works Department. Plan and profile sheets shall include notes indicating the sheet and location of the detail to be used for a particular improvement.
- 1.22.17 General and Special Notes - General and special notes shall be clearly indicated and conspicuously placed on the improvement plans. General notes shall include statements that all construction work and installation shall conform to the State Standard Plans and Specifications, the Yuba County Subdivision Ordinance, Improvement Standards and Specifications; that all work is subject to the approval of the Director; that the contractor shall verify the existence and location of all utilities; that Consulting Engineer/Developer shall be responsible for obtaining any and all required permits from other agencies when applicable; and that Contractor shall notify "Underground Service Alert" (phone 800-642-2444) two working days in advance of any digging.
- 1.22.18 County Required Notes - A list of notes that may be required by the County are included in the Yuba County Standard Drawings.

SECTION 4

INSPECTIONS

3.1 INSPECTION FEES

3.2.1 Inspection fees based upon the approved engineer's estimate shall be paid in accordance with the adopted Yuba County fee schedule. Work on projects requiring County inspection shall not commence until the required inspection fees have been paid.

3.3 PRECONSTRUCTION MEETING

3.4.1 A preconstruction meeting between the Consulting Engineer, Developer, Contractor, utility companies and Inspector shall be held prior to the commencement of work to discuss the various aspects of the project, such as schedules, responsibilities, construction concerns, etc.

3.5 INSPECTION DURING CONSTRUCTION

3.6.1 Any improvement constructed in accordance with County requirements for which final approval by the County is required or for projects that will be maintained by the County upon acceptance, shall be inspected during construction.

3.6.2 Contractor shall notify Inspector at least one (1) day ahead of the anticipated time of completion of each phase of work ready for inspection.

3.6.3 Each phase of construction shall be inspected and approved prior to proceeding to subsequent phases. All work during construction shall be inspected by the Inspector unless prior arrangements have been made for inspection to be performed by the Consulting Engineer. When inspection is performed by the Consulting Engineer, inspection of each phase of construction shall be certified and copies of the inspection reports shall be provided to the Department of Public Works. Any improvements constructed without inspection as provided above or constructed contrary to the orders or instructions of the Director will be deemed as not complying with County requirements.

3.7 FINAL INSPECTION

3.8.1 Upon completion of any improvements which are constructed under and in conformance with these Improvement Standards and prior to requesting a final inspection, the area shall be thoroughly cleaned of all rubbish, excess material, and all

portions of the work shall be left in a neat and orderly condition satisfactory to the Inspector

- 3.8.2 Within ten (10) days after receiving the request for final inspection, the Inspector will inspect the work. The Contractor, Consulting Engineer, and Developer, will be notified in writing as to any particular defects or deficiencies to be remedied.
- 3.8.3 Contractor shall correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection shall be made by the Inspector to determine if the previously mentioned defects have been repaired, altered, and completed in accordance with these Improvement Standards and Specifications.
- 3.8.4 At such time as the Director approves and accepts the work, for Yuba County, as authorized by the Board of Supervisors, the Contractor, Consulting Engineer and Developer will be notified in writing as to the date of final approval and acceptance by the Director.
- 3.8.5 The date of final approval and acceptance by the Director shall be the date of commencement of the maintenance period as defined by any associated Subdivision, Parcel Map, Site, or Development Agreement which affect the project.

3.9 COUNTY PARTICIPATION

- 3.10.1 On Assesment district or on projects where the County participates in the costs thereof, quantities will be measured in the presence of the Inspector, Consulting Engineer, and Contractor, and witnessed accordingly.

SECTION 5

CONSTRUCTION STAKING

4.1 CONSTRUCTION STAKING

4.2.1 Consulting Engineer will furnish the stakes and reference points for the improvements as defined in section 5.2 and any staking or restaking that may be required by the County. Control and reference stakes for all construction work shall be conspicuously marked or flagged.

4.2.2 Contractor shall be responsible for the preservation and perpetuation of all control and construction points, marks and stakes.

4.3 REQUIRED STAKING FOR COUNTY RIGHT OF WAY IMPROVEMENTS

4.4.1 CLEARING LIMITS -- Clearing limits shall be clearly marked by lath or ribbon approximately at fifty (50) foot intervals or as appropriate.

4.4.2 STREET GRADING -- One set of slope stakes marking the top of cuts and toe of fills will be set at a maximum of fifty foot intervals. Reference stakes shall be set at an appropriate offset from the slope stake. The witness lath for the reference stake shall indicate the offset to the slope stake and indicate the cut or fill from the reference stake to the slope stake. The reference stakes shall also indicate the cuts or fills and distances from the slope stake to the subgrade hinge point and centerline subgrade elevation.

4.4.3 At street intersections, the radius points for pavement rounding shall be staked. Slope stakes and reference stakes shall be placed so as to define the pavement roundings.

4.4.4 BLUE TOPS -- One set of blue tops shall be set on centerline and grade break points and at edge of pavement location for finished subgrade and also at top of base rock finished grade. The Consulting Engineer shall set such blue tops at fifty (50) foot intervals on tangent and twenty-five (25) foot intervals through vertical curves. Blue tops shall also be set at the edge of pavement location along the return curves at street intersections and along cul-de-sacs at a maximum 45° interval.

4.4.5 CURB AND GUTTER -- Offset stakes for curb and gutter shall be set , as agreed between the Contractor and the County, from the proposed work and at intervals appropriate to the construction methods being employed. Subgrade and forms shall be inspected by the County prior to placing curb and gutter.

- 4.4.6 CROSS CULVERTS -- The ends of all cross culverts shall be staked by an offset stake set on the prolongation of the centerline of the culvert. Those offset stakes shall be marked with a cut or fill to the flow line at the ends of the culverts. The invert elevations and final length of cross culverts are to be determined in the field at the time of staking.
- 4.4.7 UNDERGROUND STORM DRAINS -- Underground storm drains shall be staked with reference stakes set at an appropriate offset from drain centerline at fifty (50) foot intervals on tangents and twenty-five (25) foot intervals along horizontal and vertical curves. All manholes and drop inlets shall be staked with reference stakes set at an appropriate offset from the drain centerline and/or top back of curb. The witness lath for the reference stakes shall indicate the offset and the cut or fill to the flow line of the drain pipe and to the top finished grade of the drainage structure.
- 4.4.8 DRAINAGE CHANNELS -- The centerline of drainage channels shall be marked with lath at (fifty) 50 foot intervals for horizontal alignment only. When vertical alignment is noted on the plans or otherwise required, offset grade stakes shall be set a fifty (50) foot intervals. The witness lath to the offset grade stake shall be marked to indicate the horizontal offset and the cut or fill to the centerline flow line. For channels wider than fifty feet across the bottom or for channel depths of more than ten (10) feet the drainage channel shall be slope staked in a manner similar to street grading.
- 4.4.9 ADDITIONAL STAKES -- Any additional stakes required by the County shall be set at the Developer's expense.

4.5 MINIMUM REQUIRED STAKING FOR PRIVATE IMPROVEMENTS

- 4.6.1 CLEARING LIMITS -- Clearing limits shall be clearly marked by lath or ribbon at maximum one-hundred (100) foot intervals or as appropriate.
- 4.6.2 STREET GRADING -- One set of reference stakes marking the top of cuts and toe of fills exceeding a vertical differential of four (4) feet will be set at a maximum of one-hundred (100) foot intervals. A witness lath for the reference stake shall indicate the offset to the slope stake and indicate the cut or fill from the reference stake to the slope stake. The reference stakes shall also indicate the cuts or fills and distances from the reference stake to the subgrade hinge point and centerline subgrade elevation.
- 4.6.3 At street intersections, reference stakes marking the top of cuts and toe of fills shall be provided so as to define the pavement rounding.

- 4.6.4 BLUE TOPS -- Contractor shall be responsible for determining the finish grades.
- 4.6.5 CURB AND GUTTER -- Offset stakes for curb and gutter shall be set according to agreement between contractor and Consulting Engineer depending upon contracting method being employed. Subgrade and forms shall be inspected by the County prior to placing curb and gutter.
- 4.6.6 CROSS CULVERTS -- The invert elevations and final length of cross culverts are to be determined in the field at the time of staking and depicted on the As-Built drawings.
- 4.6.7 UNDERGROUND STORM DRAINS -- Underground storm drains shall be staked with reference stakes set at an appropriate offset from drain centerline at intervals dependent upon construction methods being employed. All manholes and drop inlets shall be staked with reference stakes set at an appropriate offset from the drain centerline and/or top back of curb. The witness lath for the reference stakes shall indicate the offset and the cut or fill to the flow line of the drain pipe and to the top finished grade of the drainage structure.
- 4.6.8 DRAINAGE CHANNELS -- The centerline of drainage channels shall be marked with lath at one-hundred) 100 foot intervals for horizontal alignment only. When vertical alignment is noted on the plans or otherwise required, offset grade stakes shall be set a fifty (50) foot intervals. The witness lath to the offset grade stake shall be marked to indicate the horizontal offset and the cut or fill to the centerline flow line. For channels wider than fifty feet across the bottom or for channel depths of more than ten (10) feet the drainage channel shall be slope staked in a manner similar to street grading.

4.7 CHECKING SERVICE -- Should occasion arise where the validity of a stake is questionable, either as to its horizontal or vertical position relative to the construction line being referenced, the Contractor shall advise the Inspector and notify the Consulting Engineer to check the stake(s) in question. It shall be the Contractor's responsibility to examine the construction staking before commencing operations. Any stakes found to be in error will be reset by the Consulting Engineer. The Contractor shall be responsible for any error in the finished work resulting from any questionable or erroneous stakes not reported to the Consulting Engineer.

SECTION 6

STREET CLASSIFICATIONS

5.1 STREET CLASSIFICATIONS

5.2.1 MAJOR ROAD - As more particularly defined in the County Circulation Plan, major roads are those streets which the estimated future traffic is greater than the capacity of collectors but will not be greater than the design capacity of an undivided urban street having four twelve (12) foot traffic lanes and an eight (8) foot parking lane on each side, according to design capacity standards for urban conditions adopted by the State Division of Highways.

5.2.2 COLLECTOR ROAD - As more particularly defined in the Yuba County Circulation Plan, collectors are those streets on which the estimated future traffic will not exceed the capacity of two twelve (12) foot traffic lanes with an eight (8) foot parking lane on each side, according to the design capacity standards for urban conditions adopted by the State Division of Highways.

5.2.3 MINOR ROAD (Residential Ways) - As more particularly defined in the Yuba County Circulation Plan, a minor streets (residential ways) are those which include cul-de-sacs and streets fronting on less than fifty (50) lots.

5.2.4 DRIVEWAY - A driveway is a vehicular access serving no more than two (2) residential buildings with no more than three (3) dwelling units on a single parcel and any number of accessory buildings.

5.3 URBAN MAJOR ROAD

5.4.1 The Urban Major Road typical section is depicted in the Standard Drawings.

5.4.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic lanes and the requirements for providing a center median strip, parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.

5.4.3 Traffic lanes shall be twelve (12) feet in width.

5.4.4 A minimum fifteen (15) foot wide median strip shall be provided as approved by the Public Works Director.

- 5.4.5 Sidewalk widths shall be in accordance with the requirements of the General Plan, Zoning Ordinance, Specific Plan or the Planning Director.
- 5.4.6 A four (4) lane street section may be required in certain areas as determined by the Public Works Director or the traffic circulation plan.
- 5.4.7 Bike lanes shall be four (4) feet in width and are required only on those streets as specified in the Traffic Circulation Plan.
- 5.4.8 Landscape corridors located between the curb and sidewalk shall be a minimum eight (8) feet in width and be provided when required by the Landscaping Ordinance, Chapter 12.87 of the Yuba County Ordinance Code or by the Planning Director. The slope of the ground shall be graded to drain in the direction of the natural grade or as approved by the Director.
- 5.4.9 Rolled curb and gutter may be substituted where sidewalk is attached or as may be specified in a specific plan area.

