SHASTA COUNTY
DEVELOPMENT STANDARDS

Reprinted December 1997

Assembled by:

SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS

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CHAPTER 2 - ROAD POLICIES AND STANDARDS

A. ROAD POLICIES

1. General Requirements

a. No parcel, lot or building site shall be created or developed in the unincorporated area of the County unless it is directly served by a paved road.

A "paved road" includes (1) necessary subbase and drainage facilities, and (2) surfacing with asphalt or cement-based concrete.

b. All discretionary uses located in a C, I or MU General Plan designation and all land divisions shall be served by road improvements constructed to the applicable standard established under Section B, below.

c. Road improvements are required from an existing paved public road to each parcel or use being created. Where curbs, gutters, sidewalks or side paths are required under Section B, below, these improvements shall extend through each parcel for the full length of existing and new roads. The approving authority may also require improvements to the existing paved public road if it does not meet these Standards.

2. Exemptions

The following are exempt from the construction requirements of Subsection 1:

a. An internal driveway, except a flag lot driveway, serving a single dwelling unit.

b. Any land division that creates no new building site, unless the land division results in the physical segregation of existing dwelling units, any of which were lawfully constructed or installed after January 10, 1984, or unlawfully constructed or installed at any time.

3. Exceptions

A trust fund is established in the County treasury pursuant to Government Code Section 25252. All deposits made in lieu of paving shall be credited to the fund. Policies and procedures for expenditure of money in the fund are established in Section C.

a. An approving authority may permit a subdivider or developer to substitute a chip seal surface for an asphalt concrete surface, as required by Subsection 2 of Section B, below, for a land division that creates not more than one new parcel for residential use, or for the construction or installation of a second or subsequent detached dwelling unit on a parcel, if all of the following requirements are met:

1) The resulting density will not exceed one dwelling unit per five acres for any project located in an SR or UR General Plan designation.

2) The owner of the project site enters into a deferral agreement with the County pursuant to paragraph b. of Subsection 4, and, in the case of a land division, the book and page at which the agreement is recorded is noted on the face of the recorded parcel map or notice of waiver of parcel map.

b. An approving authority may issue a building or mobile home installation permit for construction or installation of the first dwelling unit on a parcel served by a private road that does not meet the construction requirements of Subsection 2 of Section B, below, if:

1) The road is entirely surfaced with asphalt concrete or chip seal at least 16 feet wide at all points between a paved public road and the driveway, and

2) In the case of chip seal surfacing, all of the road between a paved public road and the driveway is maintained by a permanent road division.

c. An approving authority may permit a subdivider or developer to substitute a gravel road constructed to the special purpose road standard (Appendix 2-31) established under Section B. below if all of the following requirements are met:

1) The minimum parcel size is forty acres excepting land divisions created for family member housing in agriculture resource (A-C & A-G) areas. This provision does not override applicable General Plan minimum parcel size requirements.

2) All portions of all parcels are located above 1000 feet in elevation.

3) All parcels are located in T, AC, AG, M, N-H, N-R, N-O, or N-P General Plan designated areas.

4) The approving authority makes findings that the proposed road standard is appropriate for the proposed use and consistent with the definition of that standard in the publication entitled "A Policy on Geometric Design of Highways and Streets," most current edition by the American Association of State Highway and Transportation Officials.

5) A registered Civil Engineer or Traffic Engineer having a minimum coverage of $500,000 in errors and omissions insurance, a copy of which

filed with the County Risk Manager, certifies, on an approved form, that the road as designed and constructed meets all of the applicable standards referred to in the most current edition AASHTO publication, County Fire Safety Standards, and that the maximum anticipated traffic volume, on any road, will not exceed 100 vehicle trips per day.

The approving authority reserves the right to require an asphalt concrete road as described in Subsection 1 above.

d. The Department of Public Works or the approving authority may waive the requirements of Subsection 1, above, for minor or non-habitable accessory uses.

4. Deferrals of Improvements

a. Installation of curbs, gutters and sidewalks may be deferred by the approving authority for:

1) Any land division, when the smallest proposed parcel exceeds 2 acres and the deferral will not create a discontiguous pattern of road improvements, or

2) Any project in an MU (Mixed Use) General Plan designation located outside the South Central Region of the General Plan when public sewer facilities are not available, or

3) Any project where physical constraints such as topography, drainage conditions or other obstructions exist, which cannot be reasonably altered to allow the installation at the time the project is approved.

b. Surfacing of roads with asphalt concrete, as required by Subsection 2 of Section B, below, may be deferred by the approving authority when the roads are surfaced with chip seal pursuant to paragraph b of Subsection 3, above.

c. Any deferral granted under paragraph a. for a land division or under paragraph b. shall require that the deferred improvements:

1) Be completed if the property is further subdivided, or

2) Be completed if the property is further developed, unless the Director of Public Works further extends the time of construction of some or all of the defined improvements, and

3) Be constructed to the standards in effect at the time of construction.

d. Any deferral granted under paragraph a. for a project in an MU General Plan designation shall include a requirement that if public sewer facilities become available, the deferred improvements be completed within a reasonable time after notice from the County to construct the improvements.

e. Notwithstanding other provisions in this chapter, the fulfillment of road or related improvements for a parcel map creating four or fewer parcels shall not be required until the time a permit or other grant of approval for development of a parcel is issued by the County, or until the County determines that fulfillment of the construction requirements is required prior to that time based on considerations of public health and safety or of orderly development of the surrounding area. Where on-site or off-site improvement for such projects are required following parcel map approval, the resolution of approval shall set forth the factual findings by Government Code Section 66411.2.

f. An approving authority may permit a second building site to be developed as a second one-family residence without requiring road improvements to the project site as otherwise set forth in these road policies and standards, if all of the following requirements are met:

1) The existing access adequately serves the existing and proposed residences;

2) The proposed second one-family residence is intended and shall continue to be used by a family member of the owner of the first one-family residence on the same parcel; and

3) The property owner shall enter into a deferral agreement with the County:

a) acknowledging that the affected residences must be limited in use as required herein,

b) providing that the owner agrees to improve the access road to County standards if one or both of the residences are converted to non-family uses or a subsequent land division occurs, and

c) requiring that the owner give written notice to the County Department of Resource Management's Planning Division upon sale of the subject property or the conversion of one or both of the subject residences to non-family uses.

g. Any deferral granted under paragraph a. or b. shall be an agreement between the County and the owners of record of the property, substantially in the form set forth in Appendix 2-1 or Appendix 2-2, and shall be recorded in the Office of the County Recorder as a covenant running with the land. When any provision of paragraph c. or d. applies, appropriate language shall be added to that set forth in Appendix 2-1 or Appendix 2-2.

5. Rights-of-Way and Access

a. All roads shall be through roads, except Local, Minor Local and Minor roads, and Flag Lot Driveways. Roads, excepting Flag Lot Driveways, which are not through roads must end at a cul-de-sac. Emergency ingress and egress shall be provided as required by the Fire Safety Standards.

b. All new and all on-site roads shall have minimum rights-of-way easement widths as shown on the applicable road sections established under Section B, below.

c. Rights-of-way or easements for all existing off-site roads shall be sufficient to permit construction of the required road improvements, but in no case less than 40 feet wide. Where additional off-site rights-of-way or easements must be obtained, the minimum width shall be as shown on the applicable road sections established under Section B, below.

d. When roads are constructed to County Standards, all on-site and off-site rights-of-way and easements shall be offered for dedication to the County. In all other cases, the subdivider or developer shall offer for dedication to the County the on-site rights-of-way and easements and also any interest the subdivider or developer has in the off-site rights-of-way and easements.

e. When a street or road right of way is required to the boundary of the subdivision to serve adjacent undeveloped property and to facilitate future traffic circulation, the developer shall dedicate the future street right of way.

f. Where required by these standards, minimum 15-foot-wide public utility and slope easements adjacent to each side of the road right of way shall be provided and offered for dedication.

6. Reimbursement To Developer

a. Whenever a requirement that improvements installed by the subdivider for the benefit of the subdivision shall contain supplemental size, capacity, number, or length for the benefit of property not within the subdivision, and that those improvements be dedicated to the public, the subdivider may request from the County a reimbursement for costs for oversizing.

b. In the event of the installation of improvements required by Subsection 6 of Section A, above, the County may enter into an agreement with the subdivider to reimburse the subdivider for that portion of the cost of those improvements in excess of the construction required for the subdivision if the following criteria is met:

1) The improvements must reasonably be expected to benefit other properties in the immediate area.

2) The improvements shall be limited to roads, water mains, sewer mains, traffic signals, intersection improvements, bridges, and major drainage structures which are constructed "off-site."

3) The off-site improvements must constitute an expenditure equal to at least 25% of the total project cost.

c. The County will recover costs for administration of the zones and the agreements, which will be added to the reimbursable amount and will be paid by the original developer or subdivider.

d. These agreements shall only be applied to subsequent subdivisions or use permits.

B. ROAD STANDARDS

1. Classes of Roads

a. The following classes of roads are established for all uses except commercial and industrial uses:

1) Expressway- With Frontage Road - Use where indicated on General Plan Circulation Element (Appendix 2-10).

2) Arterial - Designated in the County's General Plan, arterials generally provide connections between links in the highway network and/or major destinations. Access is limited where feasible (Appendix 2-11 or Appendix 2-12).

3) Collector - Designated in the County's General Plan, collectors generally accommodate traffic between arterials and/or activity centers. Access is limited where feasible (Appendix 2-11 or Appendix 2-12).

4) Subcollector - Serves 300 or more potential lots (Appendix 2-13).

5) Major Local - Serves from 50 to 300 potential lots (Appendix 2-14).

6) Local - Serves from 25 to 49 potential lots (Appendix 2-15).

7) Minor Local - Serves from 10 to 24 potential lots in rural areas (Appendix 2-16).

Serves from 3 to 24 potential lots in urban areas.

8) Minor - Serves 3 to 9 potential lots in non-urban general plan designations areas only (Appendix 2-17).

9) Flag Lot Driveway - Serves 1 to 2 lots (Appendix 2-17).

10) Special Purpose Roads - As defined by the current edition of AASHTO, to be used only as described in A.3.d.

b. Road standards for commercial and industrial uses shall be determined by the Department of Public Works by reference to the standards of paragraph a, above, adjusted to reflect the potential traffic generated by each use in comparison to the potential traffic generated by residential uses.

2. Construction Standards

a. Construction of improvements shall conform to the applicable sections and requirements of Appendix 2-10 through Appendix 2-17, incorporated here by reference. Special Purpose Roads shall be designed by the developer's engineer using the most current AASHTO standards. In lieu of improvement plans the developer shall submit a certification by a licensed civil or traffic engineer on an approved form that the design and construction has met these standards. The Certification Form is shown in Appendix 2-3.

In the event of a conflict between the Special Purpose Road Standards and the Fire Safety Standards, the higher standard will be used.

b. Where urban road sections are required, only that portion of the required roadway which fronts on or lies within the proposed development will be required to be constructed to the full urban width. The remainder of the roadway may be constructed to the rural standard which would be required for the same class of road.

c. In the case where the street improvements have a potential of serving more lots than is immediately being planned by the subdivider, to the extent that a four-lane road will be required or where the subdivision may have a street shown on the County General Plan as a major road, the developer will be required to build only the street improvements indicated by the subdivision street standard for his subdivision, but will provide the right of way for the ultimate four-lane road. If curb and gutter is required, the developer shall install the outer portions of the road for one lane of travel in each direction plus parking.

C. ADMINISTRATION OF AIR POLLUTION MITIGATION FUND

1. Status of Fund

The fund established pursuant to paragraph a. of Subsection 3 of Section A shall be known as the Air Pollution Mitigation (APM) Fund and shall consist of the money collected pursuant to Section A, all funds received by the County in repayment of loans made pursuant to Subsection 3 of this section, all funds currently in or due to be credited to the Road Improvement Revolving Fund, and any other money directed by the Board of Supervisors to be deposited in the APM Fund.

2. Procedure

a. Between January 1 and March 1 of each year, the Director of Public Works shall recommend to the Board of Supervisors projects for the construction of paved roads to be funded by the APM Fund during the next fiscal year. When more than one project is recommended, the Director shall include a proposed priority listing. The Director's recommendations shall be based upon criteria developed by the Director in consultation with the Air Pollution Control District and shall include but not be limited to consideration of (1) providing paved roads to the most existing dwelling units for the least cost, and (2) the amount of unpaved roadway below the 1,000-foot elevation mark in each proposed project.

b. When the County has sufficient staff resources available, as determined by the Director of Public Works, to provide engineering services for roads to be constructed or reconstructed to County standards under this section, the costs of those services shall be funded by the County Road Fund. When it is necessary to employ outside engineers or consultants, the cost of such employment shall be initially borne by the APM Fund and repaid to that fund from any assessments, taxes, service charges or other revenues available for the work.

3. Use of Fund

a. Money in the APM Fund may be loaned by the County, at an interest rate set by the Board of Supervisors, to any entity formed pursuant to paragraph b., c. or d. of this subsection for the purpose of funding construction of paved roads. No money in the APM Fund may be used for road maintenance. As used in this section, "maintenance" and "construction" have the meaning ascribed to each term by Sections 27 and 29 of the Streets and Highways Code.

b. When an assessment district is proposed to fund the construction of a road, it shall be formed under Chapter 27 (commencing with Section 5870) of Part 3 of Division 7 of the Streets and Highways Code or the 1913 Municipal Improvement Act. County policies generally applicable to the formation of assessment districts apply to the formation of districts under this paragraph. Assessment districts shall not be formed under this paragraph to serve primarily new development. An assessment district formed under this paragraph may include parcels for which money was previously deposited in the APM Fund pursuant to Subsection 3 of Section A. Any assessment against such a parcel will be reduced by the lesser of the amount deposited for the parcel or the amount of the assessment against the parcel. The amount of the reduction is a charge against the APM Fund and shall be credited to the assessment district by the Auditor-Controller.

c. When a county service area (CSA) will fund construction of a road, and the CSA has adopted a road-paving program acceptable to the County, money collected from property within the CSA and deposited into the APM Fund shall be allocated by the Auditor-Controller to the CSA for use in its road-paving program. However, no funds shall be so allocated until the County has acquired the right-of-way for the proposed work and the improvement plans require the road, as constructed, to meet County standards for roads within the County's road system.

d. When a permanent road division (PRD) will fund construction of a road, and the Board of Supervisors, upon recommendation of the Director of Public Works, has adopted a road-paving program for some or all of the roads within the PRD, money collected from property within the PRD and deposited in the APM Fund shall be allocated by the Auditor-Controller to the PRD for use in its road-paving program.

D. POLICIES AND STANDARDS NOT A LIMITATION

The policies and standards established by this chapter are not a limitation upon the powers of an approving authority to protect public health and safety and to ensure consistency between projects subject to these policies and standards, the General Plan, all other applicable laws, policies and standards of Shasta County, and all applicable state and federal laws. The approving authority, by a 4/5 vote or greater may, with appropriate findings, deviate from the road policy and construction standards for an individual project if each of the following facts apply to the subject property:

1. There are unique circumstances or conditions of topography, size, shape, or location affecting such property;

2. The granting of the exception will not be detrimental to the public welfare, or injurious to or incompatible with adjacent or neighboring property; and

3. The granting of the exception will not adversely affect the County General Plan and the applicable community plan.

E. DESIGN

1. General

a. The design of all streets shall be in conformance with these development standards. Where specific information is not given, "A Policy on Geometric Design of Highways and Streets, AASHTO" current edition, or the current Caltrans "Highway Design Manual" and "Standard Plans" should be used as approved by the Director of Public Works.

b. Where streets are shown on the General Plan or any adopted Specific Plans but no plan line has been adopted by the County, the developer will be required to provide the data and establish the alignment of the streets, to the approval of the Director of Public Works.

c. The centerlines of streets entering upon opposite sides of any intersecting street shall align directly opposite of each other or the centerlines shall be offset at least 125 feet.

d. All design values shown are minimum. The designer should strive for higher values whenever possible.

e. Unless otherwise approved by the Director of Public Works, all improvement plans shall be submitted on standard 24" X 36" sheets. The minimum scale used shall be 1" = 50'; a larger scale may be required for special details.

f. Definitions

<u>LEVEL</u> terrain is the condition where highway sight distances, as governed by both horizontal and vertical restrictions, are generally long or could be made to be so without construction difficulty or major expense.

<u>ROLLING</u> terrain is that condition where the natural slopes consistently rise above and fall below the highway grade line and where occasional steep slopes offer some restriction to normal highway horizontal and vertical alignment.

<u>MOUNTAINOUS</u> terrain is that condition where longitudinal and transverse changes in the elevation of the ground with respect to a highway are abrupt and where the roadbed is obtained by frequent benching or side hill excavation.

2. <u>Design Speeds</u>

Geometric features of design shall be consistent with the following minimum design Speeds.

a. Fire Access Roads and Flaglot Driveways

There is no minimum design speed; however the minimum radius for horizontal and vertical curves shall be 50 feet.

b. Minor, Minor Local, Local, and Major Local Streets

1) Rural Designations:

CLASSIFICATION	TERRAIN		
	LEVEL	ROLLING	MOUNTAINOUS
Minor	30	20	20
Minor Local	30	30	20
Local	40	30	20
Major Local	50	40	30
	MINIMUM DESIGN SPEEDS (MPH)		

2) Urban Designations:

The preferable minimum Design Speed for all classifications is 30 MPH. When conditions warrant, as approved by the Director of Public Works, the minimum Design Speed may be reduced to 20 MPH.

c. Subcollector, Collector and Arterial Streets

1) Rural Designations:

CLASSIFICATION	TERRAIN		
	LEVEL	ROLLING	MOUNTAINOUS
Two Lane	50	40	30
Four Lane	60	50	40
	MINIMUM DESIGN SPEEDS (MPH)		

2) Urban Designations:

The minimum required design speed for all classifications is 30 MPH.

3. Sight Distance

Minimum stopping sight distance and passing sight distance are a direct function of the design speed. A height of eye of 3.50 feet and a height of object of 0.50 feet is used to determine stopping sight distance. A height of eye of 3.50 feet and a height of object of 4.25 feet is used to determine passing sight distance. All streets shall be designed using the minimum stopping sight distance criteria.

DESIGN SPEED (MPH)	ASSUMED SPEED FOR CONDITION (MPH)	STOPPING SIGHT DISTANCE (ROUNDED FOR DESIGN) (FT)	*K VALUE FOR CREST VERTICAL CURVES (ROUNDED)	*K VALUE FOR SAG VERTICAL CURVES (ROUNDED)
20	20-20	125-125	10-10	20-20
25	24-25	150-150	20-20	30-30
30	28-30	200-200	30-30	40-40
35	32-35	225-250	40-50	50-50
40	36-40	275-325	60-80	60-70
45	40-45	325-400	80-120	70-90
50	44-50	400-475	110-160	90-110
55	48-55	450-550	150-220	100-130
60	52-60	525-650	190-310	120-160
65	55-65	550-725	230-400	130-180
70	58-70	625-850	290-540	150-220
		Minimum stopping sight distance (wet pavements)		

*K value is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

4. Grades

a. Arterial Streets

1) Rural

For rural arterials decrease the maximum grade shown for urban by 2%.

2) Urban

TYPE OF TERRAIN	DESIGN SPEED (MPH)			
	30	40	50	60
	MAXIMUM GRADE (PERCENT)			
Level	8	7	6	5
Rolling	9	8	7	6
Mountainous	11	10	9	8

b. Subcollector and Collector Streets

1) Rural

TYPE OF TERRAIN	DESIGN SPEED (MPH)					
	20	30	40	50	60	70
	MAXIMUM GRADE (PERCENT)					
Level	7	7	7	6	5	4
Rolling	10	9	8	7	6	5
Mountainous	12	10	10	9	8	6

2) Urban

TYPE OF TERRAIN	DESIGN SPEED (MPH)					
	20	30	40	50	60	70
	MAXIMUM GRADE (PERCENT)					
Level	9	9	9	7	6	5
Rolling	12	11	10	8	7	6
Mountainous	14	12	12	10	9	7

Maximum grades shown for rural and urban conditions of short lengths (less than 500 ft) and on one-way down grades may be one percent steeper.

c. All other street designations:

TYPE OF TERRAIN	DESIGN SPEED (MPH)				
	20	30	40	50	60
	MAXIMUM GRADE (PERCENT)				
Level	8	7	7	6	5
Rolling	11	10	9	8	6
Mountainous	16	14	12	10	-

For streets in commercial and industrial areas, gradient design shall be less than 8%; desirably, it should be less than 5%, and flatter gradients should be emphasized.

d. Private Driveways

The maximum grade at any individual section of the driveway is 16%. Driveways with a grade of over 12% slope shall be paved in accordance with flaglot driveway standards.

e. Minimum grade (Urban streets)

To provide for proper drainage, the desirable minimum grade that should be used for streets with outer curbs is 0.30%, but a minimum grade of 0.20% may be used, if approved by the Director of Public Works.

5. Horizontal Curves

Horizontal curves shall be designed with superelevation based on the formula:

$$R = \frac{V^2}{15(S+F)}$$

where:
R = Radius of curve (feet)
V = Design speed (MPH)
S = Superelevation (ft/ft)
F = Friction factor

(V) DESIGN SPEED (MPH)	(F) FRICTION FACTOR
20	0.17
30	0.16
40	0.15
50	0.14
60	0.12
70	0.10

Every effort should be made to exceed the minimum calculated R values, and such minimum radii should be used only when the cost or other adverse effects of realizing a higher standard are inconsistent with the benefits.

For rural roads, superelevation shall be not more than 0.10 except where snow and ice conditions prevail, in which case the superelevation should be not more than 0.08.

For urban roads, superelevation shall not be more than 0.03.

Superelevation diagrams with transitions shall be shown on the improvement plans whenever the combination of curve radius and design speed indicates a need for superelevation.

For central angles smaller than 30 minutes, no curve is required.

Curve widening is required for all curves with a radius of 300 feet or less (Appendix 2-18).

6. Corner Site Distance at Rural Intersections

Intersections, including median openings, should be designed with adequate corner sight distance as follows:

DESIGN SPEED (MPH)	CORNER INTERSECTION SIGHT DISTANCE (FT)[a]
60	650[b]
50	515
40	415
30	310
20	210

[a] Corner sight distance measured from a point on the minor road at least 15 feet from the edge of the major road pavement and measured from a height of eye at 3.50 feet on the minor road to a height of object at 4.25 feet on the major road.

[b] At 60 MPH stopping sight distance governs.

Intersections should be carefully situated to avoid steep profile grades and to ensure adequate approach site distance. An intersection should not be situated on a short-crest vertical curve, just beyond a short-crest vertical curve, or on a sharp horizontal curve. When there is no practical alternate to such a location, the approach sight distance on each leg should be checked carefully.

7. Delineation

At the expense of the developer, street signs, striping, traffic delineation devices, warning and regulatory signs, guard rail, barricades and other similar devices, where required by the Department of Public Works, shall be installed according to accepted engineering practices. Signing shall be in conformance with the Department of Public Works' standards and the current State of California Uniform sign chart. Installation of traffic devices shall be subject to review and modification after construction.

The County will, at the subdivider's expense, install the signs and striping.

8. Curb and Gutter

When required, standard vertical curb and gutter shall be used in all commercial areas, on all curb returns and at all drainage inlets. In residential areas, either vertical curb and gutter or rolled curb and gutter may be used provided that drainage capacity criteria is met. The minimum transition length from rolled curb to vertical curb shall be 5 feet.

Curb, gutter, and/or sidewalk will not be required on the portion of the required access road not located within or on the boundaries of the development.

9. Structural Design of Paved Streets

The structural design of paved streets shall be based upon "R" values determined by the current California Test Method 301.

The developer shall have a private soils laboratory perform field tests to determine the "R" value of the material to be used for road construction. Using these values, the developer's engineer will establish the appropriate structural section to be used for each road. Laboratory reports and engineer's calculations used shall be submitted with the initial submittal of the improvements plans.

The following traffic indexes will be used in determining the structural design:

For Expressway - thoroughfare - the minimum traffic index shall be 9.0, or as determined by the Director of Public Works.

For Arterial and Collector Highways - the minimum traffic index shall be 7.0, or as determined by the Director of Public Works.

For Subcollector Street - the minimum traffic index shall be 6.5, or as determined by the Director of Public Works.

For Minor and Local Streets - the traffic index shall be:

(1)	minor	4.5
(2)	minor local	5.0
(3)	local	5.5
(4)	major local	6.0

Where the centerline grade exceeds 8% the required minimum thickness of A.C. shall be increased to 0.17 feet.

10. Curb Depression

Each curb return shall have a standard curb depression where sidewalks terminate at a street, driveway or a crosswalk; the final 12 inches of walk shall be marked with a series of grooves 1/4 inch wide by 1/4 inch deep at one-inch spacing for the full width of the sidewalk. This section may be deferred until construction of sidewalks occur.

11. Plan Check and Inspection Deposit

The developer shall have improvement plans prepared by a registered civil engineer for all required construction. The plans shall be approved by the Director of Public Works prior to commencement of construction.

The developer shall show existing and proposed location of all utilities, as approved by the utility company and the Director of Public Works, on the improvement plans.

Each set of plans will require an engineer's estimate which itemizes all work including unit cost amounts for each major item of work, such as grading, base, paving, concrete work, and drainage facilities. Unit cost amounts should reflect what it would cost the County to do the work if the contract was put out to bid. The unit costs will be established by the County.

A deposit to cover the improvement plan check and construction inspection is required prior to the improvement plan check. The amount of the deposit shall be as specified in the plan check and inspection deposit fee schedule, dependent upon the amount of the engineer's estimate. The plan check deposit is held by the Department of Public Works, and the actual amount of the work is charged against the project. Prior to final acceptance of the work, the actual cost against the project is determined: (1) if the amount of the deposit exceeds the costs, then the excess will be refunded; (2) if the amount of the deposit is insufficient, then the deficit amount is required.

PLAN CHECK AND INSPECTION DEPOSIT FEE SCHEDULE		
ENGINEER'S ESTIMATE	REQUIRED DEPOSIT	
	ZONE 1	ZONE 2
$0 - $5,000	$400 Minimum	$550.00
$5,000 - $20,000	6% of Estimate + $100	6% of Estimate + $250
$20,000 - $100,000	$1,200 + 2% of Amount Over $20,000	Same as Zone 1
$100,000 and up	$2,800 + 1% of Amount Over $100,000	Same as Zone 1

APPENDIX 2-4 FOR ZONE LIMITS

12. Railroad Crossings

Provisions shall be made for any and all railroad crossings necessary to provide street access to or circulation within the proposed development, including the preparation of all documents necessary for approval from the California State Public Utilities Commission and appropriate railroad for establishment and improvement of such crossing. The cost of such railroad crossing improvement, including all necessary approval documents, shall be borne by the developer.