5.5 RURAL MAJOR ROAD

- 5.6.1 The Rural Major/Collector Road typical section is depicted in the Standard Drawings.
- 5.6.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic lanes and the requirements for providing a center median strip, parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.
- 5.6.3 Traffic lanes shall be twelve (12) feet in width.
- 5.6.4 Additional traffic lanes may be required in certain locations as directed by the Public Works Director or the Traffic Circulation Plan.
- 5.6.5 Bike lanes shall be four (4) feet in width and are required only on those streets as specified in the Traffic Circulation Plan.
- 5.6.6 Concrete curbs, gutters and sidewalks may be required along some streets where property densities warrant at the discretion of the Public Works Director.
- 5.6.7 Sidewalk widths shall be in accordance with the requirements of the General Plan, Zoning Ordinance, Specific Plan or the Planning Director.

5.6.8 Landscape corridors located between curb and sidewalk shall be a minimum 8 feet in width and be provided when required by the Landscaping Ordinance, Chapter 12.87 of the Yuba County Ordinance Code or by the Planning Director. The slope of the ground shall be graded to drain in the direction of the natural grade or as approved by the Director.

5.7 URBAN COLLECTOR ROAD

5.8.1 The Urban Collector Road typical section is depicted in the Standard Drawings.

5.8.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic lanes and the requirements for providing parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.

5.8.3 Traffic lanes shall be twelve (12) feet in width.

5.8.4 A four (4) lane section may be required in certain areas as determined by the Public Works Director or the Traffic Circulation Plan.

5.8.5 Bike lanes shall be four (4) feet in width and are required only on those streets as specified in the Traffic Circulation Plan.

5.8.6 Landscape corridors located between curb and sidewalk shall be a minimum eight (8) feet in width and be provided when required by the Landscaping Ordinance, Chapter 12.87 of the Yuba County Ordinance Code or by the Planning Director. The slope of the ground shall be graded to drain in the direction of the natural grade or as approved by the Director.

5.8.7 Sidewalk widths shall be in accordance with the requirements of the General Plan, Zoning Ordinance, Specific Plan or the Planning Director.

5.8.8 Rolled curb and gutter may be substituted where sidewalk is attached or as may be specified in a specific plan area.

5.9 RURAL COLLECTOR ROAD

5.10.1 The Rural Major/Collector Road typical section is depicted in the Standard Drawings.

5.10.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic

lanes and the requirements for providing parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.

- 5.10.3 Traffic lanes shall be twelve (12) feet in width.
- 5.10.4 Additional traffic lanes may be required in certain locations as directed by the Public Works Director or the Traffic Circulation Plan.
- 5.10.5 Bike lanes shall be four (4) feet in width and required only on those streets as specified in the Traffic Circulation Plan.
- 5.10.6 Concrete curbs, gutters and sidewalks may be required along some streets where property densities warrant at the discretion of the Public Works Director.

5.11 URBAN RESIDENTIAL (MINOR) ROAD

- 5.12.1 The Urban Residential Road section is depicted in the Standard Drawings.
- 5.12.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic lanes and the requirements for providing parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.
- 5.12.3 Traffic lanes shall be ten (10) feet in width.
- 5.12.4 In urban residential zones as provided in the Zoning Ordinance, section 12.35.050(3)(C) and section 12.40.050(3)(C) of the Yuba County Ordinance Code;
 - A. On cul-de-sac roads serving no more than four (4) parcels the shoulder width may be reduced to two (2) feet, the lane width may be reduced to nine (9) feet and the sidewalk may be omitted.
 - B. On cul-de-sac roads serving no more than either five (5) or six (6) lots, the shoulder and sidewalk may be omitted from one side only.
- 5.12.5 Landscape corridors between curb and sidewalk shall be provided when required by the Landscaping Ordinance, chapter 12.87 of the Yuba County Ordinance Code. The slope of the ground shall be graded to drain in the direction of the natural grade or as approved by the director.
- 5.12.6 Rolled curb and gutter may be substituted where sidewalk is attached or as may be specified in a specific plan area.

5.13 RURAL RESIDENTIAL (MINOR) ROAD

5.14.1 The Rural Residential Road section is depicted in the Standard Drawings.

5.14.2 Road right of way widths shall be determined by the Public Works Director upon consideration of, but not limited to, the ultimate design of the street, the number of traffic lanes and the requirements for providing parking lanes, bike lanes, curbs and gutters, sidewalks (attached or detached), and landscape corridors.

5.14.3 Traffic lanes shall be nine (9) feet in width.

5.14.4 A paved surface is not required when the smallest project parcel size is fifteen (15) acres or larger. Minimum aggregate base thickness is four (4) inches for unpaved roads.

5.14.5 If the project is located within an established County Service Area (CSA) and if approved by the Public Works Director, a double chip seal road surfacing in accordance with these Improvement Standards may be substituted for asphalt concrete when the road will be maintained by the CSA.

5.14.6 Concrete curbs, gutters and sidewalks may be required along some streets where property densities warrant at the discretion of the Public Works Director.

5.15 CUL-DE-SAC ROADS

5.16.1 Cul-de-sac streets shall be terminated with a bulb which shall have right-of-way and back of curb radius dimensions conforming to the Improvement Standard drawings and the Subdivision Ordinance.

5.16.2 Cul-de-sac streets or temporary dead-end streets lengths shall not exceed the following requirements of the Subdivision Ordinance:

800 feet for parcels zoned for less than 1 acre.

1,320 feet for parcels zoned for 1 acre to 4.99 acres.

2,640 feet for parcels zoned for 5 acres to 19.99 acres.

5,280 feet for parcels zoned for 20 acres or larger.

5.16.3 The maximum allowable slope on cul-de-sacs or turn-around shall be 6%. Specific approval may be granted by the Department of Public Works allowing slopes between 6% and 8% in areas of restrictive topography.

5.16.4 The minimum radius of the outside edge of the roadway surface shall be forty (40) feet.

5.16.5 Under certain situations based upon topographic constraints and traffic impacts, alternate turnaround methods may be approved by the Public Works Director.

5.17 DRIVEWAYS

5.18.1 The Driveway section is depicted on Yuba County Standard Drawings.

5.18.2 The maximum driveway slope shall be fifteen (15) percent except in unusual terrain conditions and as specifically approved by the Director.

5.18.3 The minimum traveled way width shall be ten (10) feet.

5.18.4 Concrete driveways will not be permitted within the right-of-ways for streets without concrete curbs, gutters and sidewalks.

5.18.5 For streets with curbs, gutters and sidewalks, the minimum width for a single family residential and duplex driveway shall be sixteen (16) feet. Residential and duplex driveways with plus grades shall have a rise of no more than 8 inches above the back-of-sidewalk grade at a point seven (7) feet from the back of sidewalk. Maximum residential and duplex driveway widths shall be thirty-five (35) feet.

5.18.6 The nearest edge of driveways shall not be closer than fifty (50) feet to the end of existing or future traffic medians. Medians shall be reconstructed and/or lengthened to conform to this section if necessary, as determined by the Department of Public Works.

5.18.7 Visibility requirements for driveways shall be in accordance with the Yuba County Standard Drawings. Increased visibility requirements may be required for driveways on streets that serve a significant amount of truck traffic.

5.18.8 Major commercial driveways which will serve significant traffic volumes, shall be considered as intersecting streets and shall conform to the requirements regarding offsets.

5.18.9 Driveways near major intersections shall be no closer than one-hundred fifty (150) feet from the present or future intersection curb return. Exceptions may be granted by the Department of Public Works.

5.18.10 Driveways and private roads accessing paved public streets with no curbs, gutters or sidewalks shall be paved

with dust free surfacing (either asphalt concrete or double chip seal) from the edge of pavement to the right of way line or property line or twenty (20) feet, whichever is greater. Driveways and private roads accessing public roads with sidewalks and/or curbs and gutters shall be paved with concrete or asphalt concrete from the edge of pavement to the right of way line or property line or twenty (20) feet, whichever is greater.

5.18.11 All new residential driveways shall be constructed with a fifteen (15) foot clearance along its entire length.

5.18.12 Driveways exceeding one-hundred fifty (150) feet in length, but less than 800 feet in length, shall provide a turnout near the midpoint of the driveway.

5.18.13 Where driveway exceeds eight-hundred (800) feet, turnouts shall be provided no more than four-hundred (400) feet apart.

5.18.14 Turnouts shall be constructed to provide an area which is a minimum ten (10) feet in width and thirty (30) feet in length and with a twenty-five (25) foot long tapers at each end.

5.18.15 A turnaround shall be provided at all building sites on driveways over three-hundred (300) feet in length and shall be located within fifty (50) feet of the building.

5.18.16 Turnarounds shall be constructed with a minimum forty (40) foot radius to the outside edge of the road surface. As an alternate a 60 foot long "Hammerhead/T" turnaround area may be constructed which provides a three-point turnaround space for emergency equipment being no narrower than the roadway that serves it.

SECTION 7

STREETS AND ROADS

6.1 RIGHT-OF-WAY WIDTHS

- 6.2.1 Street and road right of way and easement widths shall conform to the requirements of the Subdivision Ordinance and the Yuba County Standard Drawings contained herein.
- 6.2.2 Right-of-way lines shall be widened as necessary through areas of steep slopes where the cut and fill areas extend past the normal right of way width requirements of the Subdivision Ordinance. The right of way line shall be located three (3) feet horizontally out from the top of cut or toe of fill.
- 6.2.3 Except as provided in Section 11.15.650(b) of the Subdivision Ordinance, right of way width may be reduced to the back of curb with the approval of the Public Works Director.

6.3 STREET SECTIONS -- Street and road sections and widths shall conform to these Improvement Standards and the requirements of the Subdivision Ordinance.

6.5 STRUCTURAL STREET SECTION DESIGN

- 6.6.1 The structural street sections shall conform to the requirements shown on the typical road sections within these Improvement Standards and the Subdivision Ordinance. The sections indicated on the standards shall be used as minimum requirements. If special or unusual conditions are determined to exist by the Department of Public Works, the sections indicated may be adjusted to meet the design requirements.
- 6.6.2 All structural street sections shall be designed on the basis of the resistance R-value method in accordance with the State of California Department of Transportation, California Bearing Ratio, unless the Director approves an alternate acceptable method or it is deemed unnecessary.
- 6.6.3 The traffic index to be used will be furnished by the Department of Public Works or by a registered civil engineer.
- 6.6.4 Prime coat required on the aggregate base if road base will be subjected to traffic or inclement weather prior to paving.

6.6.5 Double Chip Seal requirements are as follows:

1. One application of MC-70 or MC-250 penetration treatment
2. Initial application of asphalt emulsion CRS-2.
3. Initial application of screenings 3/8" x No. 6.
4. Final application of asphalt emulsion CRS-2.
5. Final application of screenings 5/16" x No. 8.

Penetration treatment, emulsions and screenings shall be applied in accordance with Chapter 37 of the State Standard Specifications.

6.6.6 Road side ditches shall be lined in compliance with section 8.10.10.

6.6.7 Shoulder width does not include concrete gutter or bicycle lane width. Foreslopes shall be 3:1 or flatter or as determined by the Public Works Director.

6.6.8 In cut or fill areas exceeding four (4) feet difference in vertical elevation, the right of way shall be widened as necessary to a point located three (3) feet out horizontally from the toe of fill slopes or top of cut slopes.

6.6.9 The toe of cuts or top of fills shall be located two (2) feet horizontally from the back of curbs or edge of sidewalks.

6.6.10 Guard rails shall be installed as necessary in accordance with the requirements of Section 7 of the Traffic Manual, State of California Department of Transportation.

6.7

7.4 CLEARING RIGHT OF WAY -- All trees and brush shall be removed from the road right of way to a distance of seven (7) feet from the edge of the paved surface of the roadway, regardless of the width of the paved section and shall be cleared a minimum of three (3) feet outside of any cut or fill slope, whichever of the above is wider. At an intersection, clearing may be required to the property line for a distance of one-hundred (100) feet from the centerline of the intersection should it be found necessary to provide a safe sight distance for approaching traffic.

6.9 DESIGN PROFILE STANDARDS

- 6.10.1 The minimum grade on new streets shall be 0.25 percent except that the minimum curb and gutter grade on intersection corner roundings shall be 0.50 percent. Curb and gutter elevations on crest and sag vertical curves shall be adjusted to meet the 0.25 percent minimum grade.
- 6.10.2 The minimum grade of gutter sections constructed on existing streets shall be 0.25 percent.
- 6.10.3 Standard cross slopes on new streets shall be 2.0 percent.
- 6.10.4 The minimum cross slope on widening shall be 1.5 percent and the maximum cross slope shall be 3.0 percent. The cross slope of the widening shall conform to the cross slope of the existing pavement whenever possible.
- 6.10.5 At new intersections, neither of the new streets shall have a grade greater than 3.0 percent for a minimum distance of forty (40) feet measured from the curb line of the intersecting street, except in unusually rough terrain, as allowed by the Department of Public Works. The centerline of the lesser intersecting street shall meet the crown slope at the projected lip of the gutter. Crown slope may be reduced to 1.0 percent within the intersection, as approved by the Department of Public Works.
- 6.10.6 The minimum vertical curve length allowable at the intersection of two grades shall be forty (40) feet. Vertical curves on residential and collector streets may be omitted where the algebraic difference in grades does not exceed 2.0 percent. The minimum vertical curve data to be computed and shown on the plans shall consist of the point of vertical intersection elevation, the tangent gradients, the length of vertical curve, the elevation of the high or low point on the curve, and the elevations of even fifty (50) foot stations along the curve. Vertical curves along a secondary road shall begin at the edge of pavement or gutter line of the primary road and shall not extend to the street crown crossings.

6.10.7 The design speed and minimum stopping sight distance over any segment of roadway shall be as follows unless a lesser design speed is specifically approved by the Department of Public Works:

STREET TYPE	RECOMMENDED DESIGN SPEED	MINIMUM STOPPING SIGHT DISTANCE
Flag lot access & cul-de-sacs	25 MPH	150 feet
Minor Roads	35 MPH	250 feet
2-Lane Major Roads & Collectors	50 MPH	430 feet
4-Lane Major Roads & Collectors	55 MPH	500 feet

6.10.8 The maximum vertical grade for major and collector roads shall be 8%.

6.10.9 The maximum vertical grade for minor roads shall be 12% for roads constructed below an elevation of two thousand five hundred (2,500) feet and 8% for roads constructed above an elevation of two thousand five hundred (2,500) feet.

6.10.10 The maximum vertical grade for minor roads serving up to 4 parcels shall be 15%.

6.10.11 The vertical grade requirements for major, collector and minor roads serving five (5) parcels or more may be partially waived by the Director of Public Works for good cause, but in no case shall such waivers exceed 3%. In such cases additional road structural requirements may be imposed, such as the use of asphalt concrete instead of gravel or chip seal.

6.11 PARTIAL STREETS

6.11.1 Partial streets may be permitted by the Department of Public Works along the boundary of a subdivision or a property where the full right-of-way cannot be deeded or where a complete street section cannot be constructed, but will ultimately be constructed with an adjacent development.

6.11.2 The minimum right-of-way width shall be thirty (30) feet or one-half of the anticipated future right-of-way width, whichever is greater.

6.11.3 Partial streets shall be constructed to a complete geometric and structural section for a minimum paving width specified by the Public Works Department.

6.11.4 When paving partial construction of an ultimate street development, the edges of the current pavement are to be protected by use of 2" x 6" approved headers, construction grade, or by placing a minimum of one foot additional width of aggregate base material beyond the edge of pavement to the grade and depth of the adjacent structural section.

6.12 OFFSET INTERSECTION

6.13.1 Streets intersecting any residential street from opposite sides shall have their centerlines meet, or street offsets shall be created such that street centerlines are a minimum of one-hundred fifty (150) feet apart.

6.13.2 Streets intersecting any industrial or residential collector street from opposite sides shall have their centerlines meet, or the offset between intersections shall be a minimum of two-hundred (200) feet.

6.13.3 Streets intersecting any major street from opposite sides shall have their centerlines meet, or at a street centerline offset as determined by the Director.

6.14 CENTERLINE RADII

6.15.1 The curve data (delta angle, length, and radius) for all centerline curves shall be computed based upon the appropriate design speed and shown on the plans.

6.15.2 The minimum radius curve for cul-de-sac streets serving up to four (4) parcels or residential driveways shall be fifty (50) feet.

6.15.3 The minimum radius curve for private streets shall be two-hundred (200) feet. A waiver of this requirement may be granted by the Public Works Director due to topographic and other special conditions but in no case may the radius be less than one-hundred (100) feet.

6.15.4 The minimum radius curve for minor streets shall be two-hundred (200) feet and for cul-de-sac streets one-hundred (100) feet. A waiver of this requirement may be granted by the Public Works Director due to topographic and other special conditions but in no case may the radius be less than fifty (50) feet.

6.15.5 The minimum radius curve for collector streets shall be five hundred (500) feet.

6.15.6 The minimum radius curve for major streets shall be one thousand (1,000) feet.

6.15.7 Special consideration will be given to unusually difficult alignment problems. Any exception to the above minimum radius requirements must be approved by the Department of Public Works.

6.15.8 Where a centerline radius on a major street that is less than the above requirements is approved by the Department of Public Works, superelevation may be required.

6.15.9 A minimum tangent length of two-hundred (200) feet is required between reversing curves on collectors and major streets.

6.15.10 An additional minimum street surface width of four (4) feet shall be added to the interior of curves of fifty to one-hundred (50-100) foot radius; two (2) feet to those from one-hundred to two-hundred (100-200) foot radius.

6.16

7.9 SIGHT DISTANCE AT INTERSECTION -- Intersections shall be designed to satisfy the requirements of the visibility details contained herein.

6.18 RIGHT-OF-WAY RADII AT INTERSECTIONS -- Minimum right-of-way radii for intersection corner roundings shall be in accordance with the following:

STREET TYPE	MIN. R/W RADIUS
Private	20 feet
Minor	20 feet
Collector	25 feet
Major	25 feet

6.20

7.11 CORNER ROUNDING RADII -- The minimum edge of pavement and top back of curb radii for intersection corner roundings shall be in accordance with the Standard Drawings and the following:

STREET TYPE	EDGE OF PAVEMENT RADIUS	CURB & GUTTER FACE OF CURB
Private	25 feet	25 feet
Minor*	25 feet	25 feet
Collector**	30 feet	30 feet
Major	30 feet	30 feet
Cul-de-sac entry	25 feet	25 feet
Cul-de-sac bulb	40 feet	40 feet

* The radius for the minor street shall apply when a minor street intersects a collector or major street.

** The radius for a major street shall apply when a collector street intersects a major street.

6.22 PARTIAL PAVEMENT WIDENING

6.23.1 Partial pavement widening shall be terminated with the end of the pavement perpendicular to the street unless otherwise specified below. A 2" x 6" redwood header board shall be required at the pavement ending.

6.23.2 Partial pavement widenings that terminate adjacent to an intersection or driveway shall be rounded as given in table in Section 5.11 where right-of-way is available.

6.23.3 Pavement at the end of a partial pavement widening shall be tapered in the direction of travel according to the following:

DESIGN SPEED	TAPER	LENGTH
25 mph	5 feet	25 feet
35 mph	7 feet	35 feet
45 mph	9 feet	45 feet
55 mph	11 feet	55 feet

6.23.4 Delineators as per the State Standard Specifications and Plans shall be appropriately placed twenty-five (25) feet apart along the taper and designated on the improvement plans or as may be directed by the Director.

6.23.5 The Director may require a different pavement taper for the termination of a partial street widening which may be different than above, depending upon a specific site determination.

6.24

7.13 DEVELOPER'S PAVEMENT, SIGNAL, AND STREET LIGHT RESPONSIBILITY

6.25.1 Where the existing pavement section does not generally meet the current standard and/or the centerline grade and alignment are not satisfactory to the Department of Public Works, the Developer shall be responsible for a half-street section along the frontage of all streets adjacent to the project, and for a full street section for streets within the project. In lieu of the half street section, the Director may in some instances require the improvement of a full street section along the adjacent streets for half of the project length.

6.25.2 The Developer shall overlay any areas beyond the centerline where the design centerline grade deviates from the existing. The Developer shall also be responsible for overlaying any low areas where the new pavement meets the existing pavement to maintain a uniform cross slope.

6.25.3 When making a connection to an existing street end, the Developer shall be responsible for removing and reconstructing up to a maximum of twenty feet of the existing roadway to make a satisfactory connection as required by the Department of Public Works.

6.25.4 The Developer shall be responsible for the installation of new traffic signals and street lights as necessary for new street(s) within a project, and for relocating existing traffic signals, street lights or other existing improvements which may be in conflict with the required project improvements.

6.25.5 Street lighting fixtures shall be provided in accordance with the State Standard Plans and Specifications. The improvement plans shall show and identify, as to type and wattage or lumens, all street lights to be installed, all existing lights in the immediate vicinity of the project. Street lights shall have a minimum wattage of seventy (70) watts. Light poles shall be constructed of galvanized steel or aluminum in accordance to the State Standard Plans and Specifications.

6.25.6 The Developer shall be responsible for all on-site modifications to existing improvements to allow for access for the disabled, including but not limited to, guidestrips, sidewalks ramps, etc.

6.26 TRENCHING IN EXISTING PAVED ROADWAYS -- After trenching activities have been completed within a street section, the roadway shall be reconstructed in accordance with the Utility Installation Detail given in the Standard Drawings. The Developer may be required to coordinate trenching work schedules to avoid cutting new pavement in instances where repaving is planned by the County. No trenching will be permitted on any street that has been recently constructed or has been overlaid within the last three years.

6.28 TESTING OF MATERIAL

6.29.1 Testing of materials to be utilized in work performed under the Standard Specifications shall be performed in accordance with the methods of the Laboratory of the State of California, Department of Transportation. Signed copies of the test results, as required, shall be submitted to the Department of Public Works. Test results shall show clearly the name of the individual and firm performing the tests, as well as the name of the project, the date of sampling, and the date of testing. Materials testing or compaction testing performed by the County Materials Laboratory will be charged at the rate specified in Yuba County Fee Ordinance unless the cost is included in the project inspection fees.

6.29.2 The tests indicated in the Standard Construction Specifications will be the minimum required. In large developments or those developments presenting special problems, a more comprehensive and extensive testing program may be required. Such conditions will be evaluated and an appropriate testing program prescribed on an individual basis.

6.30 STREET NAMES

6.31.1 All roads and streets within a new development shall be named by the Developer subject to the approval of the Address Coordinator in the Department of Public Works in compliance with Chapter 9.70 of the Yuba County Ordinance Code. Duplication of names already in use, previously proposed names, sound-alike names or names with more than 13 spaces are not acceptable.

6.31.2 Street name signs which conform to the requirements of the Standard Construction Specifications and these Improvement Standards shall be furnished and erected by the Developer.

- 6.31.3 Street name signs shall be maintained by the Developer through the one-year maintenance period of the project.
- 6.31.4 Street names and street sign locations shall be shown on plans submitted for approval. Sign details shall be as shown in the Standard Drawings.
- 6.31.5 Developer shall provide and install street signs complying with the requirements of the Standard Drawings for non-county roads as directed by the Director.

6.32 STREET SIGN LOCATIONS

- 6.33.1 Street sign placement and installation shall conform to the specifications and as shown in the Standard Drawings.

6.34 TRAFFIC SIGNS

- 6.35.1 All cul-de-sac and dead-end (stub) streets greater than three-hundred (300) feet in length and all cul-de-sac and dead-end (stub) streets less than three -hundred (300) feet in length where the end of the street is not visible from the standard driver's eye position at the entering intersection shall be posted with a standard 24" x 24" code W53 (Not A Through Street) sign. The location and installation of such sign shall conform to the specifications as shown in the Standard Drawings.
- 6.35.2 Stop signs and other regulatory signs shall be placed in accordance with the Traffic Manual and the requirements of the Public Works Department. The location and installation of such signs shall conform to the specifications as shown in the Standard Drawings.

6.36 STRIPING AND PAVEMENT MARKINGS

- 6.36.1 Painted centerline and fog line striping (where no curb and gutter) are required with the construction or resurfacing of all major and collector roads.
- 6.36.2 Thermoplastic legends are required in urban areas on major and collector roads and at all intersections with major or collector roads.