13. Utility Systems

In the case of developments included within an existing and operating Water, Public Utility, or Community Services District, the developer shall install the utility system and appurtenances in conformance with the standards established by the district. The developer shall furnish a letter from the district certifying that the improvement design is to their standards prior to approval of construction plans by the Director of Public Works. Prior to backfilling the utility trenches, the developer shall furnish evidence from the district certifying that the improvements have been installed to their satisfaction.

14. Bridges

All highway bridges shall be designed in accordance with the current edition and interims of the AASHTO Standard Specifications for Highway Bridges, with revisions by Caltrans, unless specified otherwise in these standards.

When the Service Load Method of design is allowed, the design live load shall be HS20-44 and alternate loading.

All structures designed with the Load Factor Design (LFD) criteria shall apply the permit design live loads ("P" loads).

All bridge plans shall show General Notes containing a statement as to the criteria for design, either AASHTO Service Load or AASHTO Load Factor. In addition, as a minimum, the design live loads, allowable and design footing pressure, pile design load, and allowable design stresses for reinforced concrete, prestressed concrete or structural steel, shall be shown.

The width of all new highway bridges, shall equal the full width of the traveled way and additional width as required by AASHTO. The width shall be measured normal to the centerline between vertical faces of curb, parapet or rail. When curbs are provided on the approach roadway, they should be carried across the structure without vertical or horizontal deviation.

Vertical and horizontal clearances for traffic ways under bridges shall comply with the current AASHTO standards.

Allowable bridge materials are:

1) Structural Steel
2) Reinforced Concrete
3) Treated Timber*

*Allowed for driveways only.

a. Bridge Railings

All bridges, culverts, retaining walls or other structures will be reviewed for installation of protective railings.

The railing will conform to current applicable AASHTO, OSHA, or Caltrans standards for geometric layout and design standards.

b. Foundation Investigation for Design

A foundation investigation by an engineering geologist or civil engineer will generally be required at all bridge sites. This requirement may be waived by the Director of Public Works if site conditions show the report to be unnecessary.

All reports shall contain recommendations by the civil engineer or engineering geologist for specific design considerations for the site. Soil support values, pile tip elevations, and point of fixity or piles with extensions should be included.

When required by the Director of Public Works, the foundation report shall also contain the following information:

1) Maximum credible rock acceleration
2) The magnitude of the maximum credible event
3) Depth to "rock-like" material

c. Private Bridges (Driveways Only)

All bridges require submission of plans and calculations (prepared by a civil engineer with a current valid registration in the State of California) to the County Department of Resource Management's Building Division for issuance of a building permit.

For all permanent structures, foundations shall be constructed of masonry or concrete and, in all cases, extend below the frost lines as provided for in Section 2907 of U.B.C. Other types of foundation materials may be permitted upon submission of acceptable test data, calculations, or other information relating to the properties and load-carrying capacity of such material. Section 2517 (c), U.B.C., provides for treated timber for the support of permanent structures embedded or in direct contact with the earth. The remainder of the bridge may be constructed of any material suitable for the structural capacity.

The minimum clear width should be ten (10) feet serving one lot only and fourteen (14) feet serving two lots. The minimum vertical clearance, over the roadway, should be fourteen (14) feet. These dimensions are necessary to accommodate the legal width and height for vehicles in California.

The minimum design live load should be as required by the Fire Safety Standards but in no case less than the minimum loading of AASHTO H-15-44.

For all pedestrian bridges, the design live load should be as recommended by AASHTO at 85 pounds per square foot of walkway area.

15. Embankment Guardrail

Embankment guardrail shall be designed in accordance with the height and slope of the embankment or sidehill as shown in Appendix 2-5, Equal Severity Curve. Where guardrail is required, the embankment shall be widened to accommodate the guardrail flare as shown in Caltrans Standard Plans, dated July 1992, Std. Plan No. A77F.

16. Horizontal Distance To Fixed Object

a. On new alignments with existing fixed objects on rural County roads (without sidewalks), the minimum horizontal clearance on tangent sections from the edge of pavement to the fixed object shall be six feet. All effort should be made to exceed this minimum. Objects at or near the ends of horizontal curves may have to be relocated to increase this minimum distance.

b. On new alignment with no existing fixed objects on rural County roads (without sidewalks) the minimum horizontal clearance from the edge of pavement to the fixed object shall be beyond the catch point of the roadside ditch or beyond the catch point of the fill slope, but in no case, less than 10 feet.

F. DRAINAGE

1. Required Information

Storm drain improvements submitted for review and approval shall include the following information:

a. Complete engineering calculations for each drainage basin.

b. Culvert diameter, type, gauge or class, length, slope, inlet and outlet elevation, station, skew, and minimum cover.

2. Culverts and Storm Drains

a. Culverts under driveway entrances for roadside ditches shall be adequate to carry the design flow, but shall be not less than 12" inside diameter.

b. Culverts crossing streets shall be of a size adequate to carry the design flow, but not less than 15" inside diameter for concrete and 18" for CMP.

c. Culverts under roadway embankment shall extend a minimum of 2 feet beyond the toe of the embankment.

d. Culverts for use outside the roadway may be of any <u>county</u> approved type and strength to meet field conditions. CMP shall have a minimum thickness of 0.052 inches (18 GA.).

e. Culverts in the roadway shall be designed to standard HS20-44 live load and shall have a design life of 25 years. CMP shall have a minimum wall thickness of 0.064 inches (16 GA.).

   Soil resistivity tests by a private soils laboratory shall be performed to determine the appropriate culvert to be used. The engineer's calculations and the laboratory tests shall be submitted with the initial submittal of the improvement plans. If other evidence is available (existing culvert history in the area for example), it may be used in lieu of the resistivity tests at the discretion of the Director of Public Works.

f. The minimum cover, as measured from the top of the culvert to subgrade, shall be one foot for culverts crossing streets and zero feet for culverts under driveways. The minimum cover, as measured above, for culverts crossing streets may be reduced to zero feet when a Class "C" concrete backfill is used to support the middle third of the culvert diameter.

g. All drainage structures shall be standard Department of Public Works structures or as approved by the Director of Public Works. Inlet and outlet capacity shall be equal to the design flow.

   See Section G, "Construction Standards," paragraph 16, of these Development Standards for areas requiring City of Redding standards.

h. Storm drains shall be provided where capacity of the street is less than the design storm or where the product of the velocity in feet per second times the depth of flow in feet exceeds six.

i. The maximum allowable headwater depth (HW/D) as measured from the flow line of the culvert, shall not exceed 2.5.

j. The use of high density polyethylene corrugated pipe is approved for use under the following conditions:

   1) Corrugated high density polyethylene pipe, in sizes 12 to 36 inches in diameter, shall meet the requirements of AASHTO Designation: M-294. Type S, outer corrugated pipe wall and smooth inner liner, may be used

within the roadway prism or under driveway approaches, and where the application is approved by the Director of Public Works.

2) Maximum allowable fill heights over culverts, pending further study by Caltrans, shall be limited to 11 feet for all size.

3) Excavation and backfill shall conform to the requirements of Caltrans Standard Specifications, Section 19-3, and as shown for metal pipe on Standard Plan A62F.

4) The couplings shall be corrugated to match the pipe corrugations and the width shall not be less than 1/2 the nominal diameter of the pipe. Split couplings shall engage an equal number of corrugations on each side of the pipe joint.

5) The minimum depth of cover below finish subgrade shall be two (2) feet under County maintained roads.

6) The material shall not be used under driveway encroachments unless the ends are protected by a rigid material such as a concrete headwall.

7) Storm drain culvert ends shall be protected with concrete headwalls at all locations where mechanical cleaning of ditches or culvert entrances will be necessary.

k. The maximum length of pipe between cleanout access points shall be 200 feet for culverts having a diameter smaller than 24 inches and 300 feet for those having a diameter of 24 inches or larger. Manholes may also be required at other points. See Section 838.5 of the Caltrans Highway Design Manual for examples.

3. <u>Valley Gutters</u>

Valley gutters may be provided to carry drainage across intersections whenever underground drainage facilities cannot be reasonably provided. Valley gutters shall not be permitted on arterial, collector, subcollector, and major local streets.

4. <u>Channels</u>

Developments requiring street sections with curb and gutter shall be constructed with underground drainage facilities or formed and finished reinforced concrete lined ditches.

All open ditches having a top width 10 feet or more shall be designed in an easement wide enough to allow motor vehicles on one side. The access must be at least 10 feet wide. This requirement may be waived when, in the opinion of the Director of Public Works, access will not be needed for future maintenance and when, in the opinion of the Director of Environmental Health, access is not needed for mosquito control.

The gradient for earth ditches shall not be less than 0.7%. The gradient for lined or paved ditches and gutters shall be not less than 0.25%. Ditches shall be paved or lined when the design velocity exceeds that shown below. Ditches adjacent to the roadway section shall be paved with a dike and downdrains as required by the Director of Public Works.

New unlined drainage ditches or relocated natural drains may not be installed closer than 50 feet to the existing or proposed leach lines.

PERMISSIBLE VELOCITIES FOR UNLINED CHANNELS		
TYPE OF MATERIAL IN EXCAVATION SECTION	PERMISSIBLE VELOCITY (FEET PER SECOND)	
	INTERMITTENT FLOW	SUSTAINED FLOW
Fine Sand (Noncolloidal)	2.5	2.5
Sandy Loam (Noncolloidal)	2.5	2.5
Silt Loam (Noncolloidal)	3.0	3.0
Fine Loam	3.5	3.5
Volcanic Ash	4.0	3.5
Fine Gravel	5.0	4.0
Stiff Clay (Colloidal)	6.0	4.5
Graded Material (Noncolloidal)		
Loam to Gravel	6.5	5.0
Silt to Gravel	7.0	5.5
Gravel	7.5	6.0
Coarse Gravel	8.0	6.5
Gravel to Cobbles (Under 6 Inches)	9.0	7.0
Gravel and Cobbles (Over 8 Inches)	10.0	8.0

STANDARDS FOR CHANNEL LISTINGS			
MEAN VELOCITY (FEET PER SECOND)	THICKNESS OF LINING (INCHES)		MINIMUM REINFORCEMENT *
	SIDES	BOTTOM	
ASPHALT CONCRETE			
Less than 5	2	2-3	None
5-10	3	3-4	None
PORTLAND CEMENT CONCRETE **			
Less than 10	3-3½	3½-4	#3 bars @ 18" centers both ways
10-15	4-5	5-6	#3 bars @ 15" centers both ways
15 or More	6 or More	7 or More	#3 bars @ 12" centers both ways

*For small 'V' ditch or trapezoidal concrete lined channels less than 3' deep and 8' wide, minimum reinforcement shall be welded wire fabric 6x6-10x10.

**Air Blown Mortar may be substituted for Portland Cement Concrete where construction complies with Caltrans specifications.

5. Drainage Release

Whenever surface water is discharged from a project's boundaries and the location or method of discharge has been changed, or where the rate of discharge has been increased, the engineer of work shall investigate the impact of such on the downstream property owners. Said investigation shall include all properties affected through to the point where the surface waters collect into a defined water course. Whenever the engineer determines that the proposed change in surface water runoff has the potential to do damage or where the downstream facilities are not adequate to handle the runoff, the improvement plans shall include the work necessary to mitigate the impact of the change. If the engineer determines that there is no potential for downstream damage and/or that the downstream facilities are adequate, a statement of such shall appear on the improvement plans.

In addition to the above, it will be the developer's responsibility to obtain and record all easements and/or releases necessary to perform or facilitate the work.

6. Design Criteria

The hydrology analysis criteria shall be used to determine stream flow rates and run off volumes.

This method is applicable to all uncontrolled streams regardless of watershed size or watershed condition. It should not be used where run off is significantly affected by reservoirs or diversions nor where sufficient (20 years or more) stream flow data exists to permit use of standard statistical methods.

Once the stream flow rate and run off volumes have been established, the required drainage facilities shall be designed using accepted engineering practices. Where charts or tables are used, copies shall be submitted.

All bridges shall be designed to pass a storm with a 100-year design frequency. Minimum freeboard at bridges will be 2 feet at minor streams and 3 feet at major streams or at sites where stream debris is probable.

COUNTY OF SHASTA
DEPARTMENT OF PUBLIC WORKS AND WATER AGENCY

HYDROLOGY ANALYSIS FOR SMALL WATERSHEDS

PROJECT NAME______________________________ SHEET ______ OF ______

DRAINAGE AREA NO. __________ SCALE__________ CALC. BY ______ DATE ______

SOURCE______________________________ CK'D. BY ______ DATE ______
(Attach Copy)

STEP I - WATERSHED DATA

(a) TOTAL DRAINAGE AREA (A) — A= ac. = A= $mi.^2$

(b) LENGTH OF WATERSHED (L) — L= ft. = L= mi.

(c) ELEV. OF HIGHEST POINT IN WATERSHED (E_h)=_____ft.

(d) ELEV. OF LOWEST POINT IN WATERSHED (E_l)=_____ft.

(e) HEIGHT OF WATERSHED (H) = $E_h - E_l$ — H= ft.

STEP II - SELECT DESIGN FREQUENCY

(a) CHECK APPROPRIATE BOXES

1. ☐ A<40ac.
2. ☐ 40ac.≤A≤4 $mi.^2$
3. ☐ A>4 $mi.^2$
4. ☐ Streets with curb and gutter
5. ☐ Roadway fills exceed 10 feet
6. ☐ Sumps or retention ponds

(b) BOXES CHECKED	USE
(1) only	10 year design ☐
(2) only or (1 and 4) or (1 and 5)	25 year design ☐
(3) or (6) or (2 and 5)	100 year design ☐

STEP III - FIND (T_C)

(a) FOR NATURAL DRAINAGE BASINS WHERE A>4 $mi.^2$

$$T_c = \left(\frac{11.9L^3_{mi}}{H_{ft}}\right)^{0.385} = \_\_\_\_\_\_$$

(b) ALL OTHER BASINS

$$T_c{}^{②} = \frac{K^{①}}{60}\left(\frac{L^3{}_{ft}}{H_{ft}}\right)^{0.20} = \_\_\_\_\_\_$$

T_c = hrs.

① K = Land use constant (see attachment no. 1)
② Use 5 minute minimum

STEP IV - FIND WEIGHTED ($\overline{CN}$) CURVE NUMBER

(a)

SOIL SYMBOL①	HYDROLOGIC② SOIL GROUP	LAND USE③	AREA④ ac.	CN③	AREA X CN
______	______	______	______	______	______
______	______	______	______	______	______
______	______	______	______	______	______
______	______	______	______	______	______
______	______	______	______	______	______

TOTALS $\sum A$ = ______ $\sum A \times CN$ =

(b) $\overline{CN} = \dfrac{\sum(A \times CN)}{\sum A}$ = ______ . . . . $\overline{CN}$ =

① From "Soil Survey of Shasta County Area, Ca., "by the U.S. Dept. of Agriculture, S. C. S. and F. S., Aug. 1974.

② See attachment no. 2

③ See attachment no. 3

④ Include copy of soil survey map with soil boundaries delineated or other appropriate documentation.

STEP V - FIND RUNOFF VOLUME V_{24-D})

(a) P_{6-D} (6 hour precipitation) ① = ______ $\dfrac{P_{6-D}}{P_{24-D}}$ =

(b) P_{24-D} (24 hour precipitation) ② = ______

$\dfrac{P_{6-D}}{P_{24-D}}$ =

(c) R_{24-D} ③ . . . . R_{24-D} = in.

(d) V_{24-D} (Total volume of runoff) = $R_{24-D} \times \dfrac{A\ ac.}{12}$

V_{24-D} = ac-ft.

① See attachment no's 4 thru 6

② See attachment no's 7 thru 9

③ See attachment no's 10 and 11

STEP VI - FIND PEAK FLOW RATE (Q) @ T_C

(a) SELECT CURVE TYPE ①

☐ 1A $\dfrac{P_{6-D}}{P_{24-D}} < 0.518$ ☐ 1 $0.518 \le \dfrac{P_{6-D}}{P_{24-D}} \le 0.639$ ☐2 $0.639 < \dfrac{P_{6-D}}{P_{24-D}} \le .767$

(b) CALCULATE CURVE PARAMETER (CP)

$CP = \dfrac{\frac{200}{CN} - 2}{P_{24-D}}$ = ______ . . . . CP =

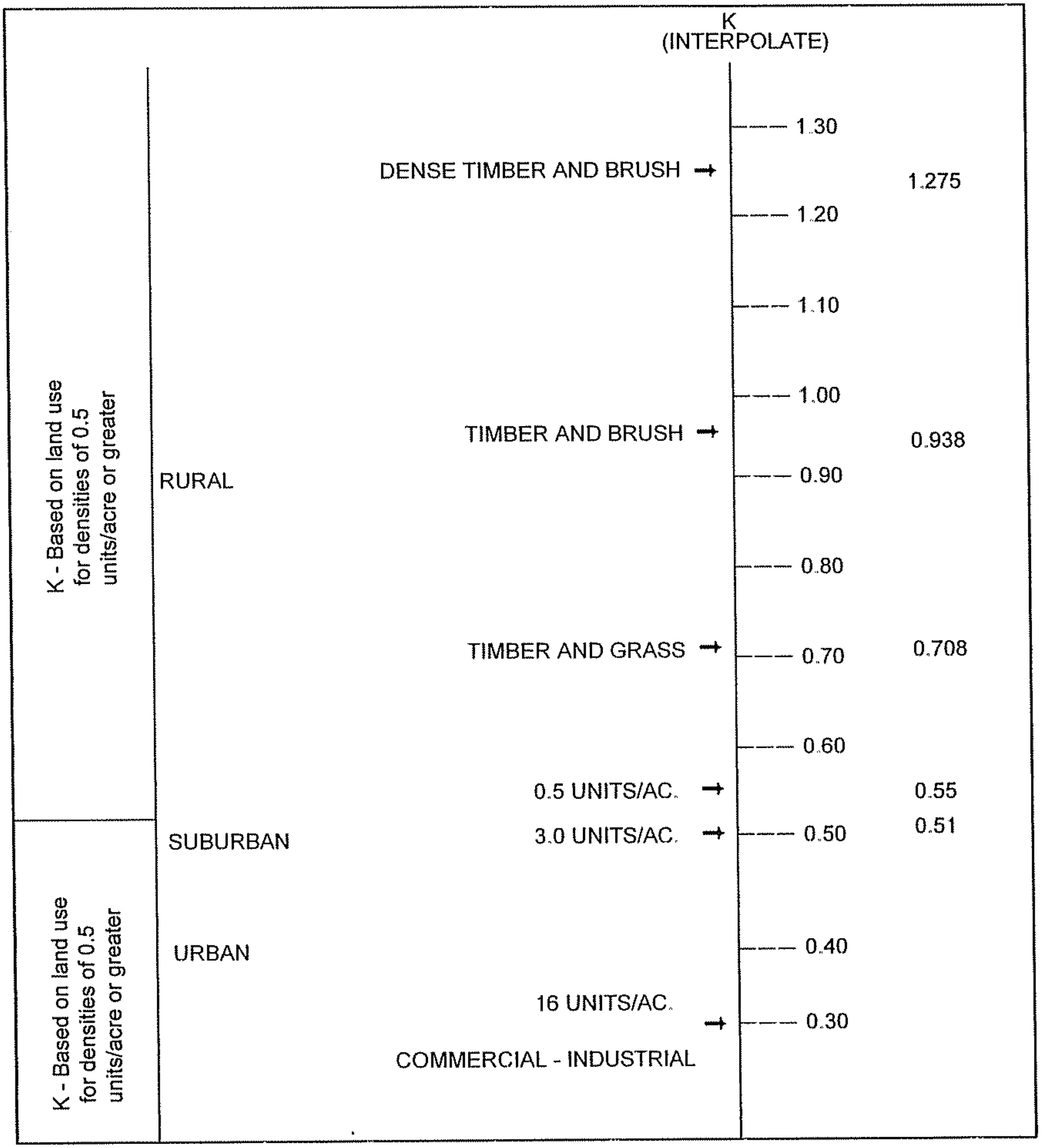
(c) FIND UNIT FLOW RATE (q)① . . . . q = csm/in

(d) $Q = q \times A_{mi^2} \times R_{24-D}$ = ______ . . . . Q = CFS

① See attachment no's 12 thru 14

ATTACHMENT NO. 1

HYDROLOGY ANALYSIS
FOR
SMALL WATERSHEADS
INTERPOLATION CHART



NOTE: Use current General Plan designations to determine ultimate development pattern of area.

For drainage areas with subareas of different development types, Tc should be calculated by summing the Tc of each subarea.

ATTACHMENT NO. 3

HYDROLOGY ANALYSIS
FOR
SMALL WATERSHEDS

"CN" RUNOFF CURVE NUMBERS FOR HYDROLOGIC SOIL-COVER COMPLEXES IN SHASTA COUNTY

LAND USE [3]		HYDROLOGIC SOIL GROUP [2]			
		A	B	C	D
Irrigated pasture		32	58	72	79
Annual grass		38	61	75	81
Broadleaf chaparral		31	57	71	78
Meadow		30	58	72	78
Open brush		41	63	75	81
Woodland-grass		32	58	72	79
Woods (Woodland)		27	55	70	77
Barren		77	86	91	93
Urban Land [1]					
Average Lot size	Average % Impervious				
⅛ acre	65	77	85	90	92
¼ acre	38	61	75	83	87
⅓ acre	30	57	72	81	86
½ acre	25	54	70	80	85
1 acre [1]	20	51	68	79	84
Commercial and business area (85% impervious)		89	92	94	95
Open spaces, lawns, parks, golf courses, cemeteries		39	61	74	80
Industrial districts (72% impervious)		81	88	91	93
Paved parking lots, roofs, driveways		98	98	98	98
Streets and roads					
Paved with curbs and storm sewers		98	98	98	98
Gravel and hard surface		76	85	89	91
Dirt		72	82	87	89

1 For urban lands with lots greater than 1 acre, use native cover.

2 Where hydrologic soil group is not known, use group D.

3 All facilities shall be designed based on ultimate land use using current general plan densities for the entire drainage area.

SUPPLEMENT TO

ATTACHMENT NO. 3

HYDROLOGY ANALYSIS
FOR
SMALL WATERSHEDS

DESCRIPTIONS OF LAND USE COVER TYPES

Irrigated pasture - Irrigated land that is planted to perennial grasses and legumes for production of forage and which is cultivated only to establish or renew the stand of plants. For hydrologic purposes, dryland pasture is considered as annual grass.

Annual grass - Areas on which the principal vegetation consists of annual grasses and weeds.

Broadleaf chaparral - Areas where the principal vegetation consists of evergreen shrubs with broad, hard, and stiff leaves. The brush cover is usually dense or moderately dense.

Meadow - Areas with seasonally high water tables, locally called cienegas, on which the principal vegetation consists of sod-forming grasses and other plants.

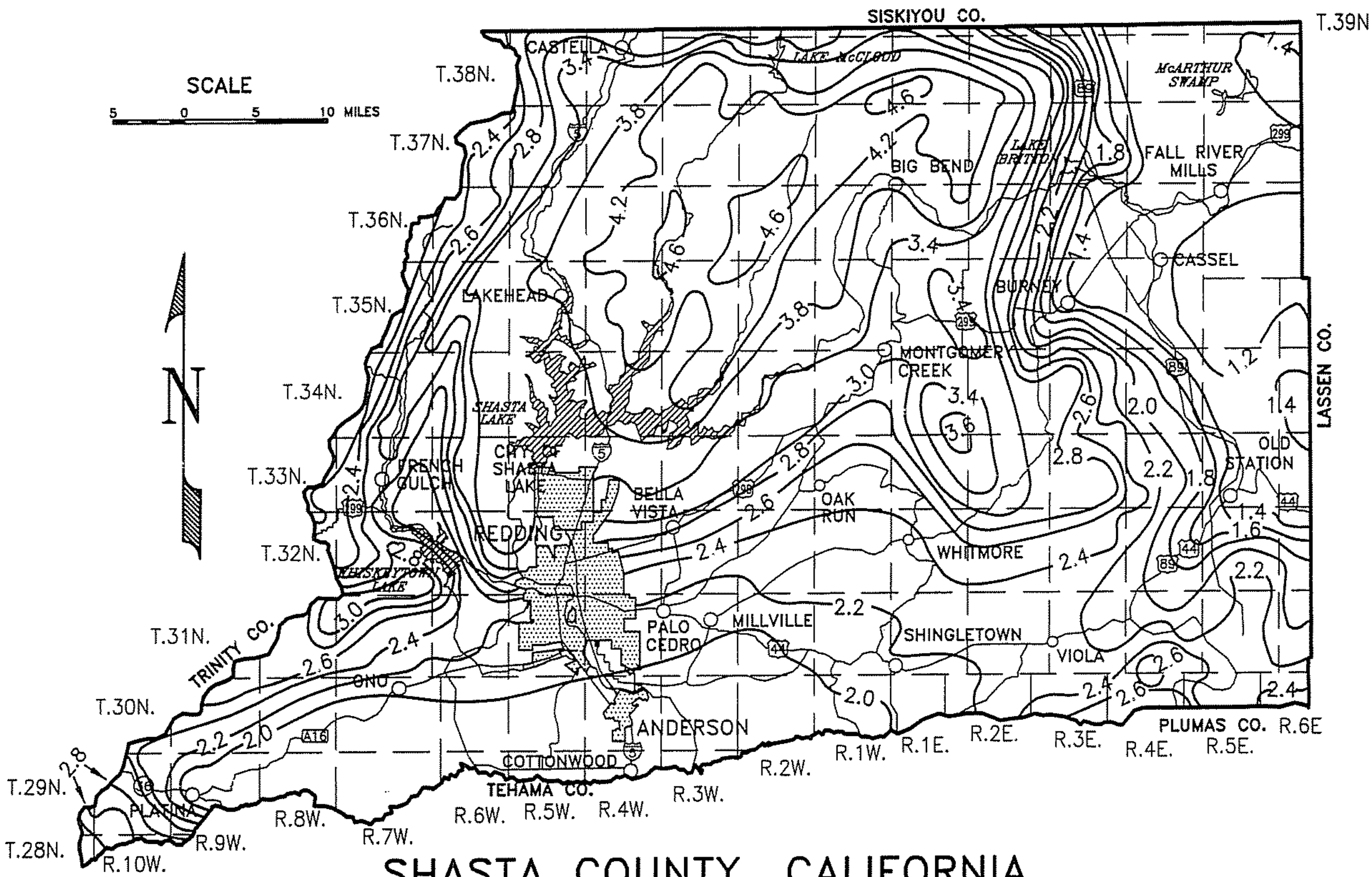
Open brush - Areas on which the principal vegetation consists of soft-woody shrubs which are grayish in color. It also includes vegetation on desert-facing slopes where Broadleaf chaparral species predominate in an open shrub cover.

Woodland-grass - Areas with an open cover of broadleaf or coniferous trees and with the intervening ground space occupied by annual grasses or weeds. The trees may occur singly or in small clumps. Canopy density, the amount of ground surface shaded at high noon, is from twenty to fifty percent.

Woods (Woodland) - Areas where coniferous or broadleaf trees predominate. The crown or canopy density is at least 50 percent. Open areas may have a cover of annual or perennial grasses or of brush. Herbaceous plant cover under the trees is usually sparse because of leaf or needle litter accumulation.

Barren - Areas with no, or practically no, plant cover; where 15 percent or less of the ground surface is protected by plants or litter. This includes rocklands, land destroyed by erosion, and shaped or graded land.

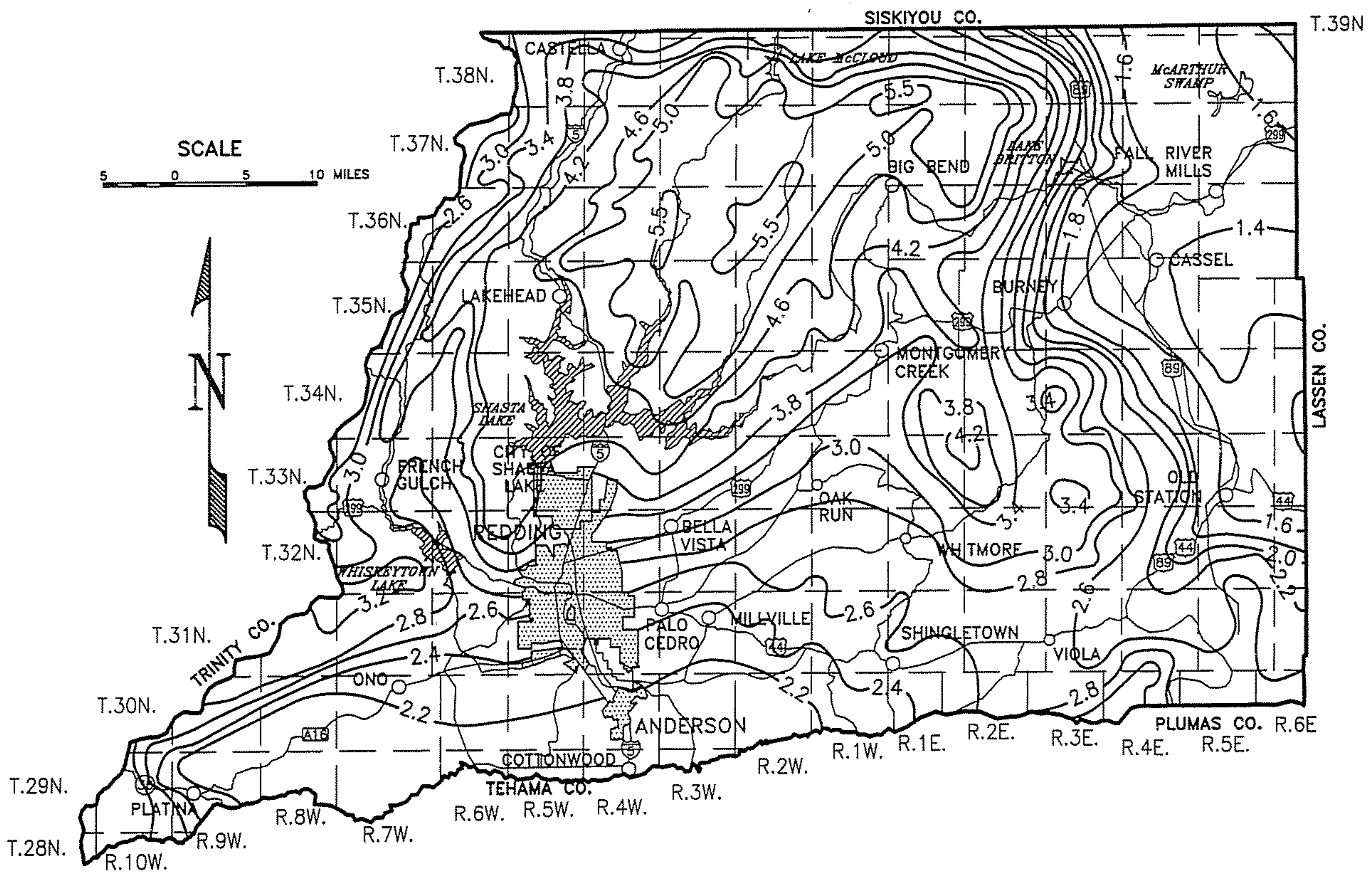
Urban Land - Urban, industrial, roads, open space, and other lands where the amount of pavements and other impervious surfaces significantly effect the runoff. Individual items are not discussed here as the table is fairly complete.