6.37 TEMPORARY LANE CLOSURES - Temporary lane closures are allowed as approved by the Department of Public Works. Lane closures on two lane roads shall conform to the details contained herein. Closures on multi-lane roads shall conform to the requirements and details contained in the State of California, Department of Transportation, HIGHWAY DESIGN MANUAL.

6.39 PERMANENT BARRICADES

- 6.40.1 Where improvements are temporarily terminated on a street proposed to be extended in the future, the improvements shall include a permanent type barricade at the end of the street extending completely across the right-of-way to prohibit access and to serve as a warning to the public. The barricade shall be constructed, erected, painted, and signed in accordance with the Standard Drawing. When necessary, barricades may be lengthened by making the 2" x 12" plank continuous with splicing at the posts.
- 6.40.2 A gate may be required where a street stubs into a public park or like area.
- 6.40.3 Sidewalk barricades shall be constructed at the end of sidewalks where pedestrians cannot safely continue beyond the end of the sidewalk. Sidewalk barricades shall conform to the Standard Plans contained herein.

6.41 STREET TREES

- 6.42.1 An encroachment permit is required from the Public Works Department in advance of the removal of any tree located within County right-of-ways or easements.
- 6.42.2 All trees removed from within the ultimate right-of-way shall be replaced with approved trees as required by the Public Works Department.
- 6.42.3 Trees shall not be planted any closer than five feet from the back of sidewalks when sidewalks are adjacent to street curb and gutter.
- 6.42.4 Street trees shall be planted in the locations shown on the approved landscape plan and in accordance with the requirements of the Landscape Ordinance, Chapter 12.87 of the Yuba County Ordinance Code.
- 6.42.5 When street trees are required in landscape strips between the curb and sidewalk, trees shall be centered and planted in a deep root tree box per the Yuba Standard Drawing, or equivalent, shall be installed.
- 6.42.6 When the area between the curb and sidewalk is filled with concrete or other hard surface, an opening 40-inches square shall be maintained as a minimum in addition to a deep root tree box.
- 6.42.7 Street trees to be planted shall be of a size not less than eight (8) feet in height nor less than one (1) inch in diameter. A tree may be rejected if it is not of a shape or condition acceptable to the County.

6.42.8 Planted street trees shall be watered between 2 - 3 times weekly up to 4 - 5 times weekly during extremely warm weather.

6.43 HANDICAP RAMPS -- Sidewalk ramps for handicapped pedestrians shall be constructed at all street intersections and at other locations where required by the Department of Public Works, in accordance with the Yuba County Standard Plans and current federal requirements.

6.45 CURB AND GUTTER -- Curb and gutter shall be installed in accordance with the Standard Drawings and the following:

6.46.1 Rolled Curb and Gutter: All developments and all locations not included in section 6.25.2 through 6.25.4 below, or as required by the Department of Public Works.

6.46.2 Barrier Curb and Gutter: Frontage roads; parks; unfenced schools; open space areas; public facilities; commercial and multi-family (not duplex) developments.

6.46.3 Barrier Curb and Gutter: Within the curb return areas of all intersections and at drop inlet locations.

6.46.4 Barrier Curb and Gutter: On all collector and major streets and locations where the proposed sidewalk will not be immediately adjacent to the curb.

6.46.5 Any development areas exempted from curb, gutter and sidewalk requirements as specified in the Yuba County Ordinance Code.

6.46.6 Any of the above may be modified due to special circumstances by the Department of Public Works.

6.47 VALLEY GUTTERS -- Valley gutters will be allowed only with the specific approval of the Department of Public Works when the intersection cannot be drained to an underground system.

6.49 SIDEWALKS

6.50.1 Sidewalk widths shall be in accordance with these standards, the General Plan, Zoning Ordinance, Specific Plan or the Planning Director and the Yuba County Standard Drawings.

6.50.2 The minimum standard width for all sidewalks shall be four (4) feet except as specified below.

6.50.3 All school developments shall have a minimum of eight (8) foot sidewalks along all frontages except that six (6) foot sidewalks may be used along fenced play areas where no

access is to be provided, as determined by the Department of Public Works.

6.50.4 All sidewalks adjacent to business or commercial developments shall be a minimum of six (6) feet wide.

6.50.5 Where utility poles and other obstructions are situated within street-side sidewalks, a minimum of four (4) feet of clear uninterrupted sidewalk area shall be provided. Where it is necessary to widen the sidewalk beyond its standard width to attain the four (4) foot clearance, the widened areas shall extend a minimum of five (5) feet beyond each side of the obstruction and a ten (10) foot taper on each side of the widening is required.

6.50.6 Where sidewalks are separated from the curb by a landscape easement for lawn or other approved landscaping, the distance between the back of the curb and the edge of the sidewalk may vary (meandering sidewalk), but shall not be less than eight (8) feet nor more than twenty-five (25) feet, except at transitions.

6.50.7 Where sidewalks end in fill areas, the fill shall be extended beyond the end of the sidewalk for a minimum distance of six (6) feet and then terminating with a fill slope ration of 2:1 or flatter. As an alternate, a cut-off wall may be constructed at the end of the sidewalk as approved by the Director.

6.50.8 Sidewalk barricades as defined in section 5.19.4 shall be required in accordance with the Yuba Standard Drawings where satisfactory provision cannot be made for pedestrians to safely continue beyond the terminus of the sidewalk.

6.51 FENCES

6.52.1 The location for fences or walls along public streets shall conform to the requirements of the County Zoning Code. Fences or walls shall not impair vehicular visibility. All fences and walls are subject to the visibility requirements of these Improvement Standards.

6.52.2 Fences and walls may require modification to accommodate street light poles and/or foundations.

6.53 PRIVATELY OWNED BRIDGES

6.54.1 Privately owned bridges on private roads or driveways shall be designed to withstand an H-20 load, unless specifically approved by the Director for a lesser loading. Other design features of the bridge, including but not limited to widths, railings, clearances and materials shall be in conformance with State Standards.

6.54.2 Plans prepared by a consulting engineer are required in accordance with Section 2.1.1.

SECTION 8

STORM DRAINAGE DESIGN

7.1 DRAINAGE POLICY -- It is the policy of Yuba County that all new habitable structures be protected from the 100-year (1%) flood event and that all public roads be protected from the 10-year (10%) flood event.

7.3 PERMITS FROM OTHER PUBLIC AGENCIES -- Where other public agencies assert jurisdiction over aspects of drainage improvements required by Yuba County, the approval of said agencies or entities shall be secured before the county will issue permits. Examples of such agencies are the State of California Department of Fish and Game, the State Reclamation Board, and the U.S. Army Corps of Engineers, City of Marysville, Reclamation District 784, City of Wheatland.

7.5 FEDERAL FLOOD PROGRAM -- Yuba County is a participant in the National Flood Insurance Program and all development in the County shall comply with the regulations of the Federal Emergency Management Agency (F.E.M.A.).

7.7 TRENCHING OPERATIONS

7.8.1 Legal requirements -- Prior to commencement of trenching or excavating operations, the Contractor shall have complied with all applicable provisions of Title 8 of the California Administrative Code and all applicable requirements of the Labor Code of the State of California, including:

7.8.1.1 Section 6705 of the Labor Code which requires that the Contractor submit plans of trench shoring or protection he proposes to use in performing the trenching and pipe installations in this contract; and

7.8.1.2 Section 6500 of the Labor Code which requires that the Contractor obtain a permit for trenching operations from the State Division of Occupational Safety and Health prior to any trench work in trenches or excavations over five (5) feet deep.

This section shall also apply to any person doing work in accordance with any permit issued by the County.

7.8.2 Bracing and Shoring -- To insure the safety of workers and to protect and facilitate the work, sufficient bracing and shoring shall be installed in all excavations. The bracing and shoring shall comply with rules, orders, and regulations of the California Division of Industrial Safety. Failure to comply with any of the above mentioned rules,

orders, and regulations shall be sufficient cause for, but shall not place any responsibility upon, the Engineer to immediately suspend the work. The Contractor shall be responsible for the adequacy of all shoring and bracing and compliance with law, and failure of the engineer to suspend the work or notify the Contractor of the inadequacy of the shoring or bracing or non-compliance with law shall not relieve the Contractor of this responsibility.

Insofar as possible, sheeting shall not extend below the top of the pipe barrel. All sheeting, timbering, lagging and bracing shall, unless otherwise required by the Engineer, be removed during backfilling, and in such a manner as to prevent any movement of the ground or damage to the piping or to the other structures. When the Engineer requires that sheet piling, lagging and bracing be left in place, such materials, shall be cut off where designated and the upper part withdrawn. If steel sheet piling is utilized, it may be withdrawn, with compacting of backfill to proceed as piling is removed.

7.8.3 Maximum Length of Open Trench -- At the end of each working day, there shall be no more than three-hundred (300) feet of open trench in unimproved areas or (50) feet in paved areas open to traffic when trench plating sufficient to support traffic loads is provided.

7.9 DRAINAGE CAPACITY DESIGN -- All drainage systems shall be designed to accommodate the anticipated future development of the entire upstream watershed.

7.11 SURFACE DRAINAGE AND GRADING DESIGN -- The consulting engineer shall be responsible for designing a grading plan which insures that storm waters flow through a development in a manner that will not flood structures in the event of malfunction or overloading of the drainage system. The design shall also include measures to minimize erosion.

7.13 DRAINAGE DIVERSIONS

7.14.1 The diversion of natural drainage will be allowed only within the limits of the proposed improvement. All natural drainage must enter and leave the improved area at its original horizontal and vertical alignment unless an agreement, approved by the Department of Public Works, has been executed with the adjoining property owners.

7.14.2 Temporary drainage diversions during construction shall be approved by the Department of Public Works and shall be located and constructed in such a fashion as to permit their removal when necessary for the prevention of damage to adjoining property.

7.15 DRAINAGE EASEMENTS

- 7.16.1 All drainage facilities other than on-site systems shall be located in one of the following:
- 7.16.1.1 Public street or alley.
 - 7.16.1.2 Public utility easement, specifically dedicated to include drainage facilities.
 - 7.16.1.3 Dedicated drainage easement. On-site drainage easements will be required in subdivisions whenever drainage is collected from one or more lots and conveyed through other lots.
- 7.16.2 Offsite drainage easements will be required whenever there is a concentrated discharge of drainage water onto offsite private property where that discharge is not made into a continuous pipeline or natural defined watercourse.
- 7.16.3 In the event that offsite easements cannot be obtained through negotiation, the County, at it's option, may condemn necessary right-of-ways providing that the person, firm or corporation requesting such condemnation shall enter into a written agreement to pay all costs and expenses of the condemnation.
- 7.16.4 The agreement shall require a cash deposit of not less than 150% of estimated costs and shall require payment of all costs and expenses in excess of the deposit as specified by the County. Any unspent funds will be returned.
- 7.16.5 Dedication of easements shall be completed and submitted to the Director with copies of deeds or title reports for the affected properties before improvement plans will be approved.
- 7.16.6 Closed Conduits-- Easements for closed conduits shall meet the following requirements:
- 7.16.6.1 Minimum width of fifteen (15) feet with the centerline of the pipe at the one-third point; pipe may reverse sides at angle points.
 - 7.16.6.2 For pipes exceeding twenty-four (24) inches in diameter or trenches exceeding five (5) feet in depth, the easement width shall be based on the following formula unless otherwise approved by the Director:

$$\text{WIDTH} = \text{Trench depth} + \text{pipe diameter} + \text{two feet or 15 feet, whichever is greater}$$

7.16.6.3 Minimum width of fifteen (15) feet for side and backlot drains in a subdivision.

7.16.7 Open Channels -- Easements for open channels shall have sufficient width to contain the open channel and side slopes, fencing and a fifteen (15) foot service road and a four (4) foot strip on the opposite side. Suitable ramps shall be provided for access to the bottom of the channel where required.

7.17 DRAINAGE DESIGN PROCEDURE

7.18.1 In order to simplify the County review process the County has prepared a "Drainage Design Procedure" which is made a part of these standards and is inserted as Appendix "A".

7.18.2 The guidelines established within the "Drainage Design Procedure" are to be used as a guide in making computations and are not intended as a single method of acceptable design procedure.