SHASTA COUNTY, CALIFORNIA

ATTACHMENT No. 4

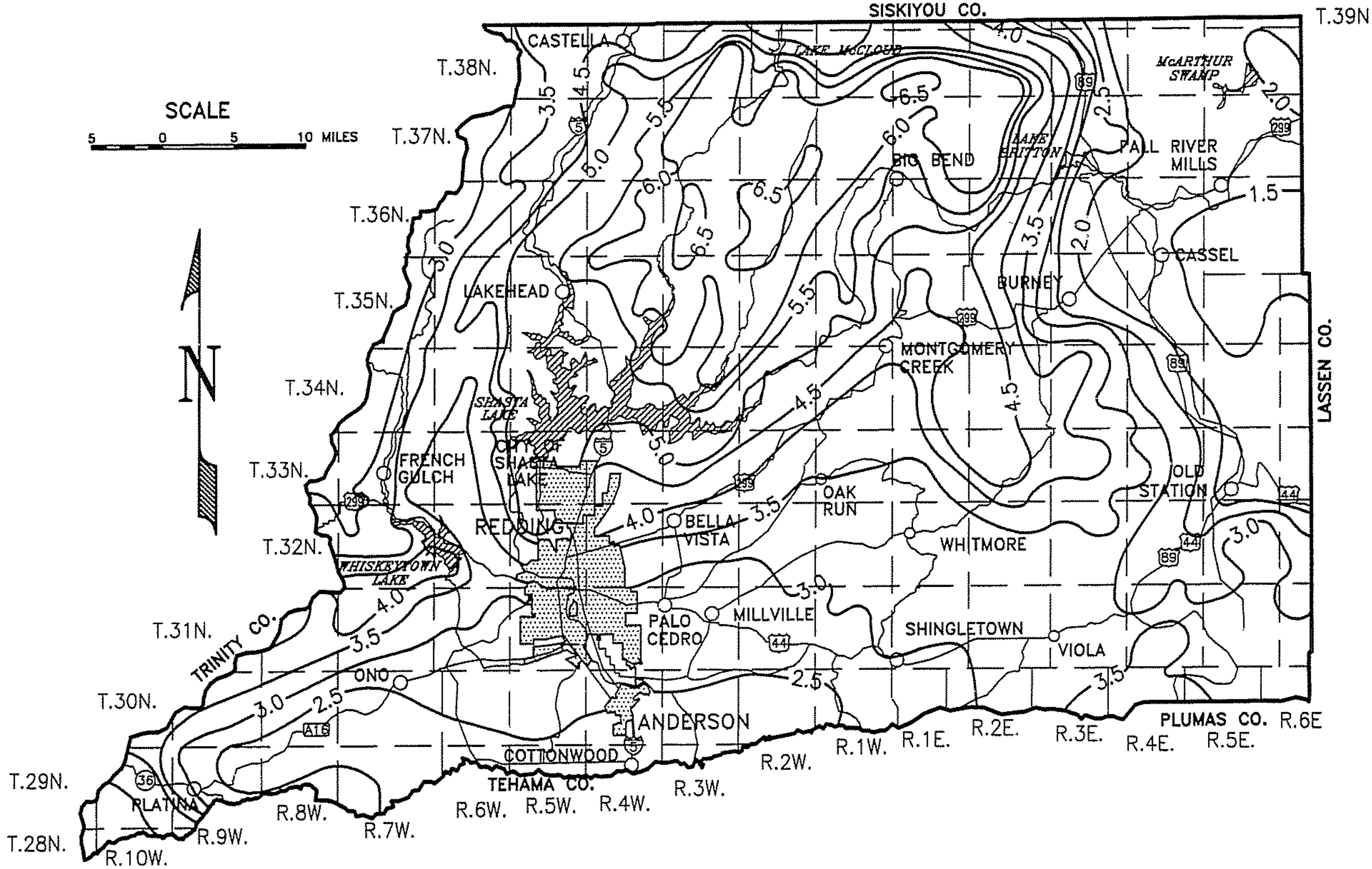
10 YEAR – 6 HOUR PRECIPITATION
ISOPLUVIALS IN INCHES



SHASTA COUNTY, CALIFORNIA

ATTACHMENT No. 5

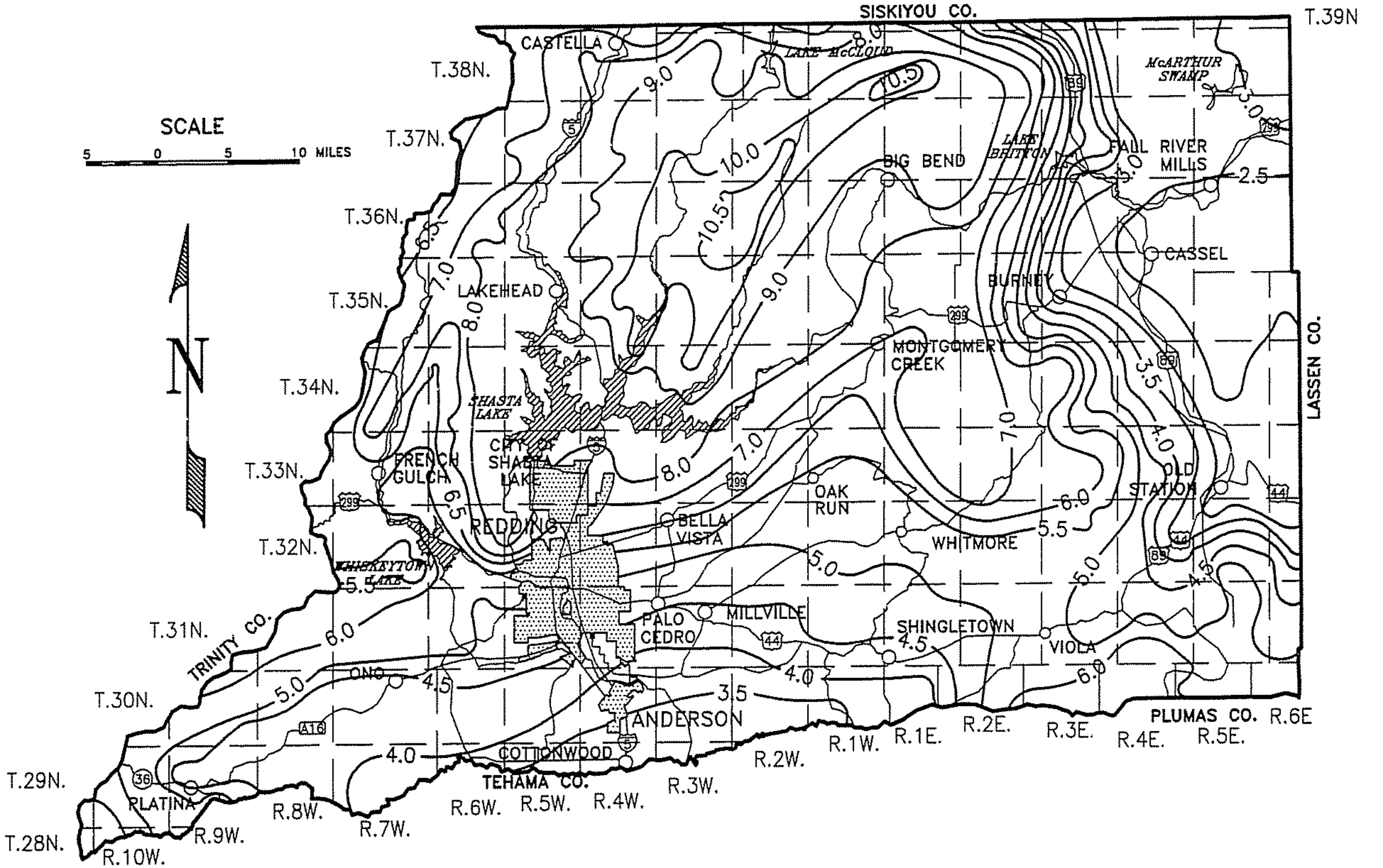
25 YEAR – 6 HOUR PRECIPITATION
ISOPLUVIALS IN INCHES



SHASTA COUNTY, CALIFORNIA

ATTACHMENT No. 6

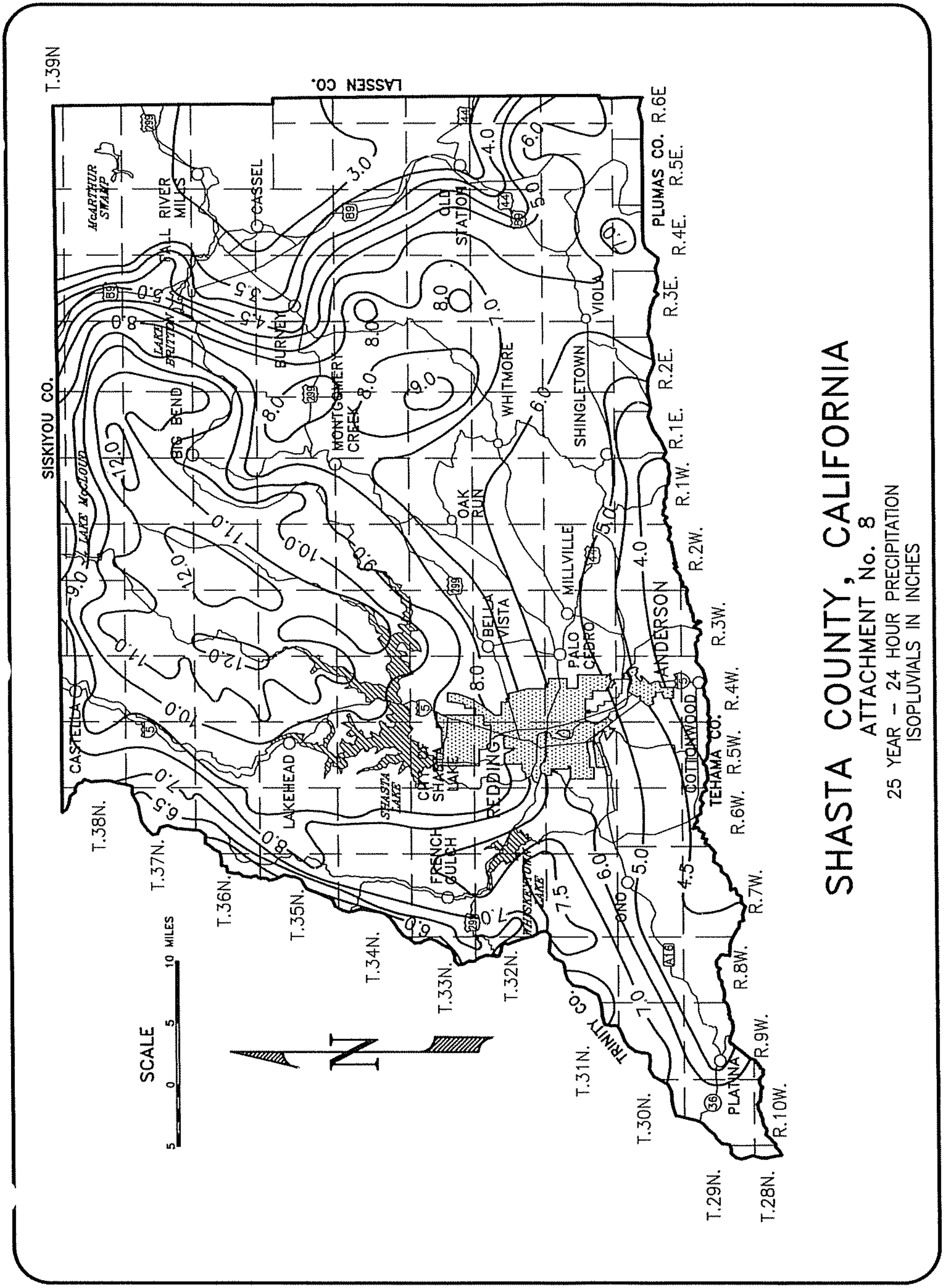
100 YEAR – 6 HOUR PRECIPITATION
ISOPLUVIALS IN INCHES



SHASTA COUNTY, CALIFORNIA

ATTACHMENT No. 7

10 YEAR – 24 HOUR PRECIPITATION
ISOPLUVIALS IN INCHES

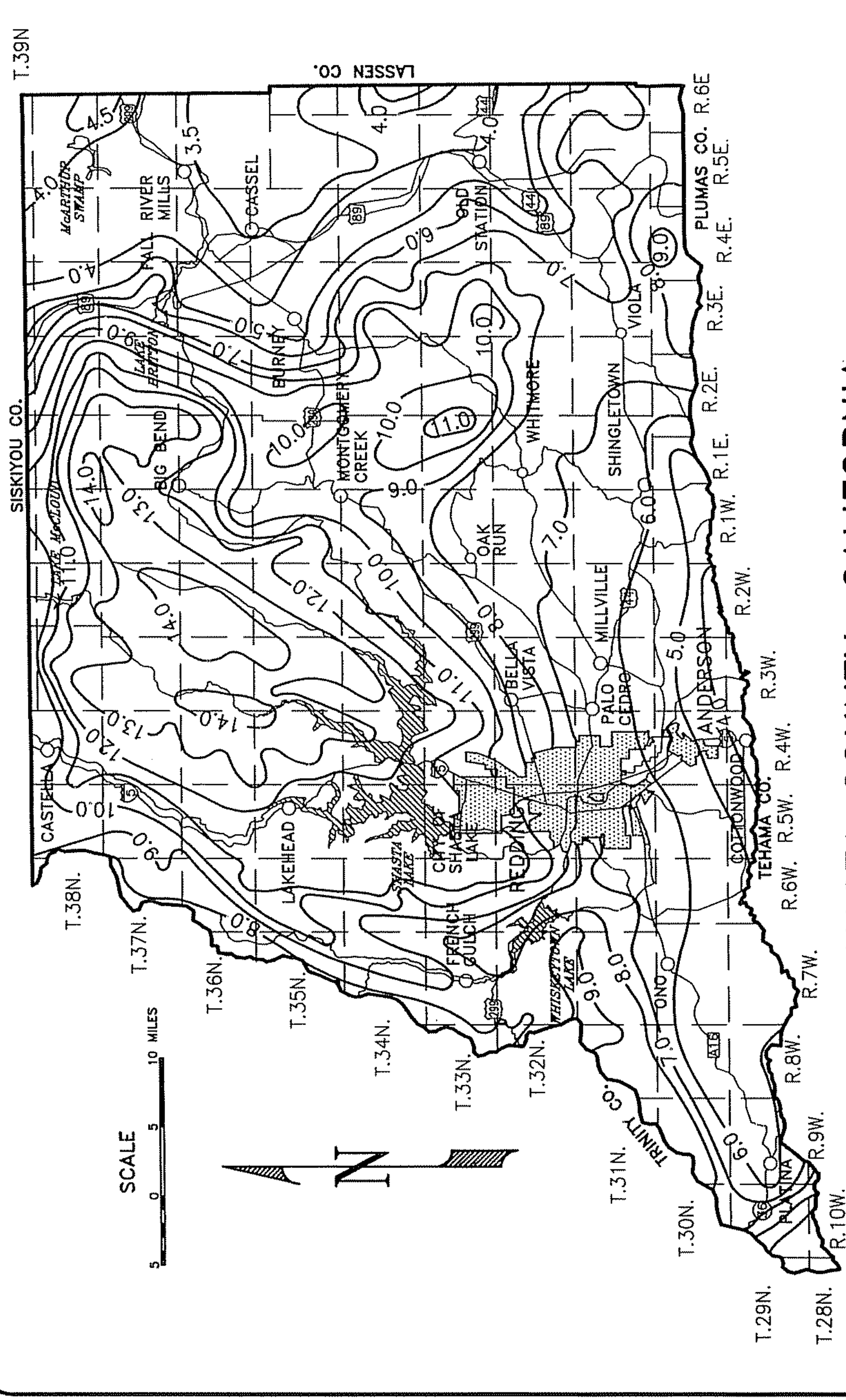


SHASTA COUNTY, CALIFORNIA

ATTACHMENT No. 8

25 YEAR – 24 HOUR PRECIPITATION

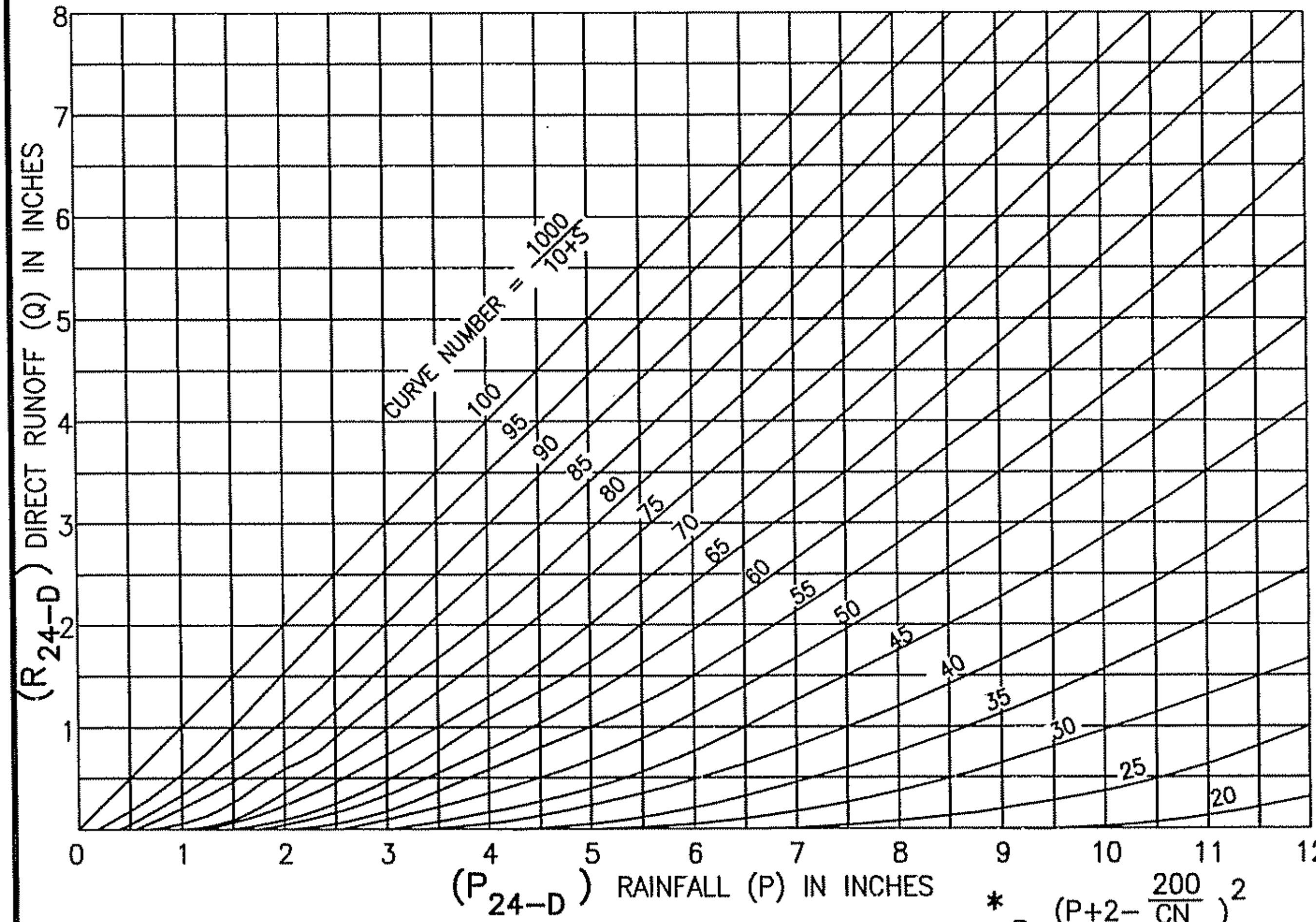
ISOPLUVIALS IN INCHES



SHASTA COUNTY, CALIFORNIA

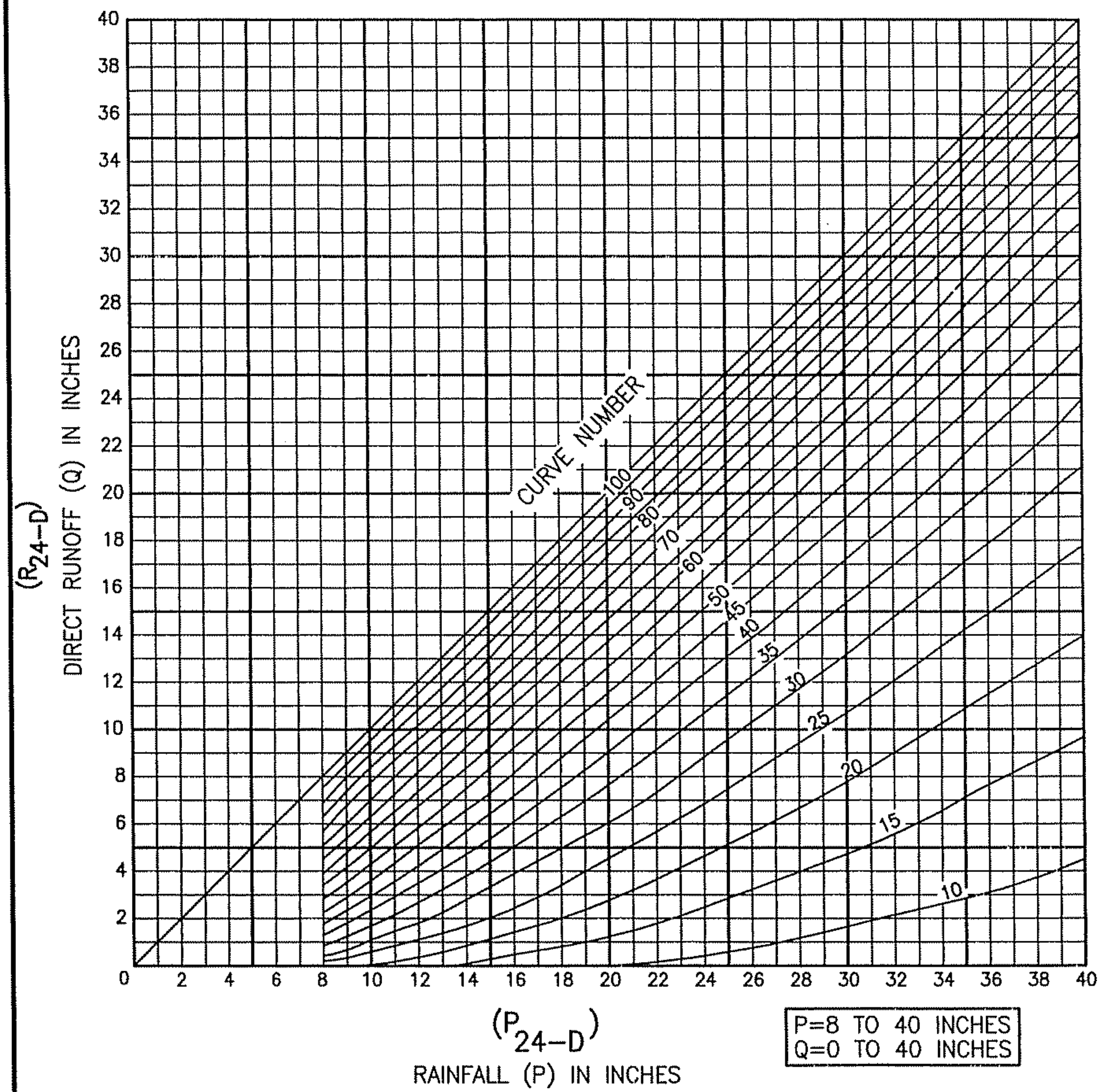
ATTACHMENT No. 9

100 YEAR – 24 HOUR PRECIPITATION
ISOPLUVIALS IN INCHES



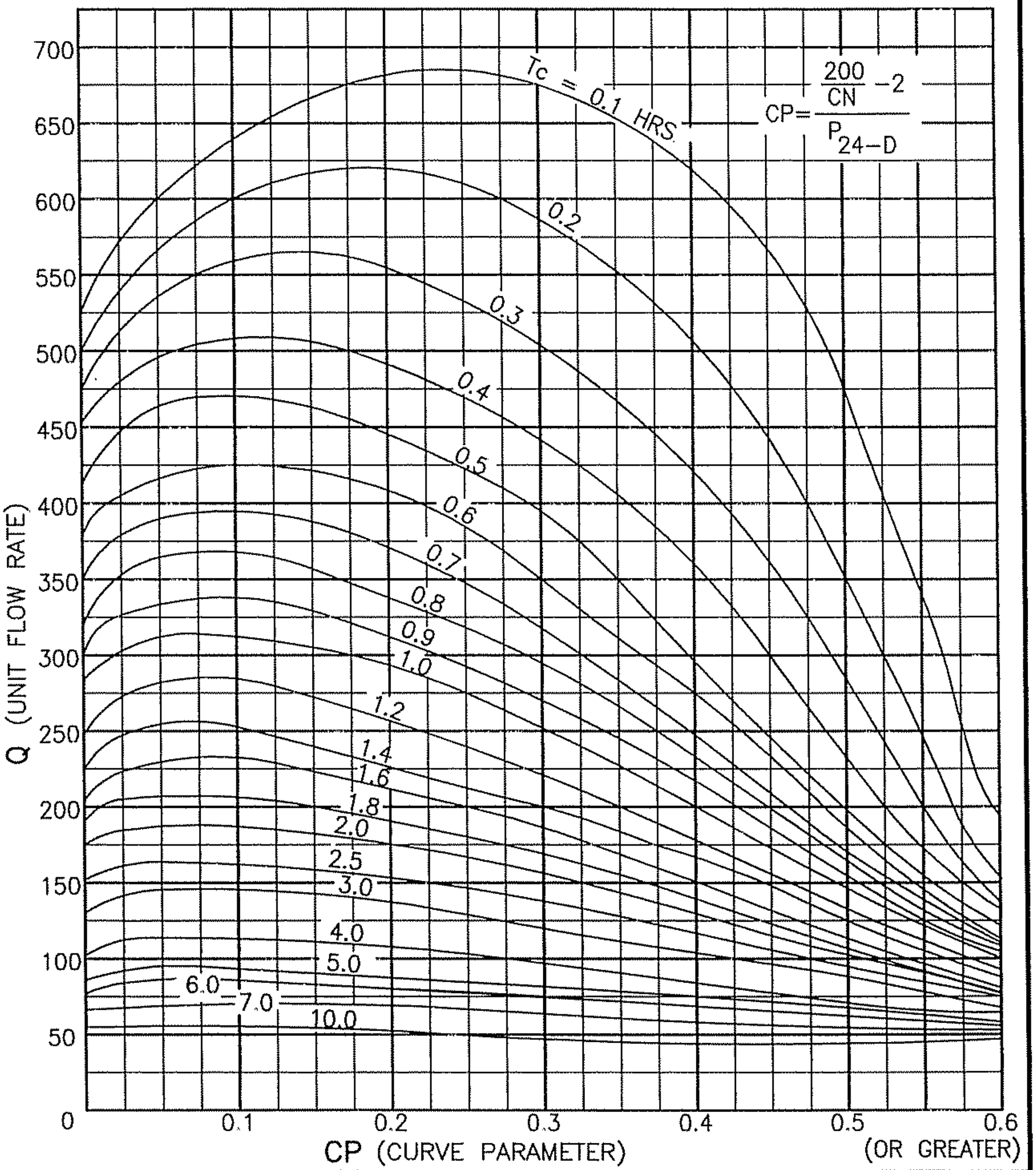
$$* \quad R=\frac{\left(P+2-\frac{200}{CN}\right)^2}{\left(P-8+\frac{800}{CN}\right)}$$

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**_HYDROLOGY ANALYSIS_** FOR **_SMALL WATERSHEDS_** ATTACHMENT No. 10
MARK	DATE	REVISION		



SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	**_HYDROLOGY ANALYSIS_** FOR **_SMALL WATERSHEDS_**
MARK	DATE	REVISION	WILLIAM E. LYMAN	ATTACHMENT No. 11

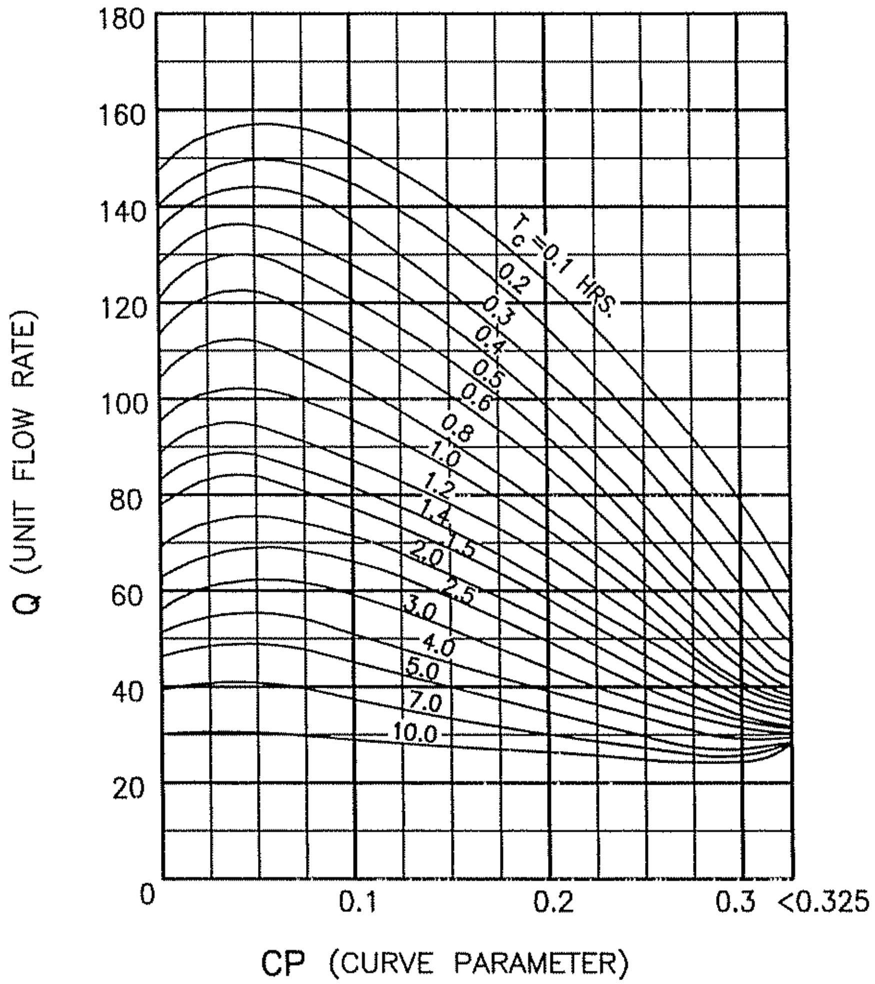
TYPE 2 CURVES FOR $0.639 \leq \frac{P_{6-D}}{P_{24-D}} \leq 0.767$



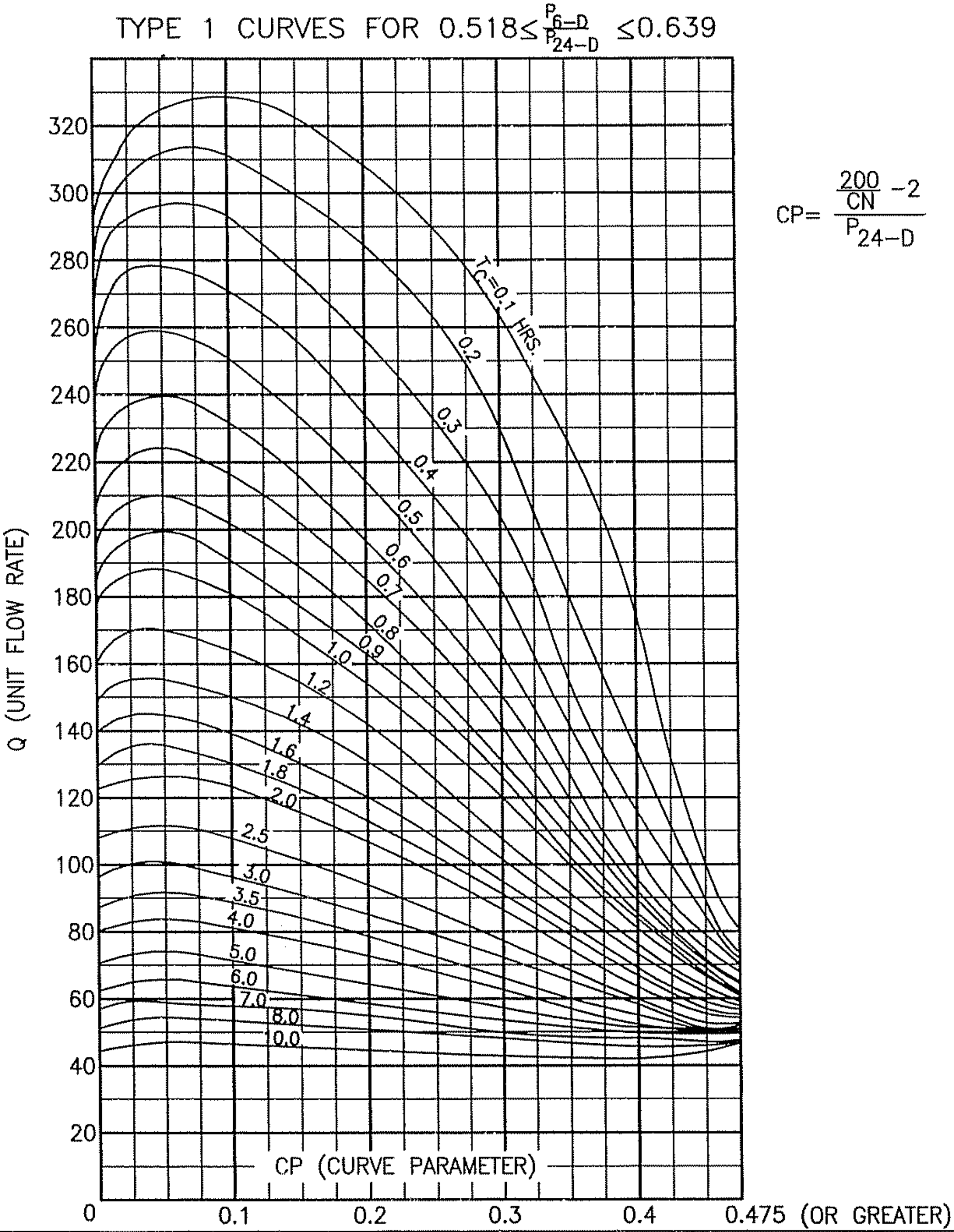
SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	***HYDROLOGY ANALYSIS*** FOR ***SMALL WATERSHEDS*** ATTACHMENT No. 12
MARK	DATE	REVISION		

$$CP = \frac{\frac{200}{CN} - 2}{P_{24-D}}$$

TYPE 1A CURVES FOR $\frac{P_{6-D}}{P_{24-D}} < 0.518$



SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	***HYDROLOGY ANALYSIS*** FOR ***SMALL WATERSHEDS***
MARK	DATE	REVISION	WILLIAM E. LYMAN	ATTACHMENT NO. 13



SCALE: NTS	DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
		APPROVED BY: William E. Lyman WILLIAM E. LYMAN	***HYDROLOGY ANALYSIS*** FOR ***SMALL WATERSHEDS*** ATTACHMENT No. 14
MARK / DATE	REVISION		

G. CONSTRUCTION STANDARDS

1. Standard Specifications

The current edition of the "Standard Specifications" of the State of California, Business and Transportation Agency, Department of Transportation, are the Standard Specifications of the County of Shasta. Said Specifications are to be read and interpreted as though the following substitutions of terms were made:

a. County of Shasta for the State;

b. The Board of Supervisors for Director of Transportation;

c. Department of Public Works of the County of Shasta for Department of Transportation;

d. The Director of Public Works of the County of Shasta acting either directly or through duly authorized agents for the Engineer;

e. The established laboratory of the Department of Public Works of the County of Shasta or laboratories authorized by the County to test materials and work involved in the contract for laboratory;

and the following SPECIAL PROVISIONS are to be added to the Specifications:

2. Requirements

Construction of improvements shall conform to the applicable provisions of the current Standard Specifications, the approved plans and Special Conditions, where directed or approved by the Director of Public Works, and these Shasta County Development Standards.

3. Control of Work

The Developer's Engineer shall set construction stakes, which shall include but not be limited to, initial control stakes, radius points, pipe grades, special ditch and centerline grades, and furnish adequate notes and copies of improvement plans that provide the contractor with sufficient information to construct the improvements and enable the County to check all work in the field. All work performed and materials incorporated therein shall be in strict conformance with the approved plans and specifications, and any change proposed must be approved by the Developer's Engineer and the County before it is incorporated in the work.

a. Permits - The developer shall obtain all necessary permits which may include, but are not limited to: encroachment permits for road, curb, gutter and sidewalk construction from Shasta County and from the California Department of Transportation; streambed alteration permit from the California Department of Fish and Game; and any other permits that may be applicable.

4. Trench Excavation and Backfill for Underground Utilities

All trench backfill between property lines in the street section shall conform to Chapter 7, Section D, “Technical Specifications for Trench Excavation, Backfill, and Surface Restoration,” of these Development Standards. In all cases, the class of backfill to be used shall be approved by the County.

Underground utilities shall include, but not be limited to, water, sewer, telephone, power service, and cable television (if applicable).

5. Asphalt Concrete

Asphalt concrete surfacing shall be 1/2 inch maximum, Type "B", and shall conform to the typical Section and Plans and to the provisions of Section 39 of the Standard Specifications.

All asphalt concrete surfacing shall have a fog seal as specified in Section 37-1 of the Standard Specifications.

6. Aggregate Base

Aggregate base shall be Class 3 and shall conform to the provisions in Section 26 "Aggregate Bases," of the Standard Specifications and the details shown on the Plans.

Aggregate for Class 3 aggregate base shall be free from vegetable matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base.

The coarse aggregate (Material retained on the No. 4 sieve) shall consist of material of which at least 25 percent by weight shall be crushed particles as determined by Test Method No. Calif. 205.

The percentage composition by weight of Class 3 aggregate base shall conform to the following grading when determined by Test Method No. Calif. 202, modified by Test Method No. Calif. 905 when there is a difference in specific gravity of 0.2 or more between the coarse and fine portion of the aggregate or between blends of different aggregates.

PERCENTAGE PASSING 3/4" MAXIMUM INDIVIDUAL TEST RESULTS		
SIEVE SIZES	MINERAL AGGREGATE	CINDERS *
1"	100	100
3/4"	90-100	90-100
No. 4	35-65	35-65
No. 30	5-35	5-37
No. 200	2-12	2-14

The aggregate base shall also conform to the following quality requirements:

TESTS	TEST METHOD NO. CALIF.	REQUIREMENTS INDIVIDUAL TEST RESULT
Resistance (R-value)[1]	310	78 min.
Sand Equivalent	217	27 min.
Durability Index	229	30 min.

* Where cinders are proposed to be used for Class 3 Base, they will be allowed only in choker sections which have a minimum of 2 feet of earth shoulder on each side of the roadway. Special Provision may be required in cut areas to release any trapped water in the roadway.

[1] The R-value requirement will be waived provided the aggregate base conforms to the specified grading and durability and has a Sand Equivalent value of 35 or more, except that the R-value requirement will not be waived for aggregates which have been treated with lime, cement of other chemical material.

7. <u>Dust Control</u>

The subdivider, or his representative, shall be responsible for preventing excessive dust nuisance during the construction operations of the subdivision. Attention is directed to Section 10 of the Standard Specifications.

8. Embankment Construction

All work involved in embankment construction shall conform to the applicable provisions of the Standard Specifications, except the relative compaction of the natural ground area shall be for a depth of six inches below the grading plane and shall not be less than 95%.

9. Excavating Below Grade

Care shall be exercised to prevent excavating below grade, and any areas excavated below grade shall be filled with suitable material and thoroughly compacted as approved by the County. All brush, roots and debris shall be removed from excavated ditch or channel.

10. Aggregate Subbase

Aggregate Subbase shall be Class 2 in conformance with the Standard Specifications.

11. Concrete

The design, proportioning and mixing of all concrete shall be approved by the Director of Public Works and in accordance with the applicable provisions of the Standard Specifications. Curb and sidewalk shall be constructed in accordance with the Standard Specifications.

12. Construction Debris

Brush and timber removed during the construction of roads or building sites shall be removed or otherwise disposed of prior to the following fire season.

Debris shall be disposed of according to the requirements of the County Department of Resource Management's Air Quality Management District.

13. Standard Construction Details

The Standard Construction Details on the following pages shall be used in all cases unless approval for the use of other details is obtained from the Director of Public Works.

14. Pipe Lines

Pipe lines for sewer, water and gas shall be installed in accordance with Chapter 7, "County Service Areas Sanitary Sewer and Water System Standards," of these Development Standards.

All pipe and other conduit shall be constructed so as to prevent leakage of water due to defective materials, improper joining, corrosion, impact, freezing or other causes.

All lines shall have trench excavation and backfill in accordance with Chapter 5, Section D, "Technical Specifications for Trench Excavation, backfill, and Surface Restoration," of these Development Standards.

15. Miscellaneous Items

Miscellaneous items not specifically covered in the Special Sections shall be constructed in accordance with the appropriate section of the Standard Specifications; or, if not covered by the Standard Specifications, shall be approved by the Director of Public Works.

16. City of Redding Standards

When developments are located within the General Plan Designations: UR, SR, C, I and MU, the current "City of Redding Public Works Construction Standards" and "Standard Specifications for Public Works Construction" shall be used, upon approval of County Director of Public Works, in lieu of County Construction Standards and Specifications. In addition, those developments located within the above General Plan designations and the City of Redding sphere of influence shall use reinforced concrete pipe in all storm drains.

17. Acceptance of Work

All work shall be inspected and approved by the County prior to final acceptance. The developer should make every effort to contact the County a minimum of 7 days prior to beginning work so that the County inspector can arrange his schedule accordingly. Failure to contact the County in a timely manner may cause undue delays in the final acceptance of the work.

18. Maintenance Bond Required

When newly constructed roads are proposed to be accepted into the County system of maintained mileage, the developer will be required to enter into an agreement with the County guaranteeing workmanship and materials for a minimum of one year. The developer will also be required to post a security acceptable to the County in an amount set by the County.

19. Construction Bond

Prior to filing a parcel map or a final map, all improvements required by the condition of approval shall be completed and approved or the developer will be required to enter into an agreement with the County guaranteeing to construct the improvements within one year. Also, the developer will be required to post a security acceptable to the County in an amount directed by the County.

20. Chip Seal

This work shall consist of an application of asphaltic emulsion followed with an application of screenings, and another application of asphaltic emulsion followed with another application of screenings.

Screenings shall be medium (3/8" x No. 6) or medium fine (5/16" x No. 8) and conform to the requirements of Section 37-1.02, "Materials," of the Standard Specifications. Asphaltic emulsion shall be LMCRS-2H grade with a liquid rubber latex additive or CRS-2H grade and shall conform to AASHTO requirements and the provisions in Section 94, "Asphaltic Emulsions," of the Standard Specifications.

Before applying asphaltic emulsion to an existing asphalt surface, all loose particles of paving, dirt and all other extraneous material shall be removed. When seal coats are to be applied to aggregate base, the base shall conform to the compaction requirements and be thoroughly dampened immediately before applying the first coat of asphaltic emulsion.

Asphaltic emulsion shall be spread at a uniform rate of between 0.35 and 0.40 gallon per square yard. Immediately following the application of the asphaltic emulsion, it shall be covered with screenings spread with a mechanical device which will spread the screenings at a uniform rate of between 20 and 30 pounds per square yard over the full width of the traffic lane in one application. After the screenings have been spread, any piles, ridges or uneven distribution shall be removed. Rolling shall consist of two complete coverages and shall begin immediately behind the spreader.

RECORDED AT REQUEST OF:
Shasta County Director of Public Works

WHEN RECORDED MAIL TO:
Shasta County Director of Public Works
1855 Placer Street
Redding, Ca 96001

NO FEE-COUNTY BUSINESS
GOV. CODE SEC. 6103
A.P. NO. ___-___-__
PROJECT: _____ No. ______

PUBLIC WORKS DEFERRED IMPROVEMENT AGREEMENT,
COVENANT AND CONSENT TO LIEN
FOR CURB, GUTTER AND SIDEWALK

This Agreement, Covenant, and Consent to Lien (the Agreement) is made and entered into by and between the County of Shasta (County), a political subdivision of the State of California, and Owner(s) ______________________.

WHEREAS, Owner, by (building permit) (encroachment permit) (use permit) subdivision) (parcel map) No. ______, is by the terms thereof, or by the County Development Policies and Standards or by County ordinance, required to (1) enter into a deferral agreement with Shasta County, prior to (issuance of the use permit) (recording the parcel map) (recording the final map) for an Encroachment Permit on) ___________________________ (County Road No. _____) for (curb and gutter) (__ foot wide sidewalk), paving from edge of existing pavement to gutter, related drainage improvements, and any required relocation of utilities. Improvement plans prepared by a registered engineer shall be submitted to and approved by the Department of Public Works prior to issuance of the Encroachment Permit, and shall constitute a part of the deferral agreement. (2) construct at his sole cost, (curb and gutter), (and) (sidewalk), (necessary drainage facilities), (and the grading, placing of aggregate base and asphalt concrete) on the road frontage for __________________, County Road Number ________.

(ADD INSERT HERE)

AND WHEREAS, County has determined that deferral of construction or installation of these improvements is appropriate under the circumstances existing at the time this agreement is executed;

NOW THEREFORE it is mutually agreed between County and Owner that:

a. Construction of the curb and gutter, sidewalks, drainage facilities, and road frontage may be deferred until such time as County notifies Owner, in writing, to proceed therewith.

b. Upon receipt of this notice, Owner shall, within 90 days, complete the construction of required curb and gutter, sidewalks, drainage facilities and road frontage. Improvements shall be constructed in accordance with the County policies, standards and ordinances in effect at the time of construction.

c. In the event of default by Owner, County is hereby authorized by Owner to cause the construction to be done and to charge the entire cost to Owner.

d. In the event of default by Owner and construction by County, the cost of the construction shall constitute a lien against all real property owned by Owners within Shasta County. If that cost is not paid by Owner within thirty (30) days after billing from County, Owner authorizes and requests County to file a notice of lien with the Shasta County recorder and to:

   1. Add any cost of less than $100.00 to the next regular tax bill, or

   2. Collect costs of $100.00 or more in two annual installments and payments of costs so deferred shall bear interest on the unpaid balance at the rate of seven percent per year.

e. Owner may prepay at any time and without penalty all or part of any unpaid costs charged against him.

f. Owner further agrees that this Agreement shall be acknowledged by him and recorded by the Department of Public Works in the office of the County Recorder of Shasta County, and that he executes this Agreement for himself, his heirs, successors and assigns, it being the intent of the parties to this Agreement that Owner's obligations shall be and are a covenant running with the land.

IN WITNESS WHEREOF, the parties have signed this Agreement this _____ day of _______________, 19__.

By ____
____________________, Owner

By ____
__________________, Owner

COUNTY OF SHASTA

Date: ________________________ By ____
Director of Public Works

By ____
Assistant Director

AND WHEREAS, owner is the owner of certain real property described below:

That parcel of land as described in the deed recorded in Book ____ of Official Records at Page ____, Shasta County Records, being a portion of (Section _____ of the P. B. Reading Grant) Section ____, Township _____ North, Range _____ (West) (East), M.D.M., in the unincorporated territory of Shasta County, State of California.

<u>ACKNOWLEDGEMENTS</u> (Check those needed)

- ☐ Individual
- ☐ Corporation
- ☐ Partnership
- ☐ DPW

RECORDED AT REQUEST OF:
Shasta County Director of Public Works

WHEN RECORDED MAIL TO:
Shasta County Director of Public Works
1855 Placer Street
Redding, CA 96001

NO FEE-COUNTY BUSINESS
GOV. CODE SEC. 6103
A.P. NO. _____-_____-____
PROJECT: U.P. ____-____

PUBLIC WORKS DEFERRED IMPROVEMENT AGREEMENT,
COVENANT AND CONSENT TO LIEN
FOR THE ASPHALT PAVING

This Agreement, Covenant, and Consent to Lien (the Agreement) is made and entered into by and between the County of Shasta (County), a political subdivision of the State of California, and Owners, ____.

WHEREAS, Owner, by (Use Permit) (Encroachment Permit) (Subdivision) (Parcel Map) No. ______-_____, is by the terms thereof, or by the County Development Policies and Standards or by County Ordinance, required to enter into a deferral agreement to pay his fair share for the future asphalt paving of the following described road:

Street name: ____
Construction Limits: ______________________________________
Required standard: ________________________ Paving Width _________

ADD INSERT HERE

AND WHEREAS, County does allow that deferral of construction of these improvements is appropriate under the circumstances existing at the time this agreement is executed;

NOW THEREFORE it is mutually agreed between County and Owner that:

a. Construction of the above may be deferred until such time as County notifies owner, in writing that an Assessment District is being formed.

b. When an Assessment District is formed to bring road into the County Road System, improvements shall be constructed in accordance with the County policies, standards and ordinances in effect at the time of construction. Owner further agrees to pay his fair share in the event an assessment district is formed.

c. Owner further agrees that this Agreement shall be acknowledged by him and recorded by the Department of Public Works in the office of the County Recorder of Shasta County, and that he executes this Agreement for himself, his heirs, successors and assigns, it being the intent of the parties to this Agreement that Owner's obligations shall be and are a covenant running with the land.

IN WITNESS WHEREOF, the parties have signed this Agreement this ______ day of ______________, 19____.

By ______________________________
______________________________, (Owner)

By ______________________________
______________________________, (Owner)

COUNTY OF SHASTA

Date: ______________________________

By William E. Lyman
Director of Public Works

By ______________________________
Assistant Director

ADD ACKNOWLEDGEMENTS NEXT PAGE

- ☐ Individual
- ☐ Partnership
- ☐ Partnership
- ☐ DPW

AND WHEREAS, owner is the owner of certain real property described below:

That parcel of land as described in the deed recorded in Book ____ of Official Records at Page ____, Shasta County Records, being a portion of (Section _____ of the P. B. Reading Grant) Section ____, Township _____ North, Range _____ (West) (East), M.D.M., in the unincorporated territory of Shasta County, State of California.

ENGINEER'S CERTIFICATION OF
SPECIAL PURPOSE ROAD COMPLIANCE

The Tentative Map of Tract No. __________, ____ __________________ Subdivision was approved by the Shasta County Planning Commission on ____ ___________, 19___.

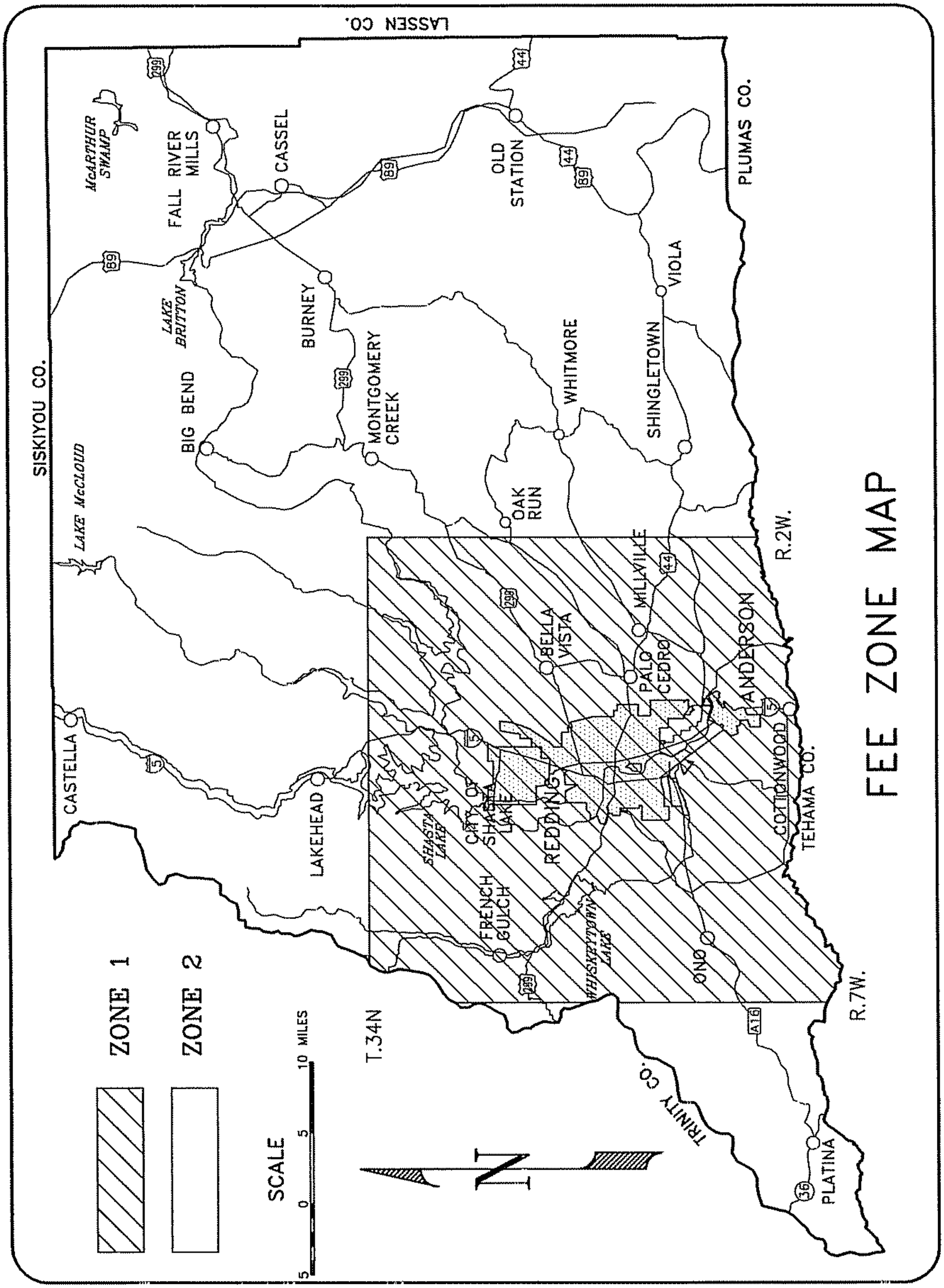
This map was approved utilizing the Special Purpose Road Standard described in Shasta County's Development Standards.

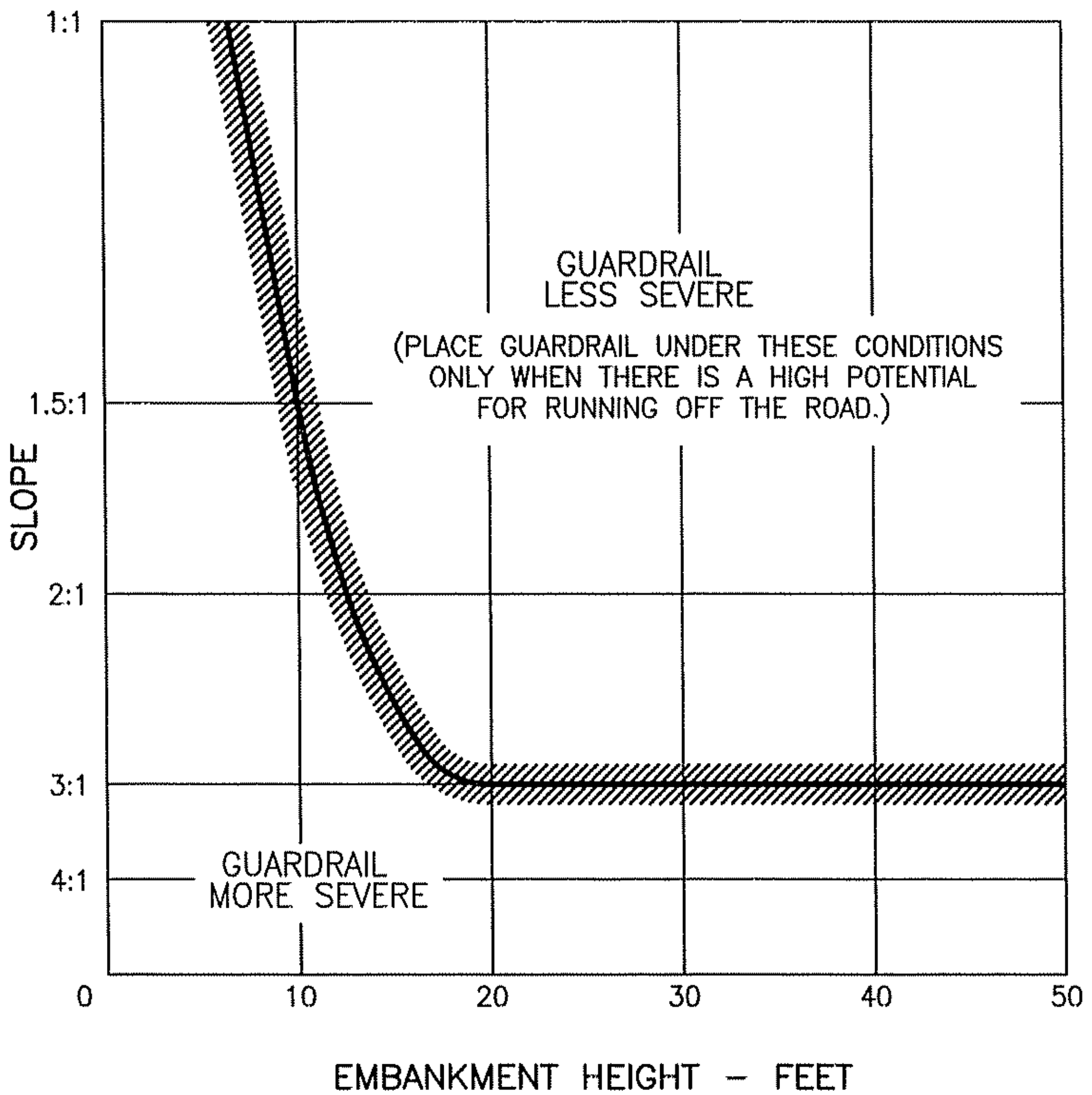
As a registered Civil or Traffic Engineer in California having errors and omissions insurance in a minimum amount of $500,000 coverage, I hereby certify that the roads in Tract No. ____ __________ were designed and constructed in accordance with the provisions of the Special Purpose Road Standards and the County Fire Safety Standards, and that the maximum anticipated traffic volume on any road will not exceed 100 vehicle trips per day.

Signed ______________________________________

Date ____

Seal and Expiration
Date


FEE ZONE MAP
ZONE 1
ZONE 2
SCALE
0
5
10 MILES
T.34N
R.7W.
R.2W.
SISKIYOU CO.
LASSEN CO.
PLUMAS CO.
TEHAMA CO.
TRINITY CO.
CASTELLA
LAKEHEAD
LAKE McCLOUD
SHASTA LAKE
CITY OF SHASTA LAKE
FRENCH GULCH
WHISKEYTOWN LAKE
REDDING
BELLA VISTA
PALO CEDRO
MILLVILLE
ANDERSON
COTTONWOOD
ONO
PLATINA
BIG BEND
LAKE BRITTON
MONTGOMERY CREEK
BURNEY
OAK RUN
WHITMORE
SHINGLETOWN
VIOLA
OLD STATION
FALL RIVER MILLS
CASSEL
McARTHUR SWAMP



SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	**EMBANKMENT GUARDRAIL PLACEMENT** EQUAL SEVERITY CURVE
MARK	DATE	REVISION		

COUNTY OF SHASTA
STATE OF CALIFORNIA
AGREEMENT - PARCEL MAP WITH PLANS

.HIS AGREEMENT, made and entered into this ____ day of __________, 19___, by and between the County of Shasta, a political subdivision and one of the counties of the State of California (hereinafter referred to as COUNTY), and ____________ (hereinafter referred to as the DEVELOPER)

WITNESSETH:

WHEREAS, the DEVELOPER is creating a development in the County of Shasta, State of California, known as Parcel Map __-__, and

WHEREAS, the COUNTY has approved the parcel map on said development subject to certain conditions.

NOW, THEREFORE, in order to meet said conditions and to qualify said parcel map for recordation, DEVELOPER agrees and covenants with COUNTY as follows:

FIRST: That the DEVELOPER shall perform the following work to the sole satisfaction of the COUNTY and in accordance with the conditions of approval and the specifications of the County of Shasta, and subject to the approval of the COUNTY Director of Public Works, as follows:

(a) Construct the improvements within one (1) year from the date of this agreement, in accordance with the plans approved by the Director of Public Works on __________, 19__;

(b) Perform any changes or alterations in the approved plans required by the Director of Public Works, provided that all such changes or alterations do not exceed a sum of $_____ (______________________ DOLLARS) or 10 percent of the original estimated cost of the improvement, whichever is greater.

SECOND: DEVELOPER agrees to perform said work at sole cost and expense, and hereby agrees to furnish an improvement security in the sum of $_____ (__________________ DOLLARS) guaranteeing that they will faithfully and properly perform the construction required by this Agreement, and hereby agrees to furnish an improvement security in the sum of $_____ (__________________________ DOLLARS) securing payment for labor and materials; that said improvement securities must be satisfactory to the COUNTY, and must be filed with the County on the date this agreement is executed.

IN WITNESS WHEREOF, COUNTY has caused its seal to be hereunto affixed by its Officers thereunto duly authorized, and the DEVELOPERS has set his hand the day and year first above written.

COUNTY OF SHASTA

By______________________________
______________________________Chairman
Board of Supervisors

ATTEST

Carolyn Taylor
Clerk of the Board
County of Shasta

By__________________________
Deputy

By______________________________
Developer

Approved as to form:

By Karen Keating Jahr
County Counsel

COUNTY OF SHASTA
STATE OF CALIFORNIA
AGREEMENT - SUBDIVISION IMPROVEMENT

.HIS AGREEMENT, made and entered into this _____ day of _______________ , 19____, by and between the **County of Shasta**, a political subdivision and one of the counties of the State of California (hereinafter referred to as COUNTY), and ________________ (hereinafter referred to as the DEVELOPER)

WITNESSETH:

WHEREAS, the DEVELOPER is creating a subdivision in the County of Shasta, State of California, known as ___________________ **Subdivision, Tract No.** ____, and

WHEREAS, the Board of Supervisors has approved the final map on said subdivision and accepted the dedications for public streets contained therein,

NOW, THEREFORE, in order to meet said conditions of approval and to qualify said subdivision map for final acceptance and recordation, DEVELOPER agrees and covenants with County as follows:

FIRST: That the DEVELOPER shall perform the following work to the sole satisfaction of the COUNTY and in accordance with the conditions of approval and the specifications of the County of Shasta, and subject to the approval of the County Director of Public Works, as follows:

(a) Construct the improvements within one (1) year from the date of this recordation of said map, in accordance with the plans approved by the Director of Public Works on __________, 19__ and the Shasta County Subdivision Improvement Standards.
(b) Perform any changes or alterations in the approved plans required by the Director of Public Works, provided that all such changes or alterations do not exceed a sum of $_____.00 (_____________ DOLLARS) or 10 percent of the original estimated cost of the improvement.
'c) Maintain the work for a period of one (1) year following the completion and acceptance thereof, make good any defective work or labor done or defective materials furnished in the performance of the construction, and furnish a maintenance security prior to acceptance of the work.
(d) Complete all survey work and establish survey monuments.

SECOND: DEVELOPER agrees to perform said work at sole cost and expense, and hereby agrees to furnish an improvement security in the sum of $______.00 (______________ DOLLARS) guaranteeing that they will faithfully and properly perform the construction required by this Agreement, and hereby agrees to furnish an improvement security in the sum of $______.00 (____________________ DOLLARS) securing payment for labor and materials; that said improvement securities must be satisfactory to the COUNTY, and must be filed with the County on the date this agreement is executed.

IN WITNESS WHEREOF, COUNTY has caused its seal to be hereunto affixed by its Officers thereunto duly authorized, and the DEVELOPER has set his hand the day and year first above written.

COUNTY OF SHASTA

ATTEST
Carolyn Taylor
Clerk of the Board
County of Shasta

By_____________________________
Deputy

By____
____Chairman
Board of Supervisors

By____
DEVELOPER

Approved as to form:

By Karen Keating Jahr
County Counsel

COUNTY OF SHASTA
STATE OF CALIFORNIA
AGREEMENT

THIS AGREEMENT, made and entered into this day of , by and between the County of Shasta, a political Subdivision and one of the counties of the State of California (hereinafter referred to as County), and (hereinafter referred to as Developer),

WITNESSETH:

WHEREAS, Developer has constructed public improvements in ______________________ Subdivision, Tract No. _____, in accordance with the plans and specifications as approved by the County Director of Public Works, and

WHEREAS, County has approved the final map on said subdivision and accepted the public improvements within said subdivision,

NOW, THEREFORE, in order to qualify said subdivision (parcel) map for final acceptance, Developer agrees and covenants with County as follows:

FIRST: That Developer shall maintain the work for a period of one (1) year from the date of this agreement and shall make good any defective work or labor done or defective materials furnished in the performance of the construction of the public improvements.

SECOND: The Developer agrees to maintain said work at sole cost and expense and hereby agrees to furnish a security in the sum of $_______.00 (________________ DOLLARS) guaranteeing that they will maintain the public improvements as required by this agreement.

IN WITNESS WHEREOF, the County has caused its seal to be hereunto affixed by its Officers thereunto duly authorized, and the Developer has set their hands the day and year first above written.

COUNTY OF SHASTA

Approved as to form:

____

______________________Chairman
Board of Supervisors

By Karen Keating Jahr
County Counsel

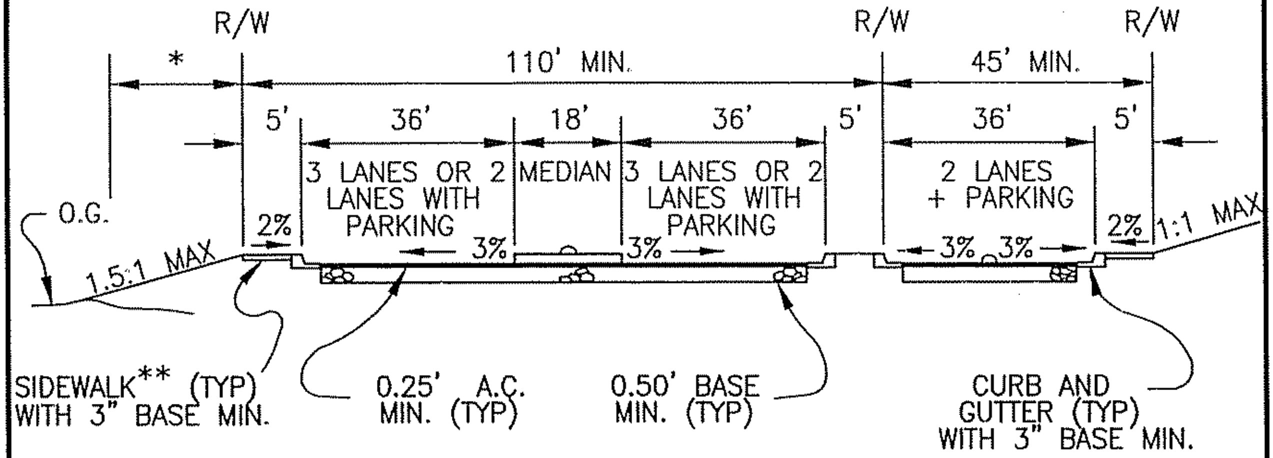
DEVELOPER

ATTEST:

____

Carolyn Taylor
Clerk of the Board
County of Shasta

By______________________
Deputy



TYPICAL STREET SECTION

SEE NOTES UNDER COLLECTOR AND ARTERIAL RURAL STREET SECTIONS

NOTES:

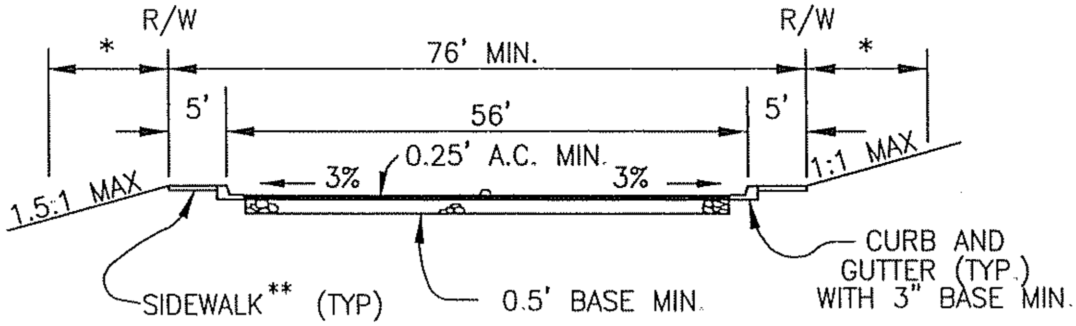
* SLOPE AND UTILITY EASEMENT AS REQUIRED, BOTH SIDES OF R/W

** 10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

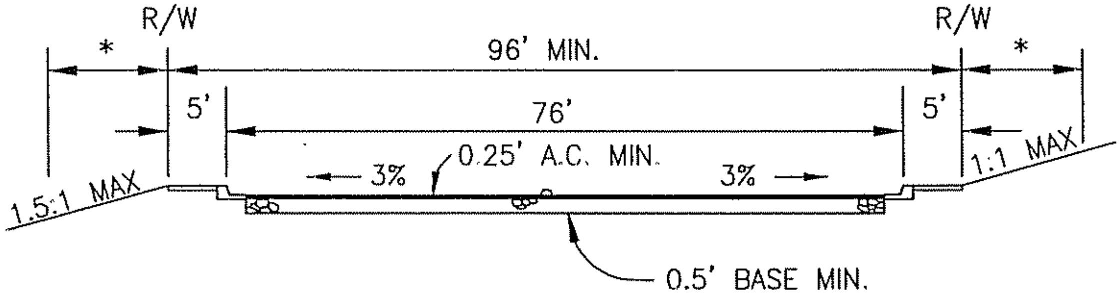
URBAN AREAS ONLY.

MIN. TRAFFIC INDEX = 9.0

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	EXPRESSWAY WITH FRONTAGE ROAD
MARK	DATE	REVISION	WILLIAM E. LYMAN	



2 LANES
WITH PARKING AND MEDIAN



4 LANES
WITH PARKING AND MEDIAN

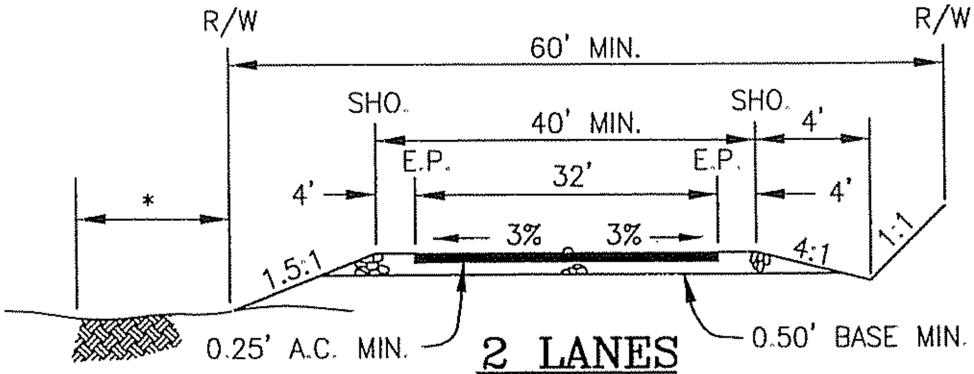
TYPICAL STREET SECTIONS
SEE NOTES UNDER COLLECTOR AND ARTERIAL RURAL STREET SECTIONS

NOTES:

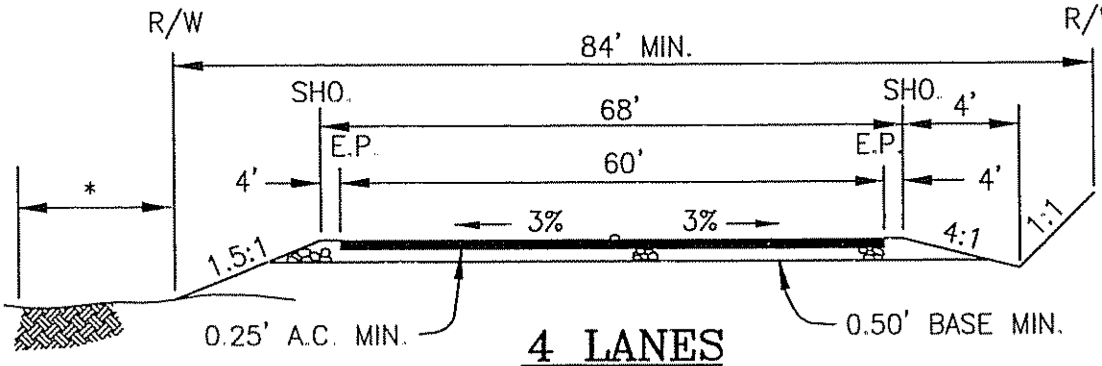
* SLOPE AND UTILITY EASEMENT AS REQUIRED
** 10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

MIN. TRAFFIC INDEX = 7.0

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	COLLECTOR AND ARTERIAL URBAN
MARK	DATE	REVISION		



2 LANES



4 LANES

WITH MEDIAN

TYPICAL STREET SECTIONS

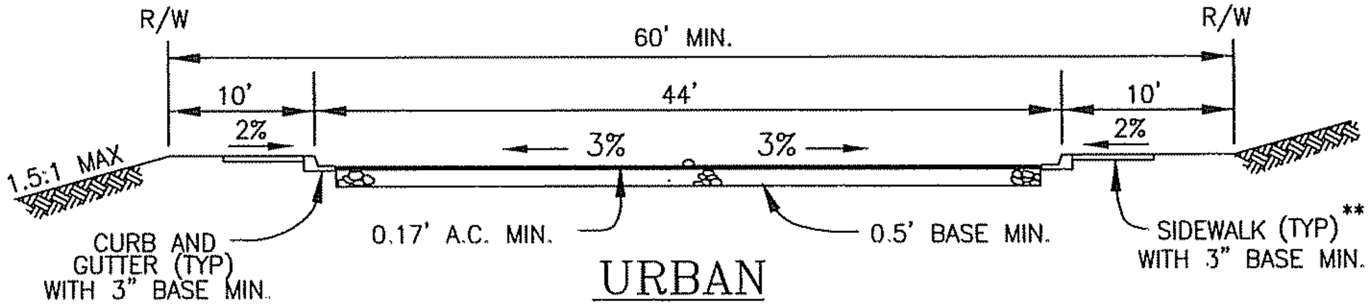
* SLOPE AND UTILITY EASEMENT AS REQUIRED. BOTH SIDES OF R/W.

NOTES

1. WIDENING MAY BE REQUIRED AT MAJOR STREET INTERSECTIONS FOR TURNING LANES.
2. URBAN STREET SECTIONS ARE REQUIRED IN GENERAL PLAN AREAS UR, SR, C, I, AND MU; AND WHERE URBAN TYPE DEVELOPMENTS ARE LOCATED IN RURAL AREAS.
3. FOR SPECIAL CIRCUMSTANCES, THE RIGHT OF WAY WIDTH CAN BE MODIFIED TO ACCOMODATE THE REQUIRED ROADWAY SECTION.
4. FINAL STRUCTURAL SECTIONS TO BE DETERMINED BY 'R' VALUE TESTING.