7.19 HYDRAULIC DESIGN CRITERIA -- In order to provide a uniform drainage system in the County of Yuba, the following criteria shall be followed in all hydraulic computations unless otherwise authorized by the Department of Public Works.

7.20.1 Flow Computations -- All hydraulic computations shall be in accordance with the following:

7.20.1.1 Urban Storm Drain Systems -- Manning's Formula shall be used to design storm drain pipes based on the 10 year storm. The Bernoulli equation shall be used to analyze the hydraulic grade line for storm drain systems based on the 25 year storm.

7.20.1.2 Rural Area Culverts -- Manning's formula shall be used to design cross culverts based on the 10 year storm. The Bernoulli equation shall be used to analyze the water levels for the 25 year and 100 year storms.

Specific requirements regarding water levels for the 25 year and 100 year storms are given in table 1 of Appendix A.

7.20.1.3 The minimum "n" values to be used in Manning's formula shall conform to table 4 in Appendix A.

7.20.2 Pipe Criteria -- Pipe criteria shall be as follows:

7.20.2.1 Minimum pipe diameter allowable on any closed conduit shall be twelve (12) inches.

7.20.2.2 Minimum velocity in closed conduits shall be sufficient enough to provide for self cleaning.

7.20.3 Driveway Culverts -- Driveway culvert criteria shall be as follows:

7.20.3.1 Driveway culverts shall be approved by the County for size, grade, alignment, and type. Contractor shall contact the County for an encroachment permit.

7.20.3.2 The minimum allowable pipe diameter for driveway culverts shall be twelve (12) inches.

7.20.4 Cross Culvert Criteria -- The design of cross culverts shall be as follows:

7.20.4.1 Cross culverts shall be designed in accordance with the procedures outlined in the State of California, Department of Transportation, HIGHWAY DESIGN MANUAL or Appendix A contained herein.

7.20.4.2 Cross culvert size shall be determined on the basis of runoff as specified in these standards.

7.20.4.3 Cross culverts shall be checked against Q_{100} to assure that no habitable structures are affected due to the higher design event.

7.20.4.4 Cross culvert profile will be determined by an examination of the overall profile of the channel for a minimum distance of two hundred (200) feet on each side of the installation.

7.20.4.5 Cross culverts shall be provided at a maximum spacing of 500' along long sustained grades unless approved otherwise by the Director of Public Works.

7.20.4.6 Erosion protection at inlets and outlets in the form of rock rip rap or other channel lining material shall be provided on all cross culverts.

7.20.5 Open Channels - Open channels shall consist of concrete lined channels, lined bottom channels or natural earth channels. Criteria for permanent open channels shall be as follows:

7.20.5.1 Open channels shall be designed for the 100-year flood event. Freeboard requirements will be as specified by the Department of Public Works.

7.20.5.2 Minimum velocity: 2 feet per second (f.p.s.) shall be achieved where practical.

7.20.5.3 Maximum velocity: Earth channels, 4 f.p.s.; lined channels, 10 f.p.s.

7.20.5.4 The centerline curve radius of an open channel shall be equal to or greater than twice the bottom width (35 foot minimum).

7.20.6 Design Computation -- The design computation for drainage shall include the following information:

7.20.6.1 Watershed map consisting of a USGS topographic map for offsite watersheds and a separate topographic map for on-site watersheds.

7.20.6.2 Drainage area in acres.

7.20.6.3 Flow rate in each pipe or channel reach.

7.20.6.4 Invert elevations for each pipe end or channel reach.

7.20.6.5 Top of structure elevation or top of channel lining elevation.

7.20.6.6 Hydraulic grade line elevations at structures. (Not required when 25 year storm flows are contained within the conduit).

7.20.6.7 Hydraulic gradient.

7.20.6.8 Pipe size, type, class length and gradient.

7.20.6.9 Channel dimensions and water surface profile computations.

7.20.7 Hydraulic Grade Lines (H.G.L.)

7.20.7.1 For closed conduits the hydraulic grade line shall be a minimum 0.50 feet below the elevation of inlet grates and manhole covers.

7.20.7.2 For open channel systems the H.G.L. shall be shown for the 10-year and 100-year flood events.

7.20.8 Drainage Profiles -- A plan and profile shall be shown for all drainage systems.

7.20.9 The criteria for design of roadside ditches are as follows:

7.20.9.1 Roadside ditches will not be allowed within the road right-of-way when the drainage exceeds the capacity of an eighteen (18) inch pipe at the roadway grade unless approved by the Director. Consulting Engineer shall submit ditch hydraulic grade line profiles for approval under these circumstances.

7.20.9.2 Side slopes of roadside ditches shall be per the standard drawings of these Improvement Standards and not steeper than 1-1/2:1.

7.20.9.3 25 year storm hydraulic gradients for roadside ditches shall be below the bottom of the structural section of the roadway and shall be shown on the plans when required by the Director.

7.20.9.4 Whenever ditch grades exceed 6 percent ditches shall be lined. Lining shall extend downstream to the nearest cross culvert or drainage swale. Ditch lining shall begin within three-hundred (300) feet downstream of any ditch high points. Proposals varying from this requirement shall be submitted with hydraulic calculations showing conformance with the requirements of table 862.2 of the State of California Highway Design Manual.

7.21

date \@ "MMMM d, yyyy"August 16, 20058.11 DRAINAGE STRUCTURES

7.22.1 Pipe Requirements -- The requirements are as follows:

7.22.1.1 Storm drain conduits shall be either cast-in-place concrete pipe, precast reinforced concrete pipe, or non-reinforced concrete pipe. Exceptions may be approved by the Department of Public Works. All pipe shall conform to the State Standard Specifications, Sections 63-66.

7.22.1.2 Metal pipe to be constructed within a public easement or right-of-way shall be designed for a service life of fifty (50) years in accordance with the methods specified in Topic 852 of the California Department of Transportation Highway Design Manual. Metal pipe may only be used for culvert applications associated with development in the foothills.

7.22.1.3 The specific type of pipe or alternate pipes to be used in the development shall be shown on the plans. If the developer proposes to use any type of pipe not shown on the approved plans, the plans shall be revised and resubmitted for approval prior to pipe placement.

- 7.22.1.4 All pipes shall be constructed with a minimum cover of two (2) feet unless other utilities or grade conditions prohibit. These minimum cover requirements may be reduced where pipe manufacturers specifications state that less cover is acceptable.
- 7.22.1.5 At locations where the minimum cover requirements cannot feasibly be obtained, the pipe shall be either encased in concrete or provided with a concrete cover or other method of pipe protection as approved by the Department of Public Works.
- 7.22.2 Storm Drain Pipe Alignment Requirements
 - 7.22.2.1 Storm drain pipes shall be located in the street.
 - 7.22.2.2 All new storm drains shall be placed a minimum of one hundred (100) feet from existing and proposed water wells.
 - 7.22.3 Radius Criteria -- All pipe placed on curves shall meet manufacturer's recommendations for curved alignment. No radius less than 200 feet will be allowed. Reverse curves will not be allowed without a manhole at the point of reverse curvature.
 - 7.22.4 Manholes -- Requirements for manholes are as follows:
 - 7.22.4.1 Standard precast concrete or saddle type manholes shall be used where required. Where special manholes or junction boxes are required, the design must be approved by the Department of Public Works. In no case will junction boxes or manholes be allowed which are smaller than twenty-four (24) inches in inside dimension.
 - 7.22.4.2 Manholes shall be located at junction points, angle points, grade breaks, and changes in conduit size. On curved pipes with radii of two-hundred (200) feet to four-hundred (400) feet, manholes shall be placed at the B.C. and E.C. and on three-hundred (300) foot maximum intervals along the curve. On curves with radii exceeding four-hundred (400) feet, manholes shall be placed at the B.C. and E.C. and on four-hundred (400) foot maximum intervals along the curve. Manhole spacing requirements on curves with radii less than two-hundred (200) feet will be determined on an individual basis.
 - 7.22.4.3 Spacing of manholes, junction boxes or inlets of such size as to be accessible for maintenance shall not exceed four-hundred (400) feet.

- 7.22.4.4 All manholes and junction boxes other than inlets shall have standard manhole covers as shown in the standard drawings. Manholes will not be allowed in the gutter flow line.
- 7.22.4.5 Improvement plans shall include a special detail for all manholes at junction points where there is a change in pipe direction and pipe diameter exceeds forty-eight (48) inches.
- 7.22.5 Inlets - Requirements for inlets are as follows.
- 7.22.5.1 Inlets shall be placed so that the length of flow in the gutter does not exceed five-hundred (500) feet in either direction. The maximum allowable area draining to one on-site inlet shall be two (2) acres.
- 7.22.5.2 The connector pipe from the inlet shall be sized to accommodate the design runoff taking into consideration pass through flow from upstream inlets.
- 7.22.5.3 Drop inlets in streets shall be placed at lot lines in residential subdivisions, except at intersections where they shall be placed at the curb returns.
- 7.22.5.4 Non-standard drop inlets for off street drainage shall conform to the following:
- The area of the opening "G" in square inches shall not be smaller than $G=30A$ where "A" is the area in acres of the contributing watershed.
- 7.22.5.5 All inlets for on-site use shall be clearly dimensioned on the plans. All grates shall be designed to provide adequate safety for automobile traffic, bicycles and pedestrians.
- 7.22.5.6 Inlets may be used as junction boxes. When used as junction boxes where pipe is changing directions, the inside dimension requirements for junction boxes shall be met.
- 7.22.6 Junction Boxes -- The requirements for junction boxes are as follows:
- 7.22.6.1 Junction boxes shall be constructed of reinforced concrete or fabricated from a reinforced concrete pipe section where size limitations permit.
- 7.22.6.2 Minimum wall thickness for cast in place reinforced concrete junction boxes shall be six (6) inches unless sidewall reinforcement is provided.

- 7.22.6.3 The inside dimension of junction boxes shall be such as to provide a minimum of three (3) inches clearance on the outside diameter of the largest pipe in each face.
- 7.22.6.4 Junction boxes deeper than four (4) feet shall have a minimum dimension of forty-eight (48) inches.
- 7.22.7 Pipe Stubs -- Pipe stubs may be used at temporary work limits to collect drainage from adjacent non developed areas. The following criteria shall be followed:
- 7.22.7.1 A headwall and/or trash rack shall be required where the upstream pipe ends at a park or permanent (more than two years in the future) open field.
- 7.22.7.2 Whenever a pipe stub is required, all ditches and swales shall be directed toward the stub.
- 7.22.8 Headwalls, Wingwalls, Endwalls, Trash Racks, Access Control Racks, and Railings -- The requirements for these facilities are as follows:
- 7.22.8.1 All headwalls, wingwalls, and endwalls shall be considered individually and in general shall be designed in accordance with the State Standard Specifications and Plans.
- 7.22.8.2 Trash racks shall be provided where they are necessary to prevent clogging of culverts and storm drains and to eliminate hazards. Temporary trash racks will be required when it is anticipated that the pipe will not be extended in the prior to the next rainy season.
- 7.22.8.3 Access control racks may be required on pipes twenty-four (24) inches or larger by the Department of Public Works. If required, plans for construction shall be submitted by the Consulting Engineer for approval by the Department of Public Works.
- 7.22.8.4 A metal beam guard rail or chain link fencing may be required by the Department of Public Works at culverts, headwalls, box culverts, and on steep side slopes. When so required, the railing shall be installed in accordance with the Standards and Specifications of the California Department of Transportation.
- 7.22.9 Drainage pumps -- Drainage pumping plants shall be designed in accordance with good engineering practice. Pumping plants shall be reviewed and approved by the Department of Public Works prior to installation.
- 7.22.10 Detention Systems -- The criteria for detention systems shall be as follows:

7.22.10.1 The design of any detention system shall be approved by the Department of Public Works.

7.23

8.12 CHANNELS AND OUTFALL DESIGN -- The design of channels and outfalls shall be as follows:

7.24.1 Open Channels -- Requirements for open channels are as follows:

7.24.1.1 Drainage may be conducted through an open channel if the following conditions exist and it is approved by the Department of Public Works:

7.24.1.1.1 The flow rate exceeds the capacity of a seventy-two (72) inch pipe.

7.24.1.1.2 The outfall is at an elevation such that minimum cover cannot be obtained over the pipe.

7.24.1.1.3 County policy requires the channel to remain natural.

7.24.1.2 Channels shall be constructed to a typical cross section. Fully lined channels shall be designed with maximum side slopes of one (1) foot horizontal to one (1) foot vertical; channels with unlined sides shall be designed with side slopes of two (2) horizontal to one (1) vertical. Exceptions require approval by the Department of Public Works.

7.24.1.3 Lined channels shall have a minimum bottom width of six (6) feet and shall have an access ramp for maintenance equipment.

7.24.1.4 For all channels, either improved or natural, the following items shall be shown on the improvement plans in addition to other information required herein:

7.24.1.4.1 Typical sections and cross sections.

7.24.1.4.2 Profile of the existing channel flowline and top of bank profile to each side of the development as necessary in order to establish an average profile grade through the development.

7.24.1.5 Interceptor Ditches -- interceptor ditches or approved alternates shall be placed at the top of cut banks or where deemed necessary by the Director to prevent erosion of the channel bank. Runoff shall not be allowed to "Sheet flow" over top of bank.

7.24.1.6 Erosion Protection -- Erosion protection as specified by the Department of Public Works shall be placed along the top

of the cut or bank where deemed necessary by the Department of Public Works to prevent erosion of the channel bank.

7.24.2 Outfall Profiles

7.24.2.1 All drainage outfalls shall be shown both in plan and profile on the improvement plans for a distance of one-thousand (1000) feet or until a definite "daylight" condition is established.

7.24.2.2 All drainage ditches upstream of the improvement shall be shown on the plans and profile for a distance of at least two hundred (200) feet or until an average profile grade though the improvement is established.

7.24.2.3 The profiles shall include ditch flow-line and top of bank elevations.

7.24.3 When improvements have more than one phase, the drainage outfall shall be shown as extending to the property boundary, and beyond if required, although it may not be constructed with the current phase of development. All temporary outfalls shall be shown both in plan and profile on the improvement plans.

7.25

8.13 DRAINAGE FENCING REQUIREMENTS -- The requirements for fencing shall be as follows:

7.26.1 Improved channels or ponds in developed areas exceeding three (3) feet in depth or with side slopes steeper than 3:1 shall be fenced with a six (6) foot chain link fence. In all other areas fencing shall be placed only as required by the Department of Public Works.

7.26.2 Vehicle gates shall be a minimum of twelve (12) feet wide, and pedestrian gates shall be a minimum of three (3) feet wide.

7.26.3 Fences shall be located six (6) inches inside the drainage easement lines and a minimum of twelve (12) inches from top of bank.

7.26.4 No fencing will be allowed within the floodway of an open watercourse without the approval of the Department of Public Works. Special requirements shall be specified by the Department of Public Works for fencing within the 100-year flood plain of any open watercourse.

SECTION 9

WATER SUPPLY SYSTEMS

8.1 DOMESTIC WATER SUPPLY SYSTEMS -- These Improvement Standards shall govern the engineering design of all domestic water systems within the County of Yuba.

8.3 APPROVING AGENCY -- Submittals for water plan approval within the County shall be as follows:

- 8.4.1 All water distribution systems within the limits of an existing water district shall be designed and constructed to the standards required by that district.
- 8.4.2 All water distribution systems lying in the vicinity of, but outside of an existing water district boundary shall annex to an existing district and be designed and constructed to the standards required by that district.
- 8.4.3 All other systems shall meet the specific requirements as established by the approval of the project by the County.
- 8.4.4 All underground water piping to be constructed within roadways shall be shown on plans submitted to the Department of Public Works along with the appropriate trenching details.
- 8.4.5 Prior to approval of any division requiring County approval the subdivider shall submit written documentation satisfactory to the Department of Public Works that compliance has been made with all the requirements of the entity having jurisdiction. Such evidence shall include a signature on the plans by the responsible person with the entity having power to approve the design.
- 8.4.6 Upon completion of the improvements the entity having jurisdiction shall notify the Public Works Department that the improvements have been completed and have been accepted by the entity.

SECTION 10

SEWAGE SYSTEMS

9.1 DESIGN REQUIREMENTS -- Sewage system and facilities design requirements shall be in accordance with the following:

- 9.2.1 All subdivisions having sewage collection systems shall be constructed to the standards required by the district to serve the subdivision.
- 9.2.2 All other subdivisions shall meet the requirements established by the Yuba County Health Officer and shall be in conformance with all current health and safety standards.
- 9.2.3 All sewage systems shall meet the requirements of Chapter 7.07 and Chapter 10.05.060 of the Yuba County Ordinance Code as such requirements may pertain to the above.
- 9.2.4 Prior to approval of any division requiring County approval the subdivider shall submit written documentation satisfactory to the Department of Public Works that compliance has been made with all the requirements of the entity having jurisdiction. Such evidence shall include a signature on the plans by the responsible person with the entity having power to approve the design.
- 9.2.5 Upon completion of the improvements the entity having jurisdiction shall notify the Public Works Department that the improvements have been completed and have been accepted by the entity.
- 9.2.6 Trenching operations shall comply with the requirements outlined in Section 7.4 of these standards.

SECTION 11

GRADING

10.1 GENERAL REQUIREMENTS -- Grading shall conform to Chapter 11 of the Yuba County Ordinance Code and the Uniform Building Code, except as modified by these Improvement Standards.

10.3 PLAN SHEET DETAILS -- A grading plan shall be required for all subdivisions. The following items shall be included on the grading plan:

- 10.4.1 Slope symbols or proposed contours for all graded slopes.
- 10.4.2 Ridge and/or valley delineation.
- 10.4.3 Typical lot grading details.
- 10.4.4 Proposed spot and/or pad elevations.
- 10.4.5 Flow directional arrows (off-site, around perimeter of development when adjacent to developed areas) and perimeter elevations at the property line.
- 10.4.6 Flow directional arrows at locations of proposed ditches and swales.
- 10.4.7 Existing spot elevations and/or contour lines on-site and off-site around perimeter of development. Where the existing terrain is not relatively flat, contour lines shall be mandatory. The spot elevations or contour lines shall be extended off-site for a minimum distance of fifty (50) feet (flat terrain -- one-hundred (100) feet minimum) when adjacent to undeveloped areas.
- 10.4.8 Retaining wall details (symbols, construction details and limits).
- 10.4.9 Back of sidewalk elevations.
- 10.4.10 Drainage systems including storm drains and erosion control measures.
- 10.4.11 Typical sections across side yard property lines where the difference in finish pad elevations exceeds two (2) feet. Delineated on the section shall be the side yard drainage swale and the minimum distance between the proposed building and the side yard property line.

10.4.12 Names of adjacent subdivisions, property owners.

10.4.13 Off-site intersecting property lines.

10.4.14 Protective tree fences around trees to remain.

10.5 INTERIOR GRADING -- Differences in elevations across interior property lines within a development, such that slopes or retaining walls are required, shall conform to the following:

10.6.1 Property Lines -- Property lines shall be situated at the top of slopes with a minimum setback of two (2) feet from the property line to the top of slopes. Grading shall not be designed to allow surface runoff to drain down the graded slopes. Property lines shall be situated at the top sides of retaining walls with a minimum setback of one (1) foot from the property line to the retaining wall.

10.6.2 Slopes -- The maximum earth slopes allowed shall be 1-1/2:1 (horizontal to vertical) and the minimum shall be 1%. Minimum asphalt concrete surface slopes shall be 1% and minimum portland cement concrete slopes shall be 0.25%. All proposed slopes shall be shown on the plans with proposed contours or other slope delineation.

10.6.3 Lots at street sag points shall be graded in such a manner as to preclude flooding of the building pad area in the event of malfunction or overloading of the street drainage system. At such locations the building pad shall be a minimum of 1.0 feet above the street centerline.

10.6.4 Commercial developments shall not be allowed to "sheet drain" more than fifty (50) feet of site frontage to a public street.

10.7 RETAINING WALLS

10.8.1 Retaining walls, including limits, heights and construction details, shall be shown on the development plans.

10.8.2 Design calculations signed by the Consulting Engineer shall be required for all walls exceeding forty-eight (48) inches in height (measured from the base of the footing to the top) or when a fence is an integral part of the wall.

10.8.3 Wood retaining walls shall not be allowed adjacent to street right-of-ways except as approved by the Department of Public Works.

10.8.4 All retaining walls within eight (8) feet of the property line exceeding four (4) feet in height shall be either concrete or masonry.

10.8.5 Grading shall be such that on-site runoff, other than side slope areas, will not flow over wood retaining walls.

10.9 GRADING AT TREES -- Grading near trees shall be in accordance with the following:

10.10.1 Grading under trees with aesthetic value (trees with a nine (9) inch diameter or larger, measured four and one-half (4-1/2) feet above the ground, in healthy condition, and all oak trees) shall be given special attention. Every reasonable effort shall be made to avoid removing trees or creating conditions adverse to the tree's health.

10.10.2 The natural ground within the drip line of trees, especially oak trees, shall remain as undisturbed as possible. Grading within the drip line of oak trees will not be permitted without adequate justification and approval by the Department of Public Works.

10.10.3 Trees with a nine (9) inch or larger trunk diameter that are questionable as to health, safety, or aesthetic value shall be reviewed by the County. If a tree is found to be not worthy of saving, the Department of Public Works can approve its removal.

10.10.4 Cross sections may be required where trees are located adjacent to roadways, new slopes or critical areas. In addition, a dimension from the face of a tree to some critical point or line may be required.

10.11 EROSION AND SEDIMENT CONTROL MEASURES--It shall be the responsibility of the developer to prevent discharge of sediment from the site in quantities greater than before grading occurred, to any watercourse, drainage system, or adjacent property and to protect watercourses and adjacent properties from damage by erosion, flooding, or deposition which may result from the grading.

10.12.1 An erosion and sediment control plans shall be required whenever:

10.12.1.1 The graded portion of the site includes more than ten thousand (10,000) square feet of area having a slope greater than ten (10) percent.

10.12.1.2 There is a significant risk that more than two thousand five-hundred (2,500) square feet will be unprotected or inadequately protected from erosion during any portion of the rainy season.

- 10.12.1.3 Grading will occur within twenty (20) feet of any watercourse.
- 10.12.1.4 The Department of Public Works determines that the grading will or may pose a significant erosion or sediment discharge hazard.
- 10.12.2 Plans showing interim erosion control devices and instructions to be used during the grading operation shall be included with the grading plan submittal. Plan submittal shall also show permanent erosion control devices to be constructed after the completion of grading.
- 10.12.3 Erosion and sediment control plans shall include an effective revegetation program to stabilize all disturbed areas which will not be otherwise protected. All such areas, where grading has been completed between April 1 and October 15, shall be planted by November 1. Graded areas completed at other times of the year shall be planted within fifteen (15) days of completion. If revegetation is infeasible or cannot be expected to stabilize an erodible area with assurance during any part of the rainy season and the unstable area exceeds two thousand five-hundred (2,500) square feet, additional erosion and sediment control measures may be required as appropriate to prevent increased sediment discharge.
- 10.12.4 Interim Erosion and Sediment control plans shall be designed to prevent increased discharge of sediment at all stages of grading and development from initial disturbance of the ground to project completion. Plans shall indicate the implementation period and the stage of construction where applicable.
- 10.12.5 Areas involving extensive grading and shaping will require stockpiling and re-use of topsoil to provide for adequate revegetation.

10.13 EROSION CONTROL MATERIALS

- 10.14.1 Seed -- Seed shall be of a quality which has a minimum pure live seed content of 80% (% purity x % germination).
- 10.14.2 Seeding preparation -- The entire area to be seeded shall be smooth and shall conform to the design grades (if grading is complete) before seedbed preparation is begun. Any debris which would interfere with seeding operations, growth or maintenance of the vegetative cover shall be removed. Seed areas shall be firm and roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of two to four inches (2" - 4"). No

implement shall be used that will create a downward movement of soil or clods on sloping areas.