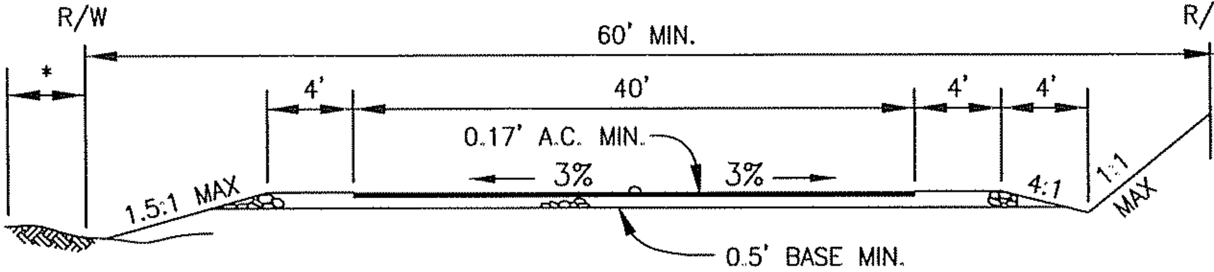
MIN. TRAFFIC INDEX = 7.0

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	COLLECTOR AND ARTERIAL RURAL
MARK	DATE	REVISION		



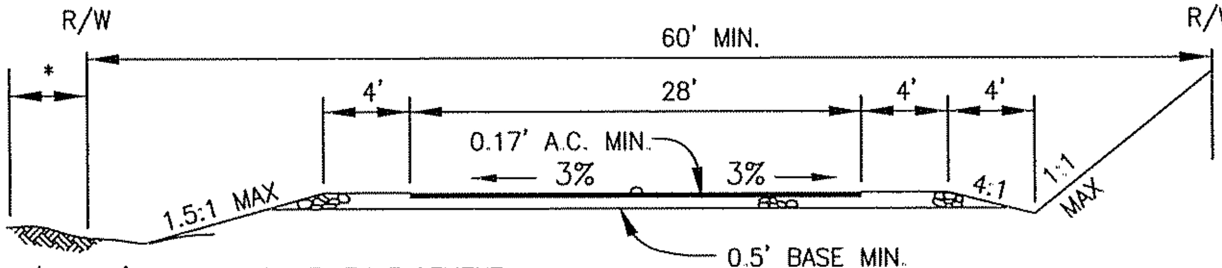
URBAN

TO BE USED IN GENERAL PLAN DESIGNATIONS UR, SR, SRI, I, AND MU.



SUBURBAN

TO BE USED IN THE SRI GENERAL PLAN DESIGNATION WHEN THE AVERAGE PARCEL SIZE IS ONE ACRE AND THE AVERAGE FRONTAGE IS MORE THAN 150 FEET, OR WHERE DENSITY AVERAGING CREATES BUILDING SITES WITH AN AVERAGE FRONTAGE OF MORE THAN 150'. A 50 FOOT BUILDING SETBACK WILL BE REQUIRED IN ALL CASES WHERE THIS STANDARD APPLIES. THIS STANDARD WILL NOT BE ALLOWED IF IT CREATES A DISCONTIGUOUS PATTERN OF DEVELOPMENT.



* = 15' SLOPE AND UTILITY EASEMENT AS REQUIRED - BOTH SIDES OF R/W

RURAL

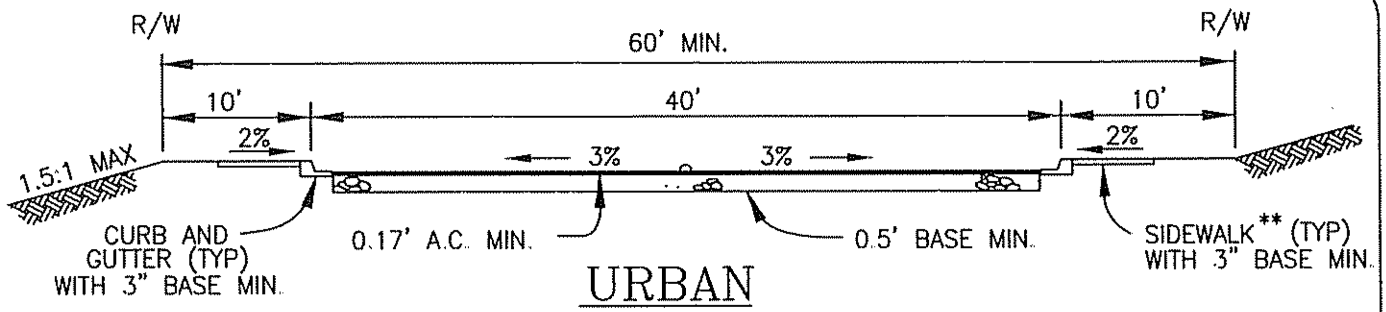
TO BE USED IN ALL OTHER GENERAL PLAN DESIGNATIONS.

TYPICAL STREET SECTIONS

NOTES:
FINAL STRUCTURAL SECTION TO BE DETERMINED BY 'R' VALUE TESTING.
** 10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

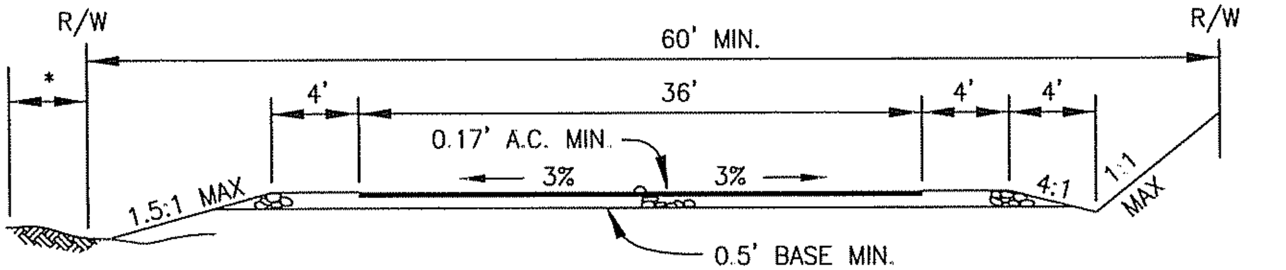
MIN. TRAFFIC INDEX = 6.5

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	*SUBCOLLECTOR* 300 OR MORE LOTS
MARK	DATE	REVISION	WILLIAM E. LYMAN	



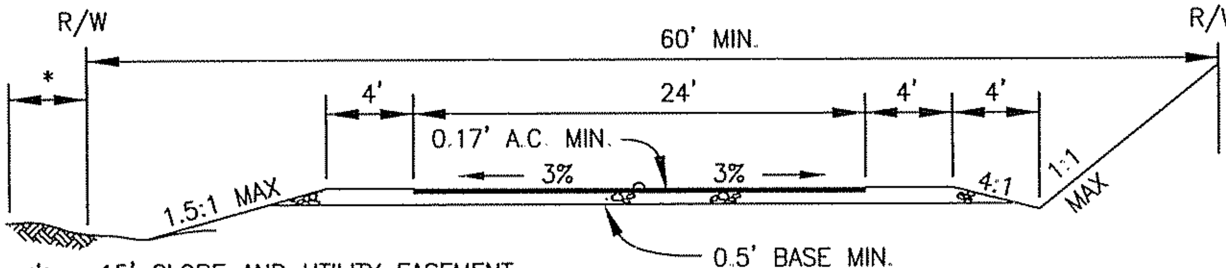
URBAN

TO BE USED IN GENERAL PLAN DESIGNATIONS UR, SR, SRI, I, AND MU.



SUBURBAN

TO BE USED IN THE SRI GENERAL PLAN DESIGNATION WHEN THE AVERAGE PARCEL SIZE IS ONE ACRE AND THE AVERAGE FRONTAGE IS MORE THAN 150 FEET, OR WHERE DENSITY AVERAGING CREATES BUILDING SITES WITH AN AVERAGE FRONTAGE OF MORE THAN 150'. A 50 FOOT BUILDING SETBACK WILL BE REQUIRED IN ALL CASES WHERE THIS STANDARD APPLIES. THIS STANDARD WILL NOT BE ALLOWED IF IT CREATES A DISCONTIGUOUS PATTERN OF DEVELOPMENT.



* = 15' SLOPE AND UTILITY EASEMENT AS REQUIRED – BOTH SIDES OF R/W

RURAL

TO BE USED IN ALL OTHER GENERAL PLAN DESIGNATIONS.

TYPICAL STREET SECTIONS

NOTES:
FINAL STRUCTURAL SECTION TO BE DETERMINED BY 'R' VALUE TESTING.
** 10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

MIN. TRAFFIC INDEX = 6.0

SCALE: NTS | DATE: 1996 | SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED BY:

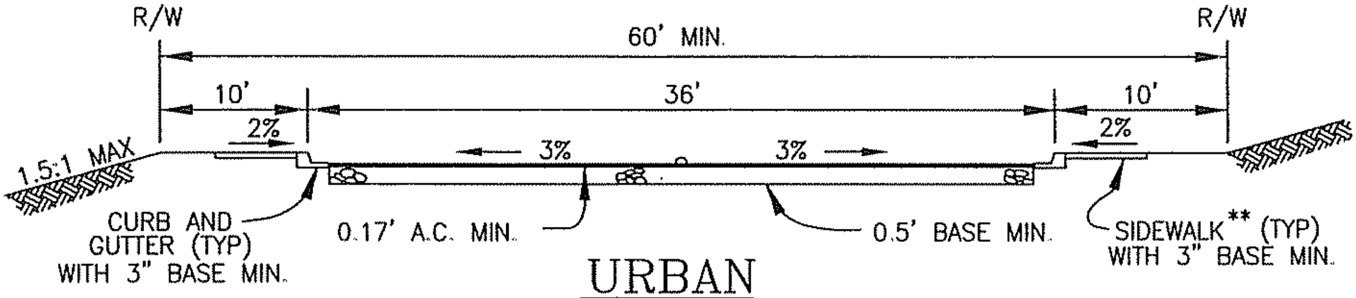
William E. Lyman

WILLIAM E. LYMAN

MARK | DATE | REVISION

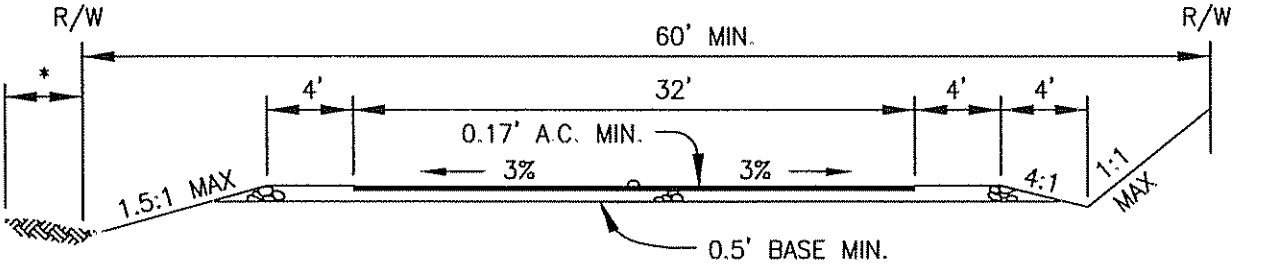
MAJOR LOCAL

50 TO 300 LOTS



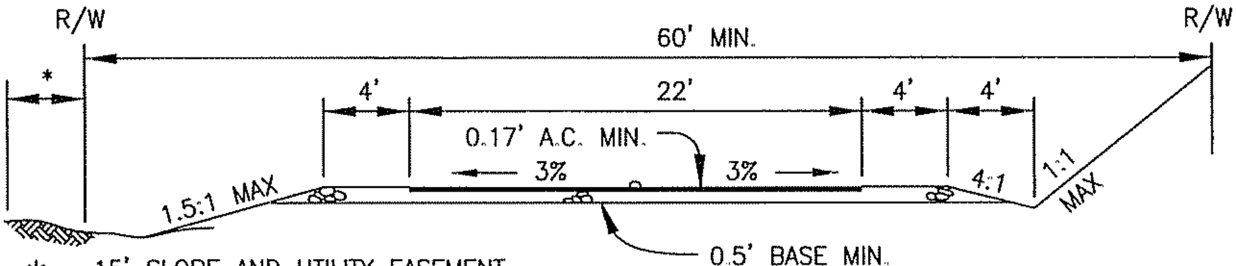
URBAN

TO BE USED IN GENERAL PLAN DESIGNATIONS UR, SR, SRI, I, AND MU.



SUBURBAN

TO BE USED IN THE SRI GENERAL PLAN DESIGNATION WHEN THE AVERAGE PARCEL SIZE IS ONE ACRE AND THE AVERAGE FRONTAGE IS MORE THAN 150 FEET, OR WHERE DENSITY AVERAGING CREATES BUILDING SITES WITH AN AVERAGE FRONTAGE OF MORE THAN 150'. A 50 FOOT BUILDING SETBACK WILL BE REQUIRED IN ALL CASES WHERE THIS STANDARD APPLIES. THIS STANDARD WILL NOT BE ALLOWED IF IT CREATES A DISCONTIGUOUS PATTERN OF DEVELOPMENT.



∗ = 15' SLOPE AND UTILITY EASEMENT AS REQUIRED – BOTH SIDES OF R/W

RURAL

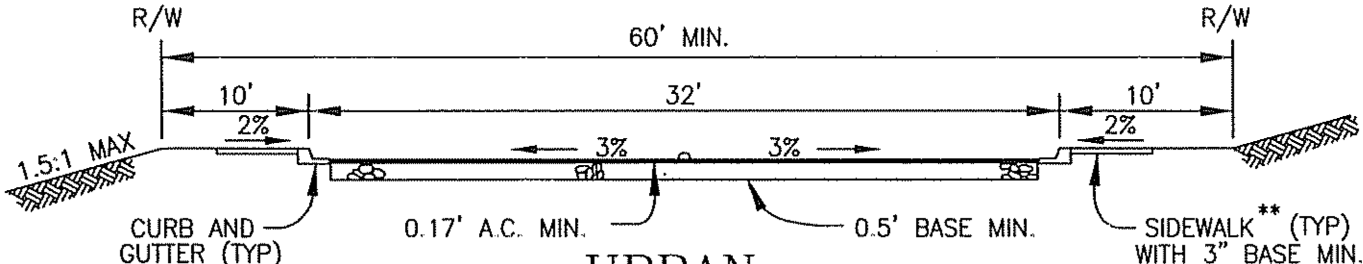
TO BE USED IN ALL OTHER GENERAL PLAN DESIGNATIONS.

TYPICAL STREET SECTIONS

NOTES
FINAL STRUCTURAL SECTION TO BE DETERMINED BY 'R' VALUE TESTING.
**10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

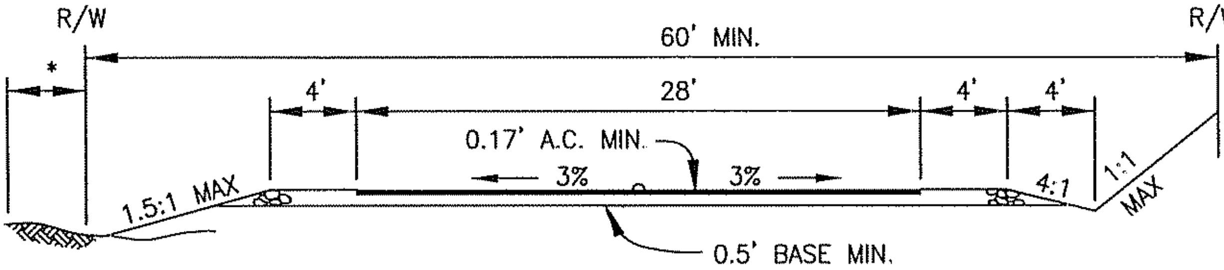
MIN. TRAFFIC INDEX = 5.5

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	*LOCAL* 25 TO 49 LOTS
MARK	DATE	REVISION	WILLIAM E. LYMAN	



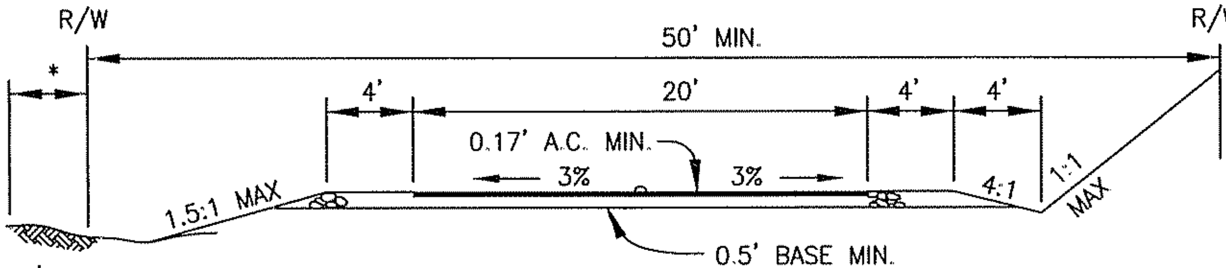
URBAN

TO BE USED IN GENERAL PLAN DESIGNATIONS UR, SR, SRI, I, AND MU.



SUBURBAN

TO BE USED IN THE SRI GENERAL PLAN DESIGNATION WHEN THE AVERAGE PARCEL SIZE IS ONE ACRE AND THE AVERAGE FRONTAGE IS MORE THAN 150 FEET, OR WHERE DENSITY AVERAGING CREATES BUILDING SITES WITH AN AVERAGE FRONTAGE OF MORE THAN 150'. A 50 FOOT BUILDING SETBACK WILL BE REQUIRED IN ALL CASES WHERE THIS STANDARD APPLIES. THIS STANDARD WILL NOT BE ALLOWED IF IT CREATES A DISCONTIGUOUS PATTERN OF DEVELOPMENT.



* = 15' SLOPE AND UTILITY EASEMENT AS REQUIRED – BOTH SIDES OF R/W

RURAL

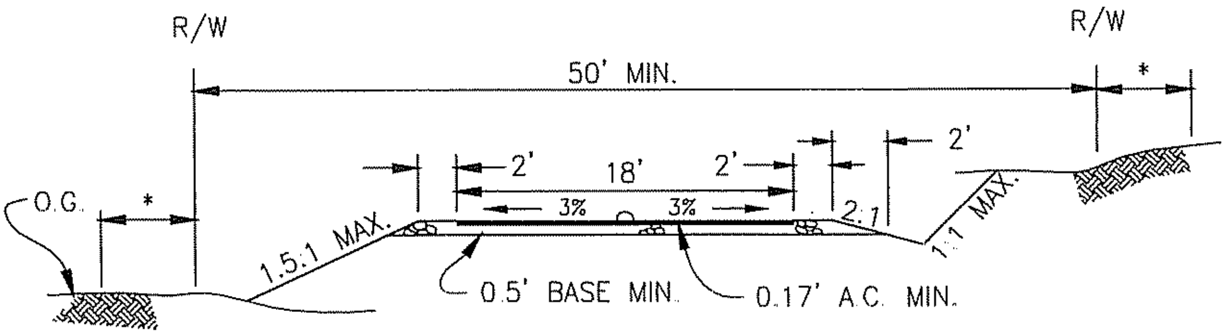
TO BE USED IN ALL OTHER GENERAL PLAN DESIGNATIONS.

TYPICAL STREET SECTIONS

NOTES:
FINAL STRUCTURAL SECTIONS TO BE DETERMINED BY 'R' VALUE TESTING.
**10' SIDEWALKS MAY BE REQUIRED IN CERTAIN COMMERCIAL ZONES.

MIN. TRAFFIC INDEX = 5.0

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	*MINOR LOCAL* 10 TO 24 LOTS (RURAL) 3 TO 24 LOTS (URBAN)
MARK	DATE	REVISION		

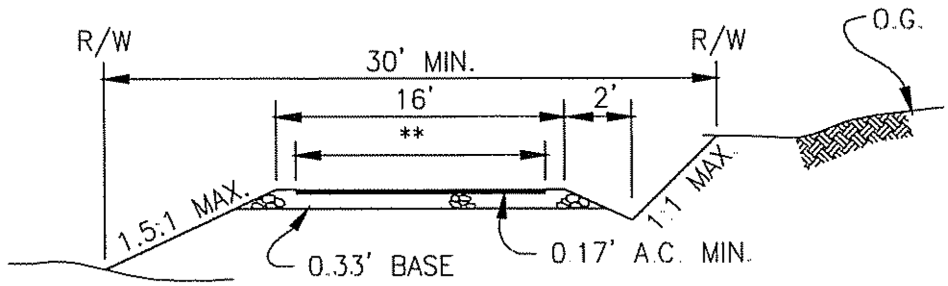


MINOR

* 15' UTILITY EASEMENT
AND SLOPE EASEMENT

MIN. TRAFFIC INDEX = 4.5

NOTE: FINAL STRUCTURAL SECTION TO BE DETERMINED BY 'R' VALUE TESTING.

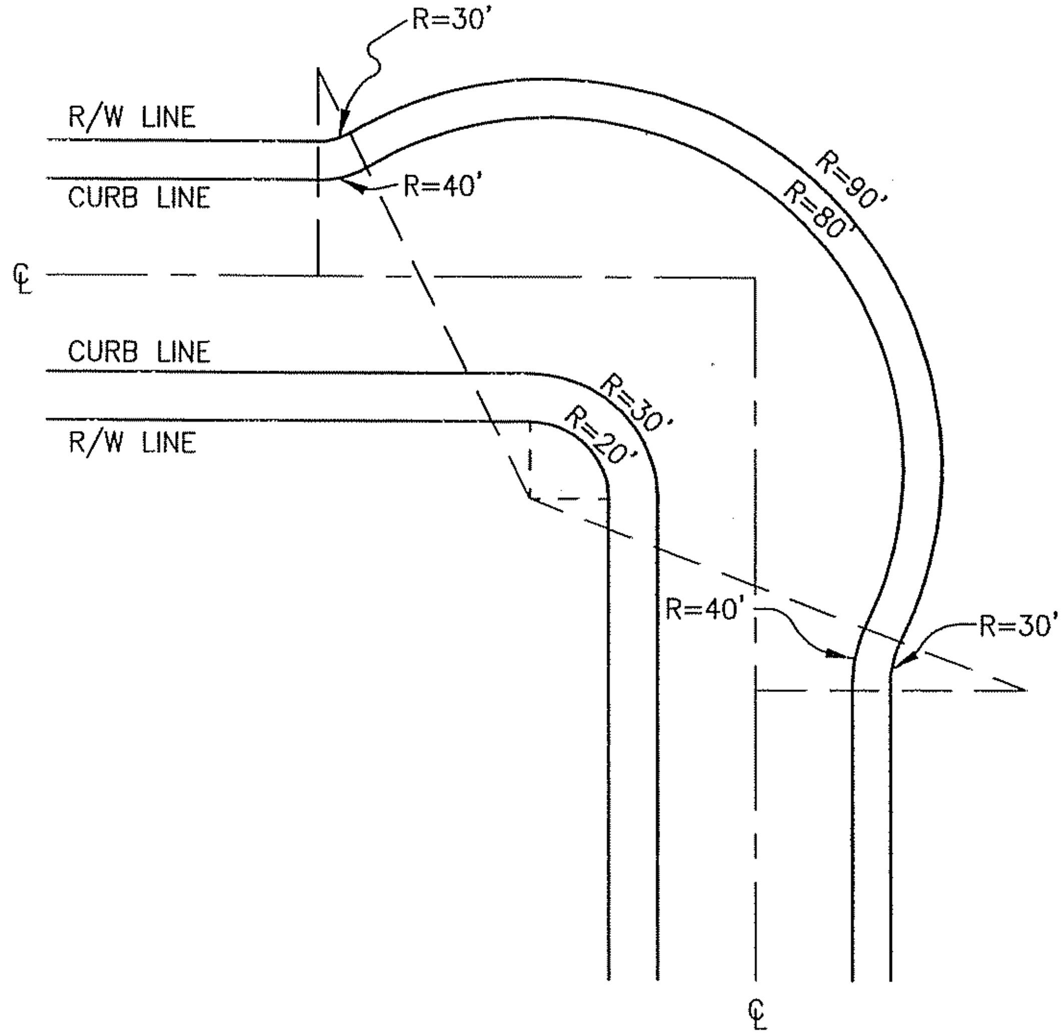


FLAG LOT DRIVEWAY

** 10' WIDE SERVING ONE LOT.
14' WIDE SERVING TWO LOTS.
RECIPROCAL EASEMENT AND
ROAD MAINTENANCE AGREEMENT
REQUIRED FOR TWO LOTS.