10.14.3 Seeding -- Seed shall be broadcast by hand, mechanical hand seeder, hydroseeder or other approved equipment. Seed shall have a soil cover of not more than one-half (1/2) inch.

10.14.4 Fertilizer -- Commercial fertilizer shall be Ammonium Phosphate and contain a minimum of 16% nitrogen, 20% phosphorus, and 0% potash, uniform in composition, dry and free flowing, pelleted or granular. Fertilizer shall be provided whenever topsoil is not replaced over the graded area.

10.14.5 Mulch -- Mulch shall be either straw, wood fiber mulch or other acceptable material. Straw shall be new straw derived from rice, wheat, oats, or barley, and be free of mold and noxious weed seed. Straw shall be furnished in air dry bales.

10.14.6 Mulching -- At the option of the Consultant Engineer mulch covering may be provided in addition to or in lieu of seeding. Mulching shall occur with or follow immediately after seeding where applicable.

Straw mulch shall be applied at a rate of two (2) tons per acre.

The mulch shall be applied by hand or hand blower, or other suitable equipment. If straw is applied with a blower, it shall not be chopped in lengths less than six (6) inches.

10.15 CERTIFYING PAD ELEVATIONS

10.16.1 Upon completion of the grading and prior to acceptance of the subdivision improvements by the County, the Consulting Engineer or Land Surveyor shall verify the final pad elevations. Elevation deviations of more than 0.20 feet shall be noted on the tracings.

10.16.2 For rural subdivisions where building pads are not created the Consulting Engineer shall be required to verify that grading is in general conformance with the grading plan. Such verification will be required in written form and may be required in the form of as-built plans as directed by the department of Public Works.

10.16.3 A signature block, certifying the final graded elevations in the field are the same as those shown on the plans, shall be included on the tracings of the subdivisions grading plans. The Consulting Engineer shall sign the signature block, certifying the above, and shall provide three sets of record (as-built) grading plans to the Director. A letter of certification from the Consulting

Engineer may be substituted for the Consulting Engineer's signature on the as-built grading plans.

SECTION 12

SOUND BARRIER DESIGN

11.1 LOCATION REQUIREMENTS -- Sound barriers may be required along the rear and side property lines of residential developments adjacent to freeways, major highways and other ground level noise elements in order to achieve the noise control objectives of the Yuba County Noise Element and Noise Ordinance.

11.3 SOUND STUDY -- When it appears to the Department of Public Works that a sound barrier may be necessary or when a sound barrier is a condition of development, a sound study prepared by an Acoustical Consultant shall be submitted to the Department of Community Services before the improvement plans will be approved by the Department of Public Works. The sound study shall include recommended height and termination points for the sound barrier including all backup material leading to the recommendations.

11.5 DESIGN

11.6.1 The sound barrier shall be designed to obtain a 60 LDN at the affected property line or as required by the Department of Community Services.

11.6.2 Sound barriers shall be designed for a minimum longevity of thirty (30) years.

11.6.3 Sound barriers will not be allowed within public right-of-ways when installed as a condition of the development or as an option of the builder.

11.7 PLAN REQUIREMENTS -- All construction details for sound barriers, including the location and limits, shall be shown on the site improvement plans.

SECTION 13

SURVEY MONUMENTS

12.1 SUBDIVISIONS

- 12.2.1 A survey centerline monument well shall be placed in paved roadways at:
- 12.2.1.1 The intersection of all street centerlines.
 - 12.2.1.2 The radius point of cul-de-sacs.
 - 12.2.1.3 Intervals, not to exceed one thousand (1000) feet along street centerlines. Monuments are to be set at even stationing when practicable.
 - 12.2.1.4 Other positions as may be required by the County Surveyor.
- 12.2.2 Corner monuments shall be securely placed at all exterior boundary corners; lot corners, including angle points or the termini of curves along road right of way lines; reference points marking the property or lot line intersection with all road right of way lines; at all termini of curves along the centerlines of paved roads, except those points which may require a centerline monument well; and as may be required by the County Surveyor. In the case of graveled or dirt roads, centerline monumentation may be omitted as long as the right of way lines are fully monumented. In the case of a paved roads, where the centerline is fully monumented, the right of way lines need not be monumented, except at reference points. Meander lines along water boundaries, or along natural boundaries need not be monumented except as reference points at their intersection point with regular boundary lines.
- 12.2.3 In subdivisions where the right of way line is immediately behind the concrete curb, lot corners may be referenced by placing a lead and tag reference point in the top of the curb or by placing a gash mark in the concrete. The offset distance along the extension of the lot line to the true corner position shall be reflected on the map.
- 12.2.4 The County Surveyor may waive the requirement for the placement of any of the above corners for good and sufficient reason at the request of the project surveyor or engineer.

12.3 PARCEL MAPS

12.4.1 Corner monuments shall be securely placed at all exterior boundary corners; parcel corners, including angle points or termini of all curves along road centerlines; radius points of cul-de-sacs; reference corners marking the property or parcel line intersection with road easement lines. In the case of graveled or dirt roads, centerline monumentation may be omitted as long as the right of way lines are fully monumented. In the case of a paved road, where the centerline is fully monumented, the right of way lines need not be monumented, except at reference points. Meander lines along water boundaries, or along natural boundaries need not be monumented except as reference points at their intersection point with regular boundary lines.

12.4.2 The County Surveyor may waive the requirement for the placement of any of the above corners for good and sufficient reason at the request of the project surveyor or engineer.

12.5 RECORD OF SURVEYS

12.6.1 Monuments set shall be sufficient in number and durability and efficiently placed so as not to be readily disturbed, to assure, together with monuments already existing, the perpetuation or facile re-establishment of any point or line of the survey (Section 8771, Land Surveyors Act).

12.7 GENERAL

12.8.1 All section corners, quarter corners, sixteenth corners, rancho corners, government lot corners, known survey control monument (horizontal or vertical), corner shown on record maps, known property corners, or any other monument as required by the County Surveyor located within an improvement area which may be disturbed, shall be referenced with at least two (2) swing ties to protected points outside of the construction area. The County Surveyor's Office shall be provided a copy of swing ties to such monuments for use until the corner is remonumented. Upon completion of construction, the corner shall be replaced with a monument well or corner monument when such corner is located within a paved or seal coated surface, or with a corner monument when located within gravel or dirt roadways.

12.8.2 Corner monuments shall be a minimum of a three-quarters (3/4)-inch diameter galvanized iron pipe or a one-half (1/2)-inch #4 rebar, a minimum eighteen (18) inches in length, securely set in place. A rock mound should be placed around the monument when practicable. Railroad

spikes, properly marked, may be substituted in pavement areas when approved by the County Surveyor.

12.8.3 Corner monuments set in pavement areas shall be driven flush with the pavement surface and shall not be allowed to protrude above the surface. The top of monuments placed in graveled or dirt roads should be driven to a depth of at least four) 4-inches below the road surface.

12.8.4 A Corner Record, in a form acceptable to the County Surveyor and in conformance with Section 8773 of the Land Surveyors Act shall be filed in the County Surveyor's Office for each remonumented corner unless it is to be shown on a filed Final Map, Parcel Map or Record of Survey Map. Each monumented corner should have a minimum of two (2) swing ties reflected on the corner record to assist in future corner recovery if practicable.

12.8.5 Reference points shall only be monumented at the intersection of right of way lines with boundary lines, except when unusual physical constraints would dictate the monument to be set at a different location.

12.8.6 Deteriorated or dilapidated corners as defined by Section 8773.3 of the Land Surveyors Act shall be replaced by a new corner monument.

APPENDIX "A"
DRAINAGE DESIGN PROCEDURE

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13 INTRODUCTION

This Appendix has been prepared as a supplement to the Storm Drainage Design Section (Section 8) of the County Standards contained herein [1]* and is intended to be used as a guide for determination of runoff quantities and for design of storm drainage facilities in Yuba County. Its use, where applicable, by the County as well as private engineers and developers, will simplify County review of drainage calculations.

*** Numbers in brackets indicate references listed at the end of this Appendix.**

15 DESIGN STANDARDS

General guidelines for design storm return period are given in Table 1. Other conditions may be imposed by the County or other agencies in individual cases.

TABLE 1

STORM RETURN PERIOD CRITERIA FOR COMPUTATION OF DESIGN FLOW

DESCRIPTION	MINIMUM RETURN PERIOD IN YEARS
Urban drainage system with adequate outlet works	10
Urban drainage system with unknown outlet works:	
Water 6 inches below inlet	25
Water in gutter but not in travelled way	25
Water below lowest building pad	100
Urban systems less than 320 acres	10
Urban collector systems	25
Major collector channels	50
Rural Area culvert water at top of pipe	10
Rural Area culvert water below bottom of road structural section	25
Rural Area Culvert water not flooding road	100
Pump station and detention basins:	
Design water surface with 3 feet freeboard	25
Design water surface with zero freeboard	100

17 COMPUTATION OF RUNOFF

Because of its simplicity and widespread use, the rational method is recommended for runoff calculations on small developments. In general, the rational method should be applied to areas less than 1/2 square miles. For larger areas more complex computation methods should be used.

In the rational method, the peak runoff rate is computed by the formula:

$$Q = C i A \quad (1)$$

where Q is the peak discharge at the design point in cubic feet per second (cfs), C is a dimensionless runoff coefficient, i is the average rainfall intensity in inches per hour, and A is the drainage area tributary to the design point, in acres. The conversion factor from acre-inches per hour to cubic feet per second (1.008) is generally ignored.

A. Runoff Coefficient C

Table 2 lists ranges of runoff coefficients for use in undeveloped areas. This tabulation of recommended values is also used by Butte and Nevada Counties [2], [3]. Runoff coefficients for urban areas can be selected from Table 3 [4].

In computation of a peak runoff rate, a composite runoff coefficient must be computed if more than one type of surface is involved. This is accomplished by determining the product CA for each sub-area and dividing the sum of all CA values by the total area.

The runoff coefficients listed in Tables 2 and 3 are appropriate for use in computing peak runoff from storms with a 10 year return period. For other return periods determine the coefficient from Figure 1 [5].

TABLE 2

RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

CONDITION	EXTREME	HIGH	MODERATE	LOW
Slope %	.36 - .28 Above 30%	.28 - .15 30% - 10%	.15 - .10 10% - 5%	.10 - .05 5% - 0
Surface Permeability	.20 - .15 Bare rock or very thin soil	.15 - .07 Impervious clays shallow soils	.07 - .04 Deep pervious loam, sandy loam	.03 Deep sand, volcanic ash
Vegetation	.20 - .15 none or very sparse	.15 - .07 Less than 20% covered with substantial growth	.07 - .04 About 50% covered with heavy growth	.03 90% covered with heavy growth, deep humus layer
Surface	.20 - .15 Smooth soil, slick rock, drainage flow continuous	.15 - .07 Roughened soil or rocks	.07 - .04 Drainage flow interrupted, many ponds, lakes, marshes	.03 Drainage flow arrested, large lakes, ponds, marshes

Note: This table is valid for a 10-year return period. For other return periods use Figure 1.

TABLE 3
RUNOFF COEFFICIENTS FOR DEVELOPED AREAS
FROM [4]

Land Use
Coefficient C

Business	
Downtown	0.70 to 0.95
Neighborhood	0.50 to 0.70
Residential	
Single-family	0.30 to 0.50
Multi-units, detached	0.40 to 0.60
Multi-units, attached	0.60 to 0.75
Residential (suburban lots 1/2 acres)	0.25 to 0.40
Apartment dwelling	0.50 to 0.70
Industrial	
Light	0.50 to 0.80
Heavy	0.60 to 0.90
Parks, cemeteries	0.10 to 0.25
Playgrounds	0.20 to 0.35
Railroad yard	0.20 to 0.35
Unimproved	0.10 to 0.30

Character of Surface

Coefficient C

Pavement	
Asphaltic and Concrete	0.70 to 0.95
Brick	0.70 to 0.85
Roofs	0.75 to 0.95
Lawns, sandy soil	
Flat, 2 percent or less	0.05 to 0.10
Average, 2 to 7 percent	0.10 to 0.15
Steep, 7 percent or more	0.15 to 0.20
Lawns, heavy soil	
Flat, 2 percent	0.13 to 0.17
Average, 2 to 7 percent	0.18 to 0.22
Steep, 7 percent	0.25 to 0.35

Note: This table is valid for a 10-year return period. For other periods use Figure 1.

This page for Figure 1

B. Time of Concentration, t_c

The rational method is based on the concept that a steady, uniform rainfall intensity will cause runoff to reach its maximum rate when all parts of the watershed are contributing to the outflow at the point of design. Thus, a design storm is selected which has a duration equal to the time required for runoff to travel the entire length of the watershed. This time is called the time of concentration, t_c .

Computation of t_c is separated into overland flow and flow in well-defined channels. The method is somewhat different for urban areas than for undeveloped areas.

In undeveloped areas, the time of concentration may be estimated by adding ten minutes [6] to the time computed by Kirpich equation [7]:

$$t_n = 0.0078 \left(\frac{L^3}{H} \right)^{.385} \quad (2)$$

where L is the maximum length of travel, in feet, H is the difference in elevation along the effective slope line, in feet, and t_n is the flow time in the natural area, in minutes.

The slope of the main stream should be determined by plotting a profile of the channel as shown on Figure 2. A straight slope line is drawn on this profile so that the area under the line is approximately the same as that under the profile. Values of H and L for use in equation (2) are the total horizontal length and total elevation difference of this effective slope line [8].

If runoff from the natural watershed enters a well-defined channel before it reaches the design point, the flow time in the channel should be added to the flow time computed for the natural area upstream of the channel. Use Manning's equation as suggested in the following section to compute velocities in channels. If there is no such well-defined channel, the time of concentration t_c is equal to t_n .

A similar procedure is used to compute t_c for urban areas. The time required for runoff to travel by sheet flow to the

first well-defined channel may be estimated by the following equation from [9]:

$$t_o = \frac{1.8(1.1-C) - \sqrt{L}}{\sqrt[3]{S}} 2(3)$$

where C is the runoff coefficient, L is the horizontal flow distance, in feet, S is the overall slope of the flow path, in percent, and t_o is the overland flow time, in minutes. Figure 3 is a graphical solution of equation (3). Travel times in channels are determined by dividing the travel distances by the velocities calculated by Manning's equation using n-values from Table 4. To compute the hydraulic radius, assume that gutter flow is at curb level, open channels are bank full, and conduits are flowing full. Usually the runoff will travel in a series of channels such as street gutter, pipelines, and open channels. Travel times for each of the components, including overland flow computed from equation (3), are added to determine t_c .

Inlet time, the time required for runoff to travel overland and in a gutter to the first inlet, is usually between 20 and 25 minutes for a typical residential subdivision constructed in flat terrain.

The time of concentration, t_c , is generally regarded as the largest sum of inlet time plus travel time in pipes or channels to the design point. Comparison of the flow times for several paths may be required in order to determine the longest time.

C. Rainfall Intensity, i

After t_c has been determined, a design storm is selected whose duration is equal to t_c . Two other parameters are required to determine the design rainfall intensity. They are: project location, and design storm return period. Recommendations for storm return period are given in Table 1.

Data from DWR Bulletin 195 [10] indicates that in Yuba County and surrounding areas there is a strong correlation between mean annual precipitation, P_{ma} , and rainfall intensity. In the lower elevation areas of Yuba County, the data from the Wheatland gage, should be used. In the upper areas of the County the Camptonville gage data should be used. Intensity duration curves for these gages are reproduced as Figure 4.

For foothill areas within the County a linear interpolation based on elevation between the Camptonville data and Wheatland data appears to be justified. Storm durations less than 30 minutes seem to produce rainfall intensities that are substantially the same. Based on these findings, a series of curves for various return periods and various values of P_{ma} can be generated. These curves, along with a mean annual precipitation map of Yuba County, will enable easy selection of an appropriate design intensity.

This page for Figure 2

This page for Figure 3

This page for Figure 4

TABLE 4

MANNING'S ROUGHNESS COEFFICIENT, n

Channel or Conduit

Closed Conduits

Asbestos-cement pipe
Concrete pipe - cast-in-place
Concrete pipe - precast
Corrugated steel pipe (annular)
Corrugated steel pipe (helical)

Open Channels - Lined

Asphalt
Concrete, float finish
Gunitite

Open Channels - excavated

Straight and uniform, clean
Straight and uniform, some weeds
Winding and sluggish, some weeds
Winding and sluggish, dense weeds

Note: These are average values and may be inappropriate under

19 APPLICATION

Peak discharge is computed as a new solution of the rational formula for each point downstream where runoff from new areas is added to the system. The time of concentration at each new point downstream is the previous t_c plus the increment of flow time to the new point, and the area is the total contributing area. The solution in cfs is the design flow for the pipe or channel leading away from the design point.

A. Drainage Systems

Computations for urban systems should be shown on a runoff computation form similar to the form included herein. See Section V, SUBMITTALS for information to be included with submittals.

When designing any drainage facility, the engineer should review the total drainage system of the area and downstream limitations to ensure that no backwater conditions will violate the basic design standards. Downstream conditions should be checked for long duration low-intensity storms as well as short duration high-intensity storms.

B. Partially Contributing Areas

Whenever the times of concentration and peak rates of runoff from sub-areas are greatly different due to size variations or differences in flow times, maximum discharge can occur for a storm whose duration is shorter than the longest time of concentration. When this occurs only part of the area is contributing. The contributing fraction of a particular sub-area can be found by the ratio of the storm duration to the time of concentration of the sub-area.

EXAMPLE: Consider a watershed containing two sub-areas, A and B. Sub-area A has a CA of 100 while sub-area B has a CA of 30. The times of concentration are 1-hour and 3-hours for areas A and B respectively. If the rainfall intensity is 0.8 in/hr for a 1-hour storm and is 0.4 in/hr for a 3-hour storm, the total peak flow in a 3-hour storm for both areas would be:

$$Q = 100 \times 0.4 + 30 \times 0.4 = 52 \text{ cfs.}$$

In a 1-hour storm only 1/3 of area B is contributing. Therefore the total peak flow would be:

$$Q = 100 \times 0.8 + 30 \times 1/3 \times 0.8 = 33 \text{ cfs.}$$

C. Culvert Selection

For drainage channel crossings of roadways, the design of culverts shall follow the procedure outlined in this section and Section 8 of the County Improvement Standards. In general, culverts shall be designed to pass the peak flow from a 100-year storm without flood water encroaching on the roadway. In addition to the above requirement, the culvert shall be designed to pass the peak flow from a 10-year storm while maintaining the headwater elevation at the top of pipe.

If the culvert capacity is controlled by inlet conditions then charts or nomographs for this condition may be used. Note that inlet control is not possible if tailwater submerges the downstream pipe crown. In most cases analysis of the downstream channel will be required to determine the outlet condition.

If the culvert capacity is controlled by outlet conditions, or by the barrel of the culvert itself, then formulas or nomographs for a pipe flowing full are to be used. Under these conditions, the pipe friction and downstream water surface elevation are important. In the flat areas of the county, the total head loss measured from the inlet water

surface to the exit water surface will normally be required to be 0.10 foot or less.

D. Detention Basin Sizing

Detention basins are water storage areas that temporarily store peak runoff flows. Their function is not to reduce runoff volumes but to delay release of runoff so that excessively large pumps, downstream structures, and channels can be avoided.

Table 1 suggests design storm return periods for pump stations and detention basins. These suggestions are to be considered as minimum requirements and other criteria may be required by the County under special circumstances.

Detention basin volume can be computed [11] by the following formula:

$$V = \frac{K(CA)^{1.74}}{Q_p^{0.74}} 3 (4)$$

where V is the detention basin water volume in acre feet, Q_p is the outfall pumping rate in cfs, C is the runoff coefficient used in the Rational formula, A is the watershed area in acres, and K is a constant which depends on the storm return frequency. The following values of K are recommended for the lower elevation areas of Yuba County:

25-year return period	K = 0.026
50-year return period	K = 0.031
100-year return period	K = 0.036

In the foothill regions pond volumes will be determined based on the runoff contributing to the basin.

The minimum design volume of the basin should be the larger of the following two conditions:

- 100-year storm with no freeboard
- 25-year storm with 3 feet freeboard

Where possible, gravity overflow devices shall be provided such that pond will not overflow in events of prolonged power outages.

Pumps and basin sizes should be selected so that at full pumping capacity with no inflow, the basin will be emptied in not more than 48 hours and not less than one hour.

Using equation (4) one can plot a curve of V vs Q_p so that the relative values of the variables can be easily visualized. A combination of V and Q_p can then be selected such that the project design criteria are satisfied.

21 SUBMITTALS

For all drainage calculations submitted to the County for review, the following should be included where applicable:

1. Map of drainage area showing contours and watershed boundaries.
2. Profiles of channels showing hydraulic grade line. The hydraulic grade line for pipelines need not be shown unless it is above the pipe crown.
3. Sections and plans of structures and canal sections with design water surfaces delineated.
4. Data and computations used to determine design flows.
5. Hydraulic computations for design of structures.
6. Elevation of lowest gutter flow line or lowest shoulder (if no curb) which will be affected by the structure or pipe under consideration.

COMMENTS :

23 EXAMPLE

The following example is from a typical low-density residential subdivision in the lower portion of Yuba County. The area is small so the Rational Method is applicable.

Given: Design return period in 10 years.

Required: Design flows in pipelines.

Solution:

1. Prepare a tributary drainage area map. Identify inlets, manholes, and areas.
2. From Table 2 select 0.4 as the average runoff coefficient. This value includes all portions of the area including streets and sidewalks. If the project contained especially large areas of a particular surface type, it would be desirable to compute a composite area weighted runoff coefficient. Since the design return period is 10-years, no modification of the C Values is necessary.
3. Determine overland flow times. In this subdivision, the longest overland flow paths are about 150 feet with 1% slopes. Using a mean C value of 0.2 for overland flow area gives an overland flow time from equation (3) of 20 minutes.
4. Determine gutter flow time. Gutter slopes and distances produce a nearly uniform gutter flow time of 4 minutes to the inlet in each sub area.
5. Add overland flow time and gutter flow time to determine time of concentration for each sub area.
6. Find rainfall intensity for this storm duration from Figure 4.
7. Multiply $C \cdot i \cdot A$ to find the design peak flow rate flowing into each inlet. Standard inlets will usually accept up to 2 cfs. Catch basins are usually required for greater flows.
8. For downstream areas add pipe flow times to the previous times where the runoff flows in a pipe leading up to the design point. Round times to the nearest minute.
9. Compute $C \cdot i \cdot A$ for each design point using the longest flow time to that point and the total area tributary to that point.

The Standard Runoff Computation form has been filled out for this example.

THIS PAGE FOR FIGURE 5

THIS PAGE FOR EXAMPLE COMPUTATION SHEET

25 REFERENCES

- 1.MHM, Inc., "South Yuba Drainage Master Plan, Volume I, Master Plan", September 1981.
- 2.County of Butte; Improvement Standards for Subdivisions, Parcel Maps and Site Improvements, March 1977.
- 3.County of Nevada; Standard Specifications for Storm Drainage.
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- 5.Water Resources Engineers, Inc.; Hydrology and Drainage Design Procedure for the County of Solano, October 1977.
- 6.Department of Public Works; Drainage Manual for the County of Santa Clara, March 1966.
- 7.Kirpich, Z.P., "Time of Concentration of Small Agricultural Watersheds", Civil Engineering (N.Y.), vol. 10, no. 6, p. 362, June 1940.
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- 9."Airport Drainage", Federal Aviation Agency, Department of Transportation, Advisory Circular, A/C 150-5320-5B, Washington, D.C., 1970.
- 10.State of California, Department of Water Resources; Rainfall Analysis for Drainage Design, Volumes I, II, and III, Bulletin No. 195, October 1976.
- 11.Burton, Kit R., "Stonewater Detention Basin Sizing", Journal of the Hydraulics Division, ASCE, Vol. 106, No. HY3, March, 1980.
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COUNTY OF YUBA
DEPARTMENT OF PUBLIC WORKS
STANDARD DRAWINGS

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- 601 TYPICAL LANE CLOSURE AND DELINEATION (2 LANES, 2 OPEN)