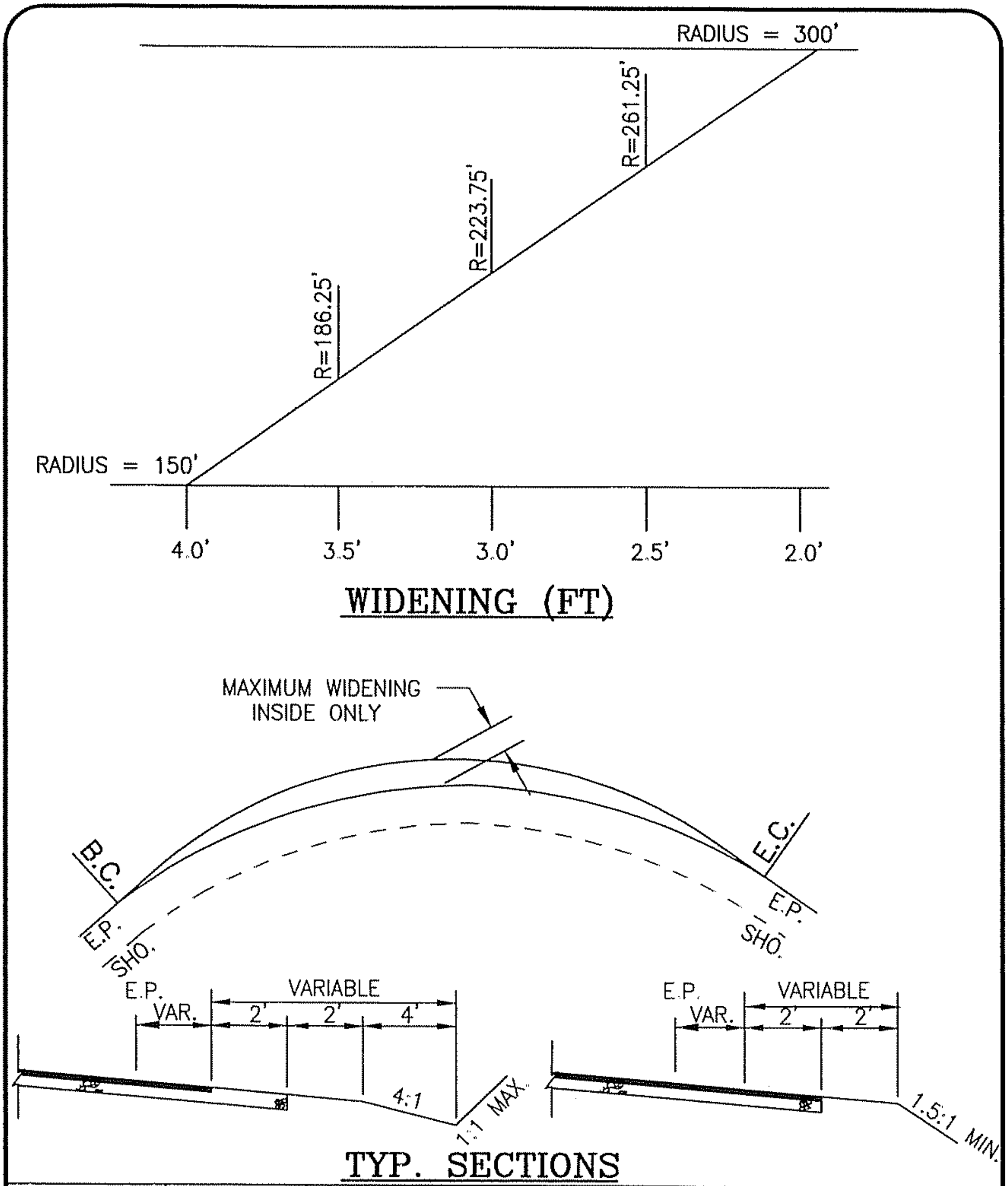
TYPICAL SECTIONS

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	MINOR 3 TO 9 LOTS AND FLAG LOT D/W 1 TO 2 LOTS
MARK	DATE	REVISION		

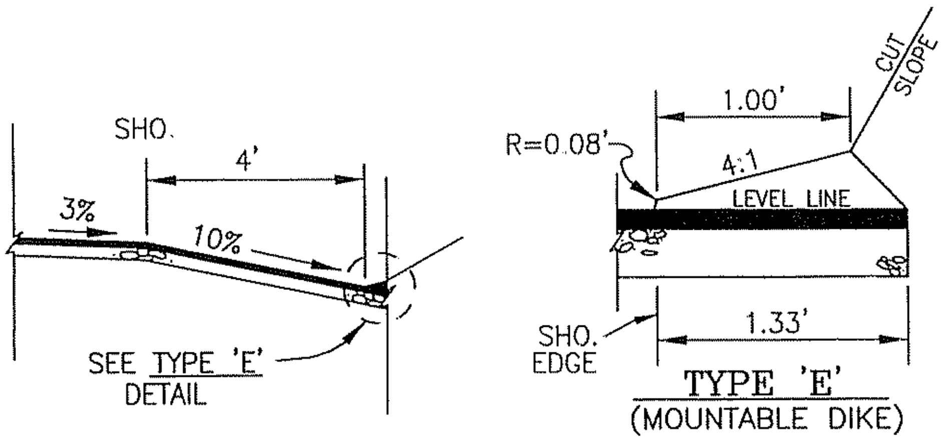


NOTE:
THIS CONFIGURATION MAY BE USED IN HIGH DENSITY RESIDENTIAL AREAS WHERE THE TRAFFIC VOLUMES ARE BELOW 150 ADT AND THE PRIMA FACIA SPEED LIMIT IS 25 MPH.

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	**URBAN ROAD INTERSECTION**
MARK	DATE	REVISION	WILLIAM E. LYMAN	'L' SHAPE



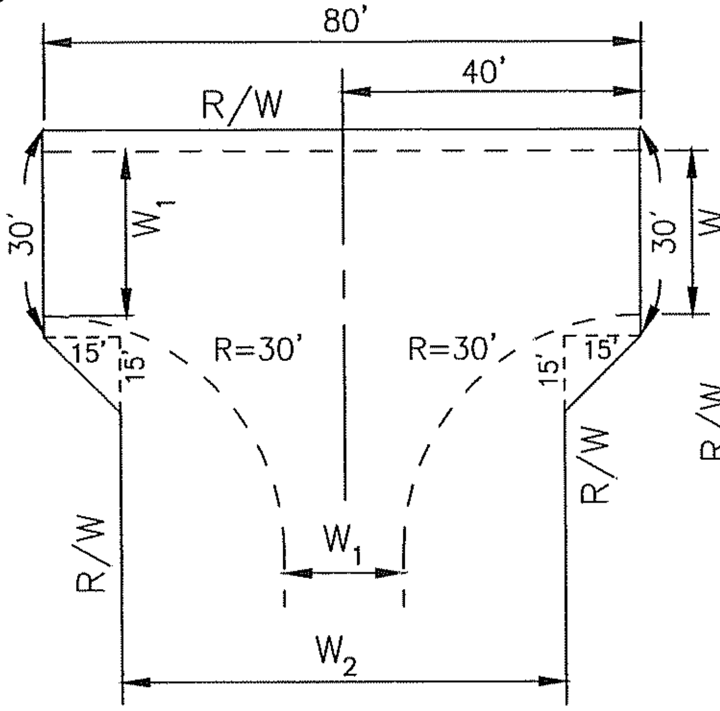
SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman (signature) WILLIAM E. LYMAN	**SHORT RADIUS CURVE WIDENING**
MARK	DATE	REVISION		



THIS SECTION SHALL NOT BE USED WHERE THE EDGE OF PAVEMENT ELEVATION IS MORE THAN 0.5' ABOVE ORIGINAL GROUND.

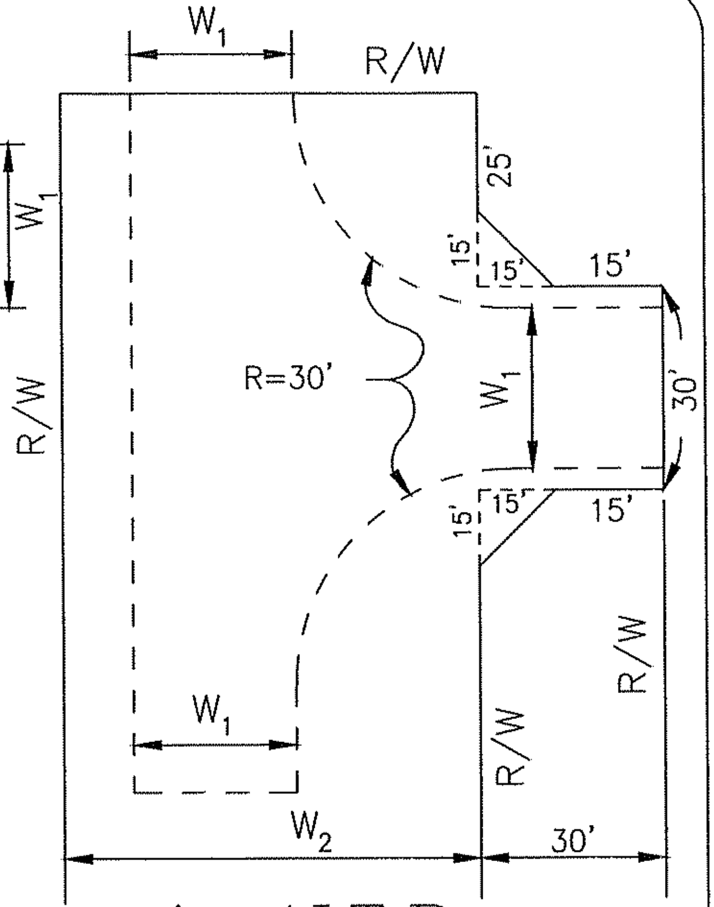
PAVED GUTTER

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	***MISCELLANEOUS TYPICAL SECTIONS***
MARK	DATE	REVISION	WILLIAM E. LYMAN	

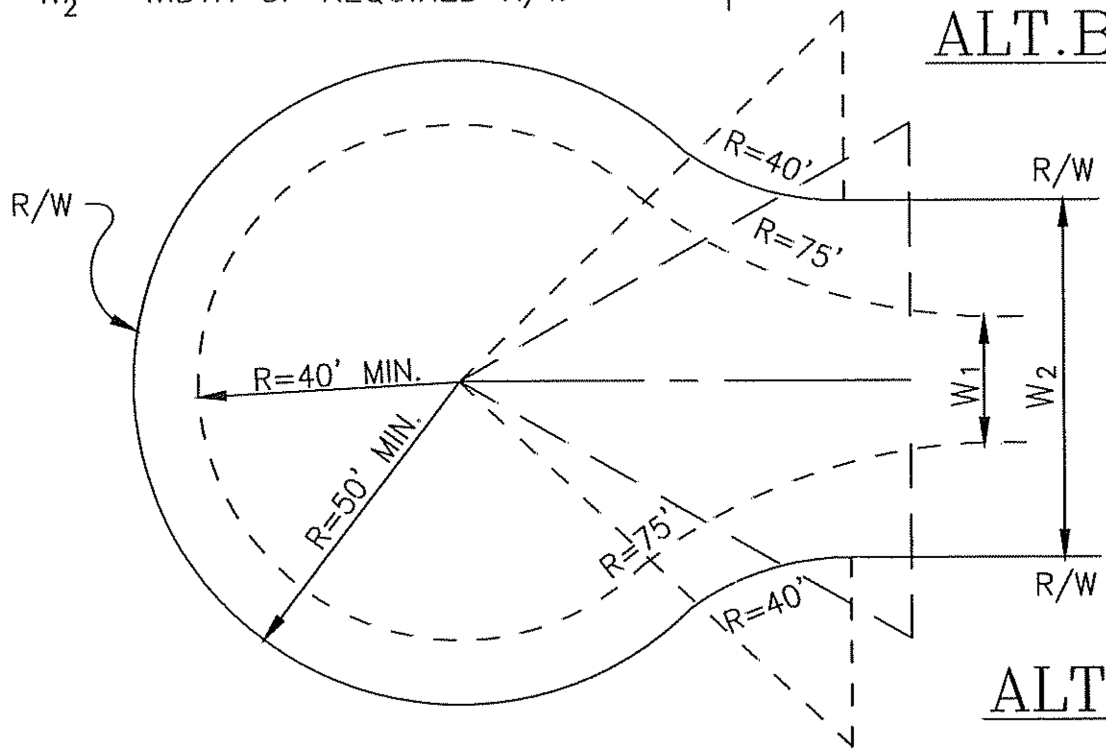


ALT. A

- - - - EDGE OF PAVEMENT
W_1 WIDTH OF PAVEMENT
W_2 WIDTH OF REQUIRED R/W

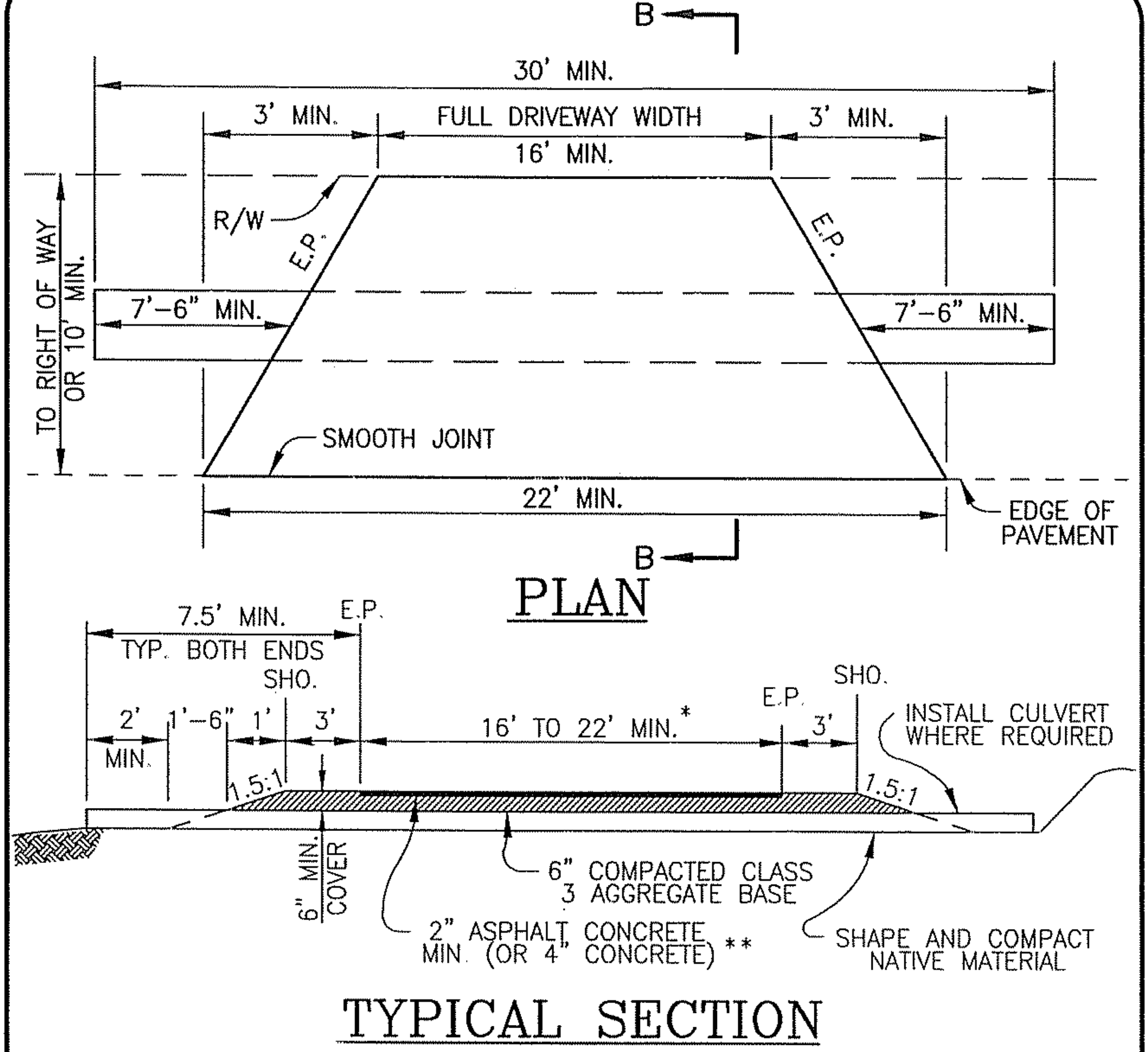


ALT.B



ALT. C

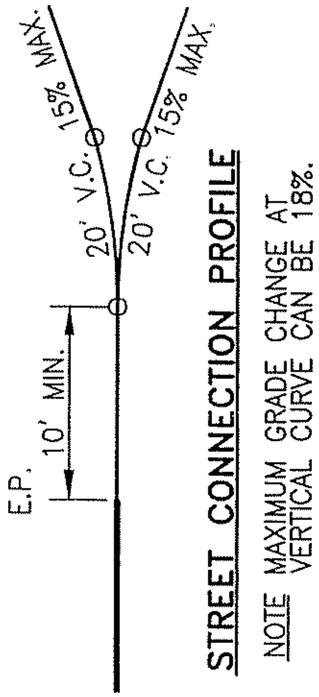
SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	*TURNAROUND ALTERNATES* FOR RURAL GENERAL PLAN DESIGNATIONS
MARK	DATE	REVISION		

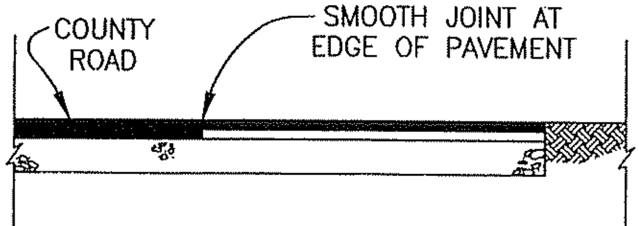


* WIDER WIDTHS MAY BE REQUIRED, AS DETERMINED BY DPW

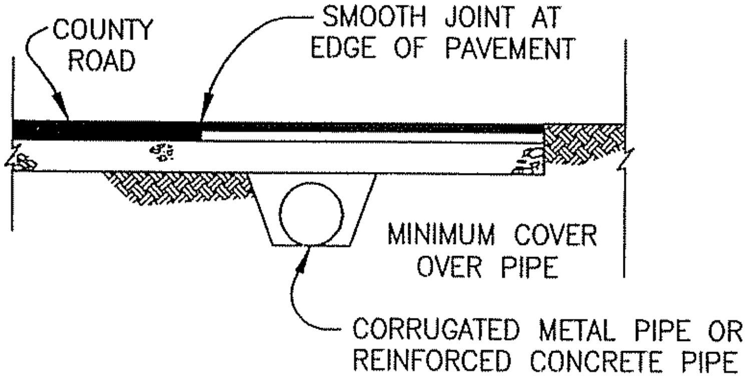
** CONCRETE FORMS TO BE INSPECTED BY DPW PRIOR TO PLACEMENT.

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	TYPE 'A' ROAD CONNECTION
MARK	DATE	REVISION	WILLIAM E. LYMAN	

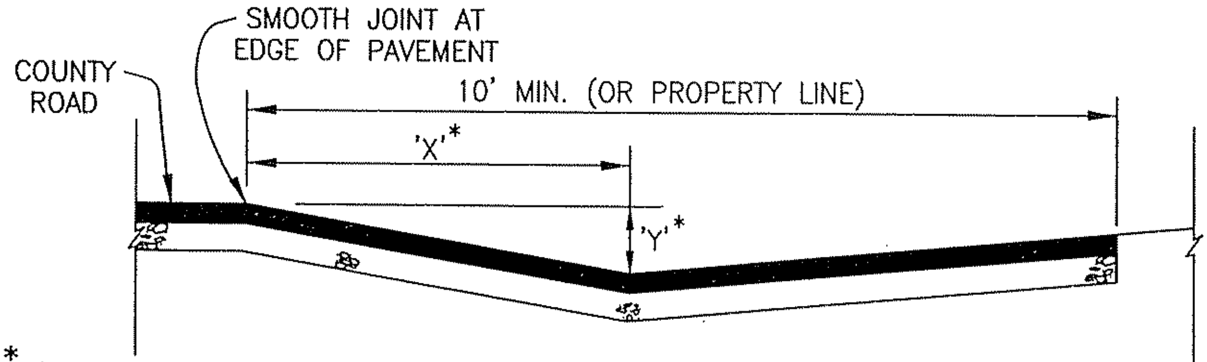




SECTION B–B



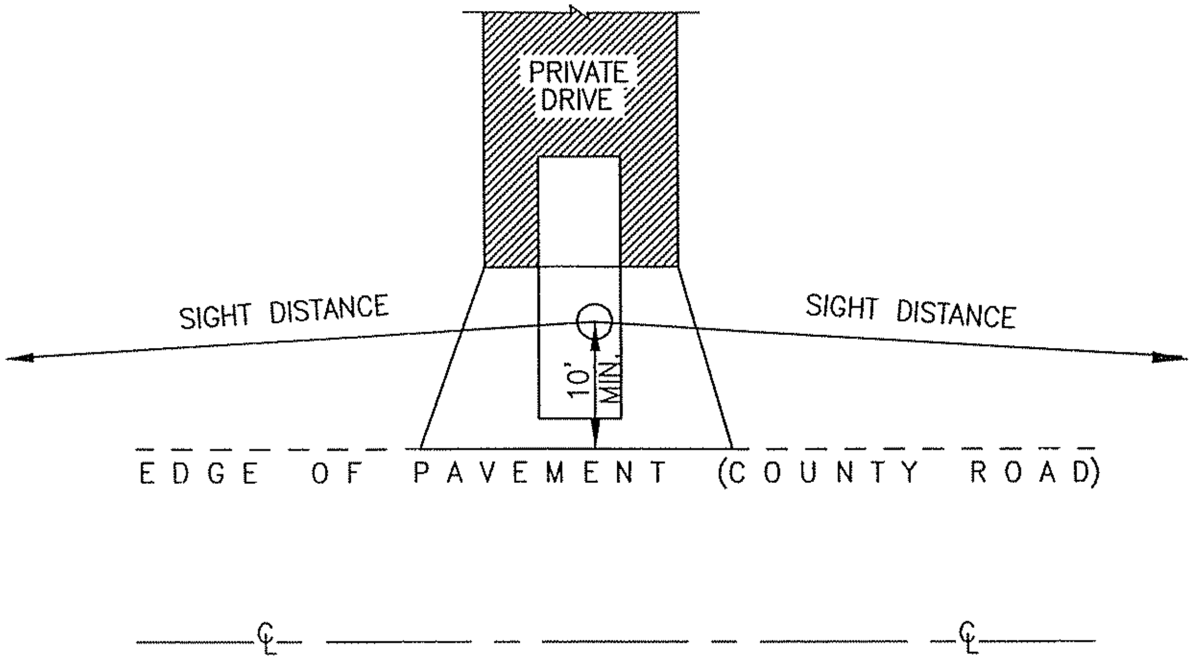
SECTION B–B
WITH CULVERT



* 'X' AND 'Y' TO BE SPECIFIED BY DPW

SECTION B–B
PAVED DIP

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**TYPE 'A' ROAD CONNECTION**
MARK	DATE	REVISION		

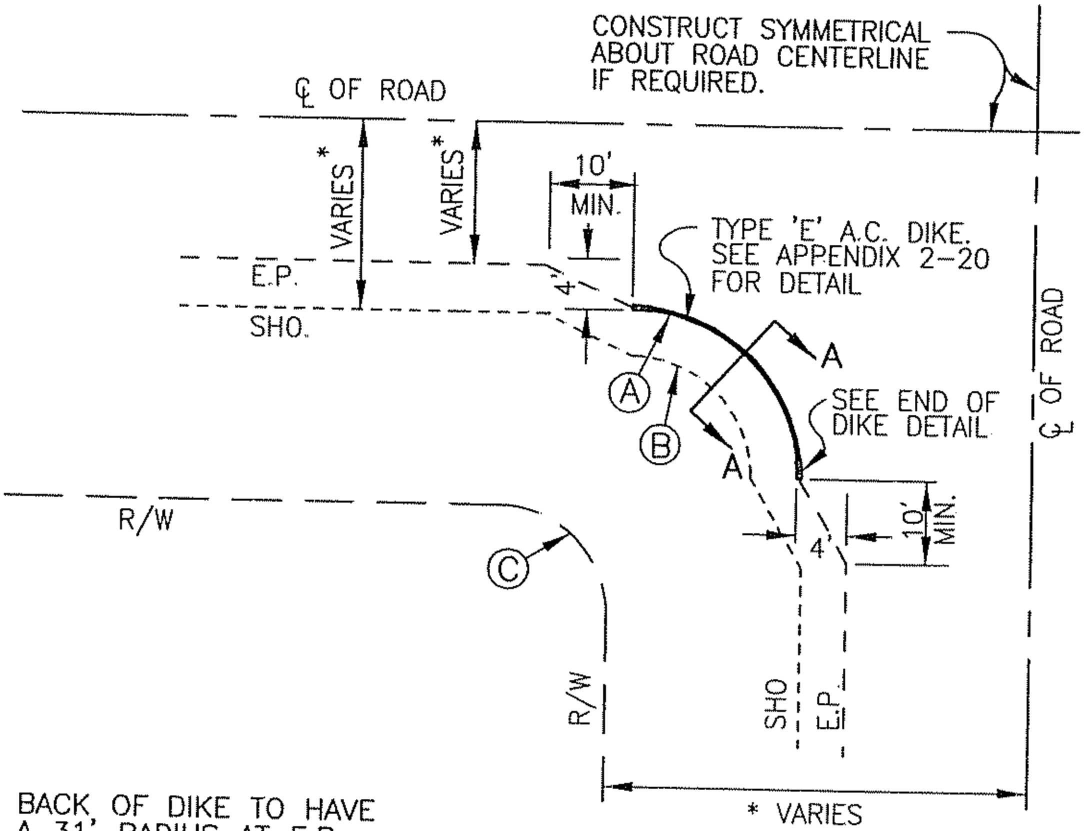


SIGHT DISTANCES *

MINIMUM	PREVAILING SPEED LIMIT
450'	55 MPH
325'	45 MPH
225'	35 MPH
150'	25 MPH

* SIGHT DISTANCE IS THE CALTRANS MINIMUM STOPPING SIGHT DISTANCE.

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman	**SIGHT DISTANCES FOR DRIVEWAY CONNECTIONS**
MARK	DATE	REVISION	WILLIAM E. LYMAN	

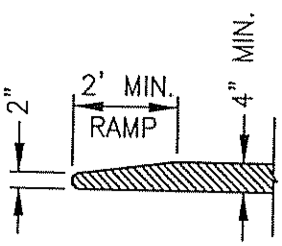


Ⓐ BACK OF DIKE TO HAVE A 31' RADIUS AT E.P.

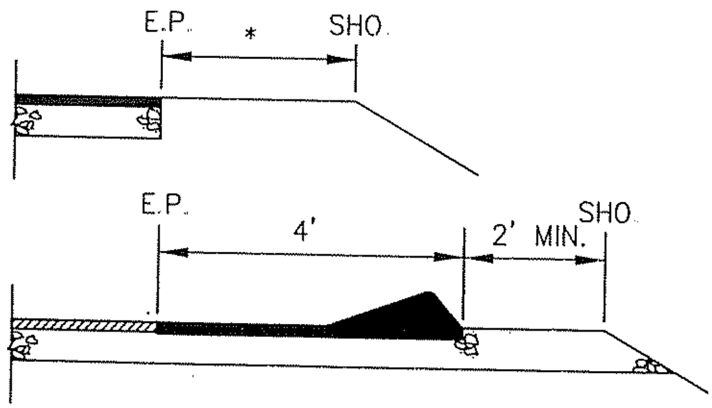
Ⓑ 29' RADIUS AT SHOULDER

Ⓒ 20' RADIUS AT R/W

* SEE CONDITIONS REQUIRED



END OF DIKE



SECTION A–A

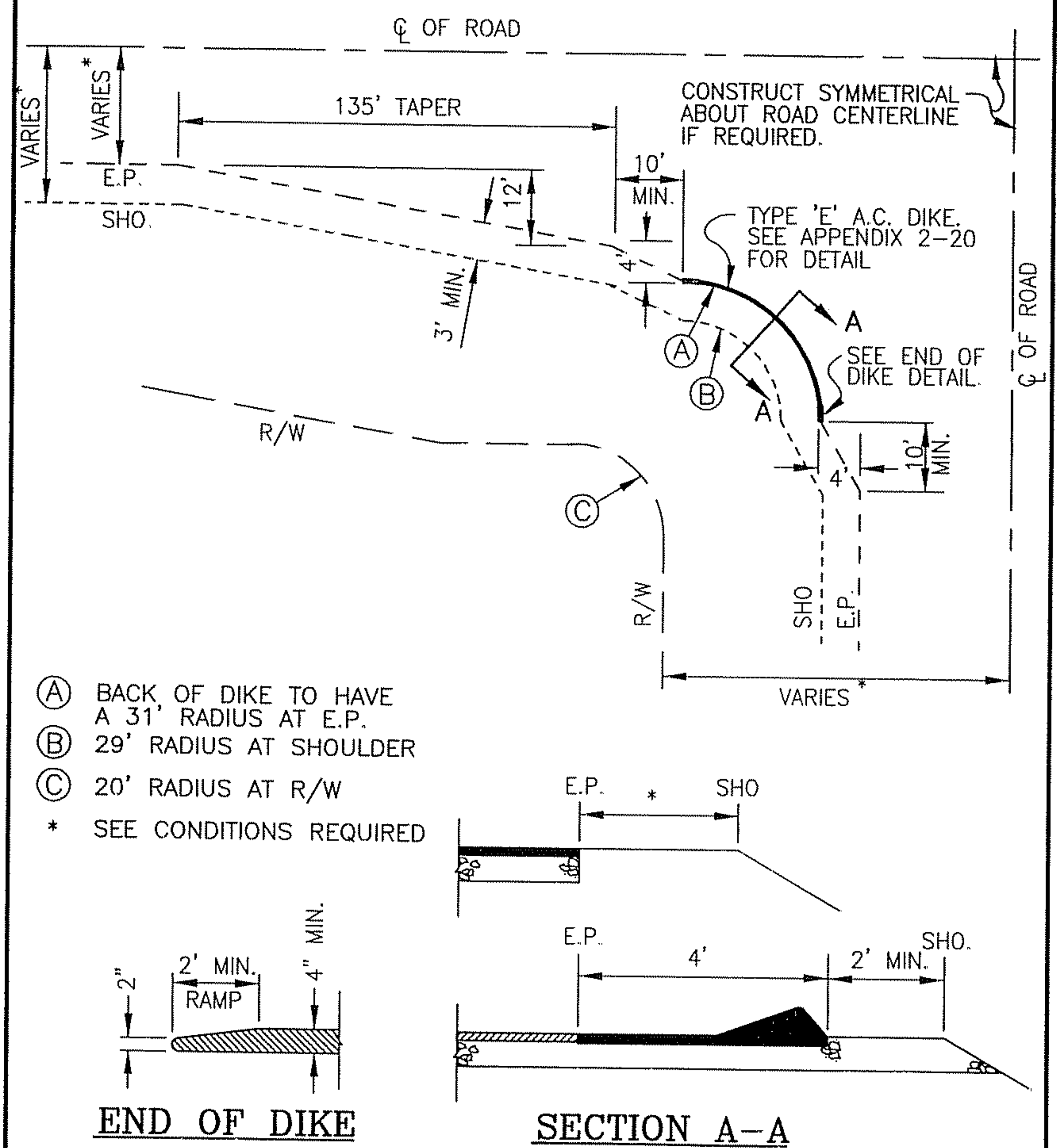
SCALE: NTS | DATE: 1996 | SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS

APPROVED BY: William E. Lyman

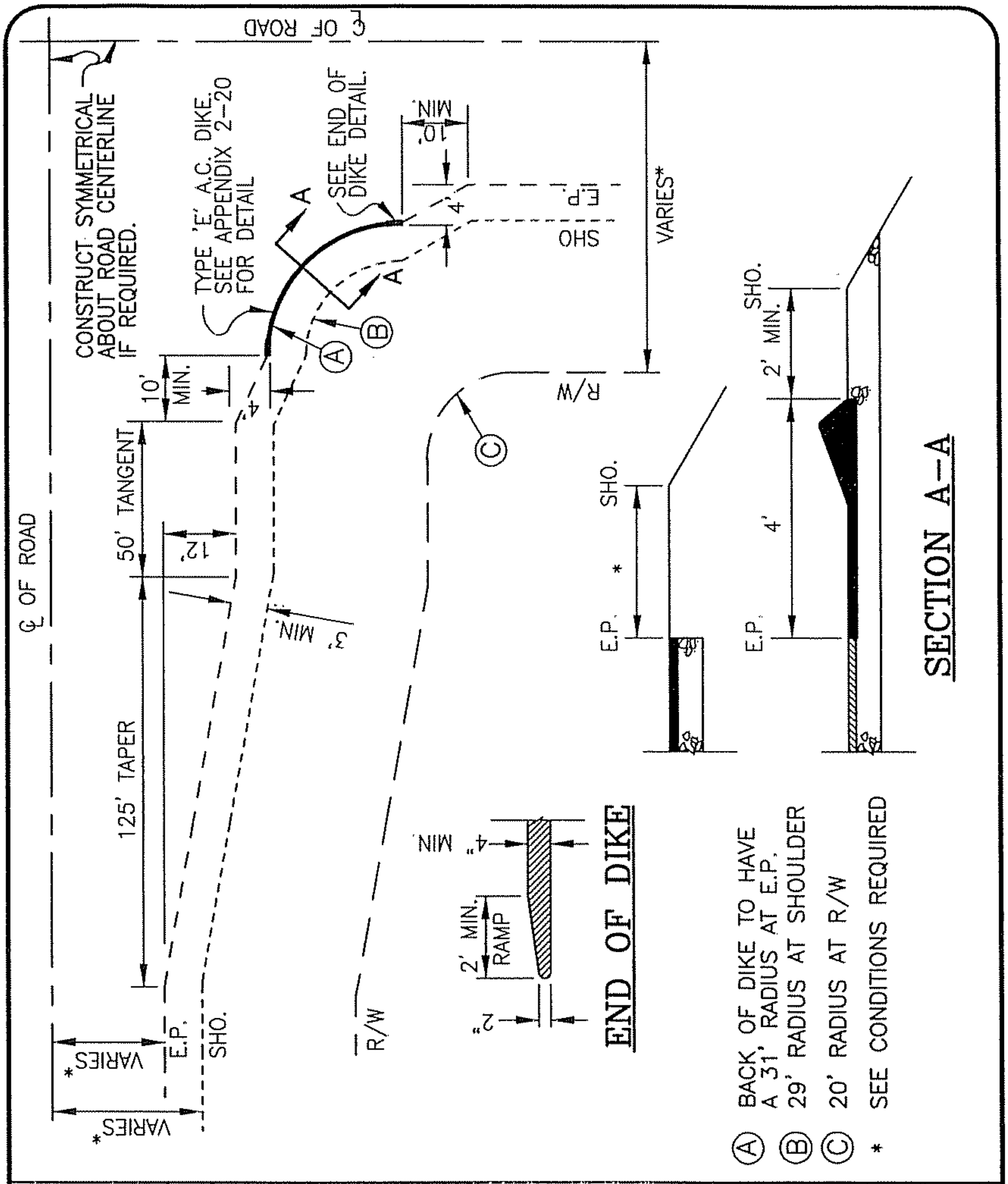
WILLIAM E. LYMAN

MARK | DATE | REVISION

TYPE 'B' ROAD CONNECTION

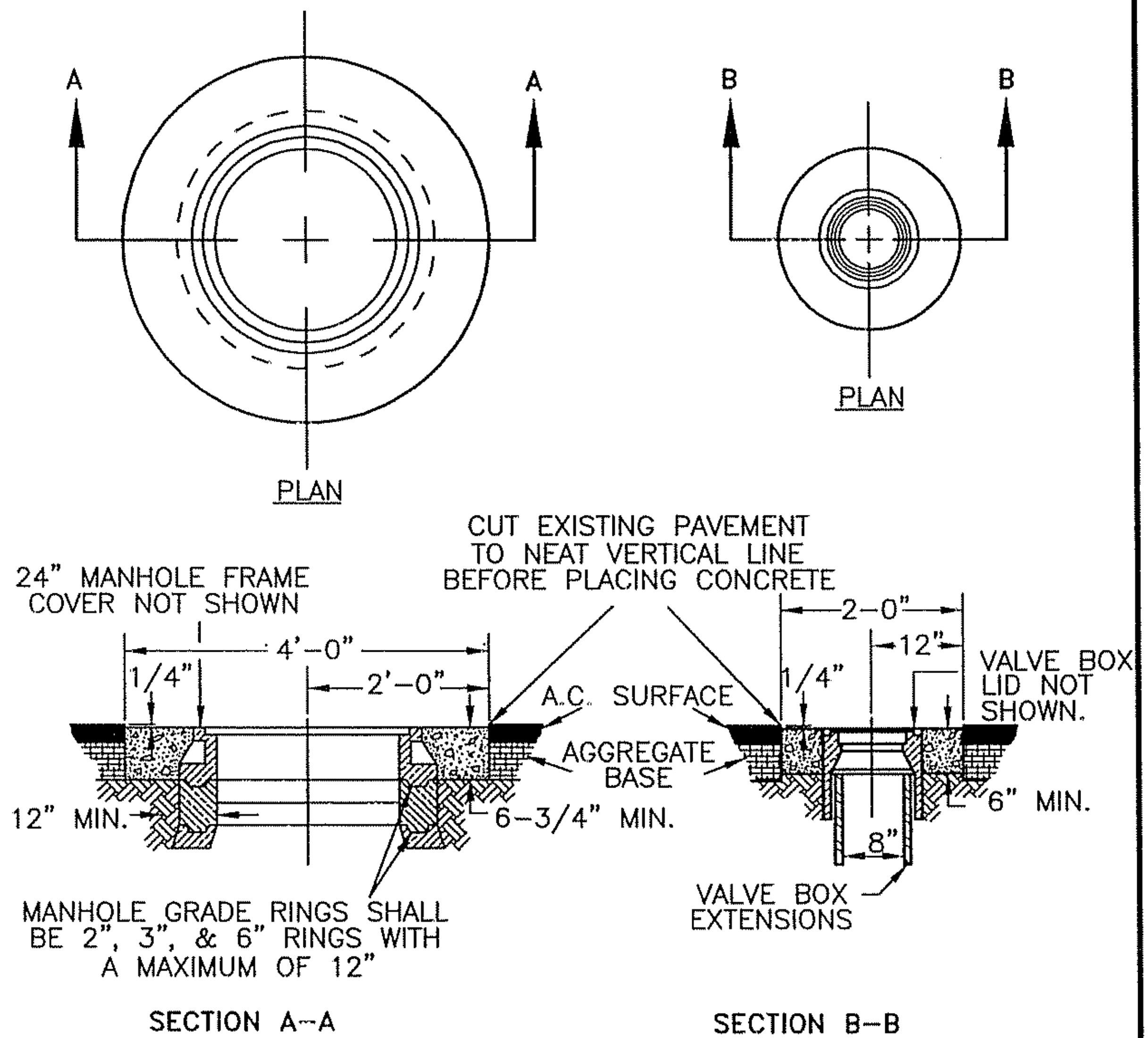


SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**TYPE 'C' ROAD CONNECTION**
MARK	DATE	REVISION		



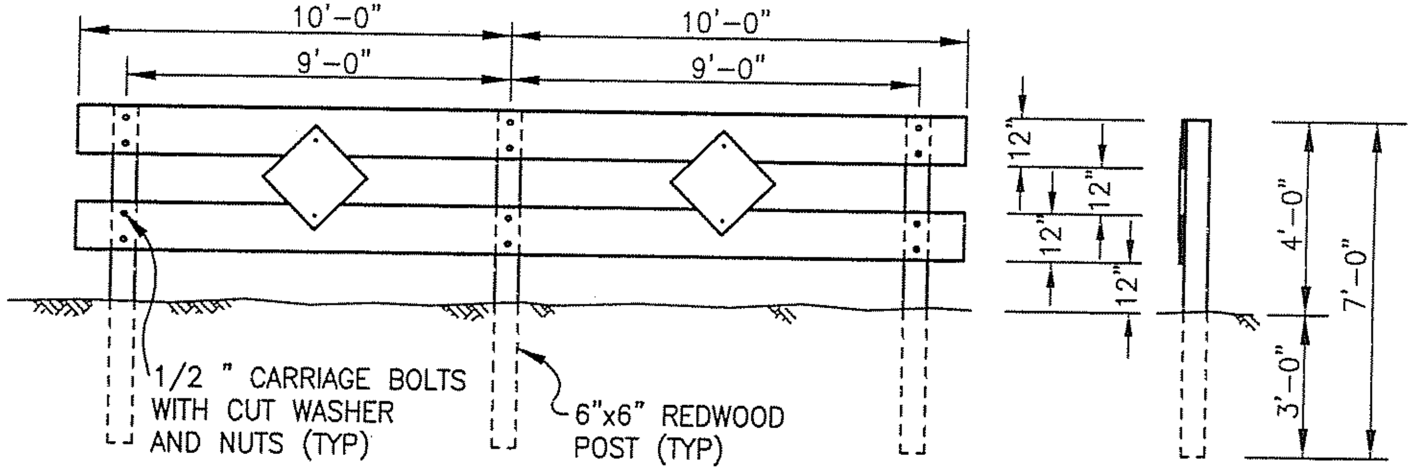
SCALE: NTS	DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
		APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**TYPE 'D' ROAD CONNECTION**
MARK / DATE	REVISION		

NOTE:
ALL CONCRETE SHALL BE 5 SACK MIX

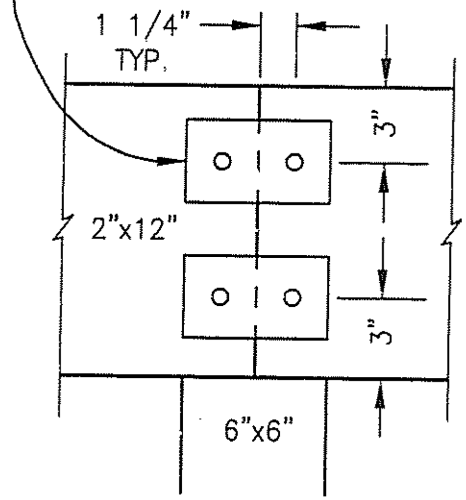


MANHOLE ADJUSTMENT VALVE COVER ADJUSTMENT

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	***MANHOLE AND VALVE COVER GRADE ADJUSTMENT***
MARK	DATE	REVISION		



2 – 2"x12"x20' No. 2 OR BETTER DF
3 – 6"x6"x7' 'A' OR BETTER REDWOOD
2 – 18"x18" OBJECT MARKER (TYPE N-2)
CALTRANS STD. PLAN A73B

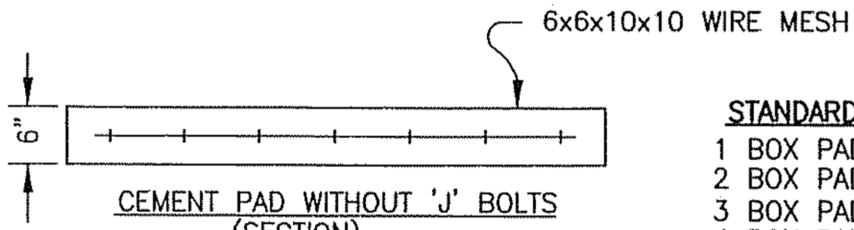


DETAIL OF BUTT JOINT

NOTES

1. BARRICADES TO BE ERECTED AT EACH STREET TERMINAL IN ACCORDANCE WITH THE SPECIFICATIONS.
2. ALL LUMBER TO BE SURFACED FOUR SIDES.
3. ALL EXPOSED SURFACES TO BE PAINTED WITH TWO COATS OF WHITE EXTERIOR GRADE PAINT.
4. BARRICADE INSTALLATION SHOWN IS TO BE USED FOR STREETS HAVING CURB TO CURB WIDTHS UP TO 40 FEET. WHERE A WIDER WIDTH OF BARRICADE IS REQUIRED, IT SHALL BE MADE IN 10 FOOT MULTIPLES OF THE ABOVE UNIT.
5. STEEL PLATES TO BE INSTALLED WITH 1/2" CARRIAGE BOLTS USING CUT WASHERS AND NUTS.

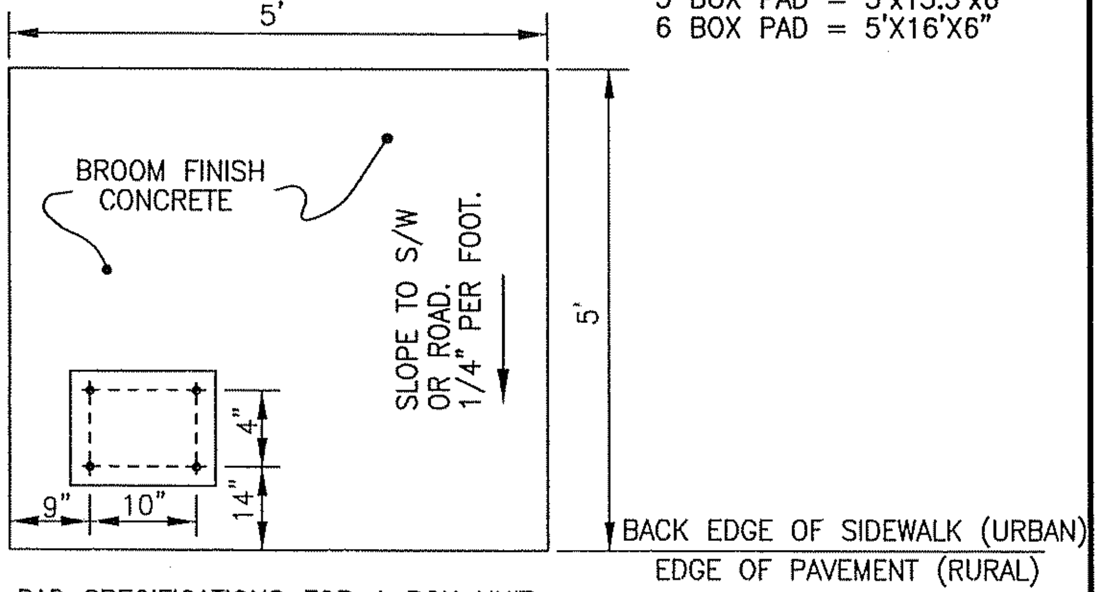
SCALE: NTS	DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
		APPROVED BY: WILLIAM E. LYMAN	***STANDARD STREET TIMBER BARRICADE***
MARK	DATE	REVISION	



CEMENT PAD WITHOUT 'J' BOLTS
(SECTION)

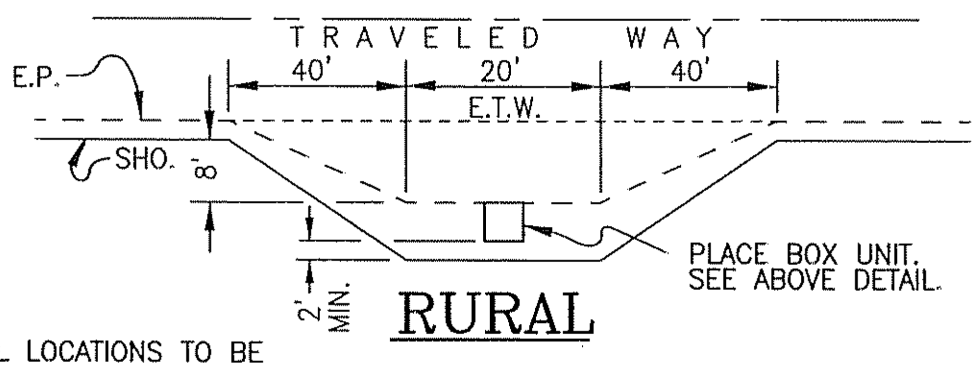
STANDARD BOX PADS

1 BOX PAD = 5'x5'x6"
2 BOX PAD = 5'x6'x6"
3 BOX PAD = 5'x8.5'x6"
4 BOX PAD = 5'x11'x6"
5 BOX PAD = 5'x13.5'x6"
6 BOX PAD = 5'X16'X6"



PAD SPECIFICATIONS FOR 1 BOX UNIT
(PLAN)

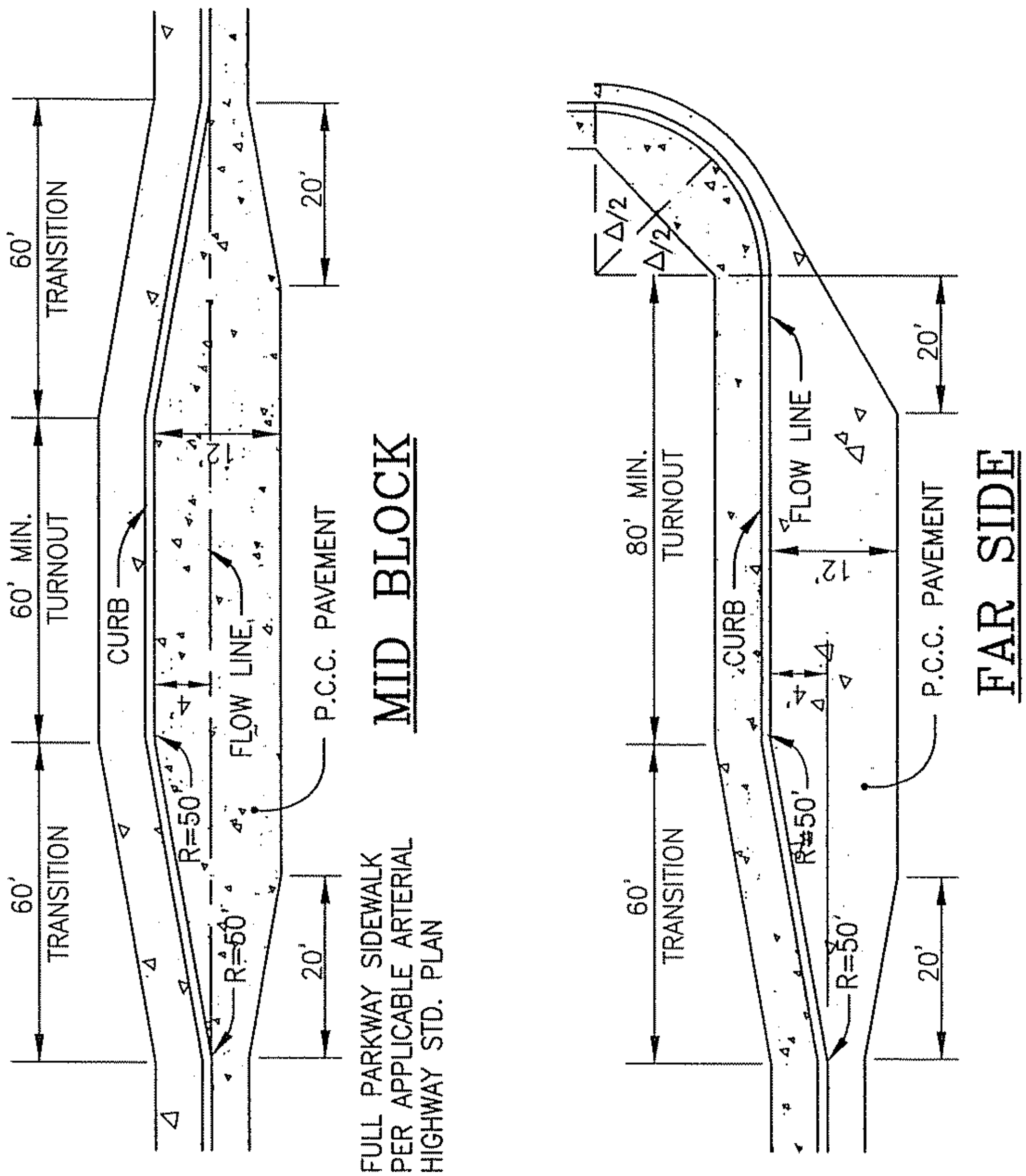
URBAN



RURAL

NOTES
1. FINAL LOCATIONS TO BE DETERMINED BY POSTAL SERVICE.
2. EACH BOX UNIT SERVES UP TO 15 RESIDENCES.

SCALE: NTS	DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS
		APPROVED BY: William E. Lyman — WILLIAM E. LYMAN
MARK / DATE	REVISION	***CLUSTER BOX PADS*** FOR CENTRALIZED MAIL DELIVERY UNITS



NOTES:

1. P.C.C. PAVEMENT THICKNESS SHALL BE DETERMINED BY THE ENGINEER.
2. BUS SHELTERS SHALL BE SET BACK FROM THE FACE OF THE CURB A MINIMUM CLEAR DISTANCE OF FOUR (4) FEET FOR PEDESTRIAN TRAVELWAY.
3. CURB SHALL BE POURED MONOLOTHIC WITH P.C.C. PAVEMENT.
4. MODIFICATION OF THIS STANDARD SHALL BE REVIEWED FOR ACCEPTABILITY BY THE TRAFFIC ENGINEERING DIVISION.

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**BUS TURNOUTS**
MARK	DATE	REVISION		

SPECIAL PURPOSE ROADS

INTRODUCTION

For the purpose of design, highways have been classified in this book by function with specific design values for each functional class. Subsequent chapters discuss the design of collectors, arterials, and freeways. The first two sections of this chapter discuss the design of local roads and streets. Another type of highways, however, is different because of its purpose and does not fit into any of the notes classifications. This type of highway is referred to as a special purpose road, and because of its uniqueness, separate design criteria are provided. Special purpose roads include recreational roads, resource development roads, and local service roads. Roads in the special purpose category are generally lightly traveled and of low speed and for these reasons deserve special consideration relative to their appropriate design features.

REFERENCES

1. *Standard Specifications for Highway Bridges*, Washington, D.C.: AASHTO, 1973.

2. Federal Highway Administration, National Joint Committee on Uniform Traffic Control Devices. *Manual on Uniform Traffic Control Devices.* Washington, D.C." U.S. Government Printing Office, 1978.

3. Bert, K. E., et al. *Accommodation of Utility Plants Within the Rights-of-Way of Urban Streets and Highways, Manual of Improved Practices. ASCE Manual No. 14.* Chicago: American Public Works Association, and New York: American Society of Civil Engineers, July 1974, 102. Pp.

4. *Guide for Accommodating Utilities on Highway Rights-of-Way.* Washington, D.C.: AASHTO.

5. American Association of State Highway and Transportation Officials, Joint Task Force for Highway Lighting. *An Informational Guide for Roadway Lighting.* Washington, D.C.: AASHTO, 1976.

6. *Guide for Development of New Bicycle Facilities.* Washington, D.C.: AASHTO, 1981.

7. Construction Engineering Laboratory. Corps of Engineers. *Design Guidelines for Recreational Roads.* 1975.

8. *Guide for Selecting, Locating, and Designing Traffic Barriers.* Washington, D.C.: AASHTO, 1977.

9. U.S. Forest Service. *Logging Road Handbook – The Effect of Road Design on Hauling Costs. Agriculture Handbook No. 183.* 1960.

10. Glennon, John C. "Design and Traffic Control Guidelines for Low-Volume Rural Roads." *NCHRP Report 214*, 1979, 41 pp.

RECREATIONAL ROADS

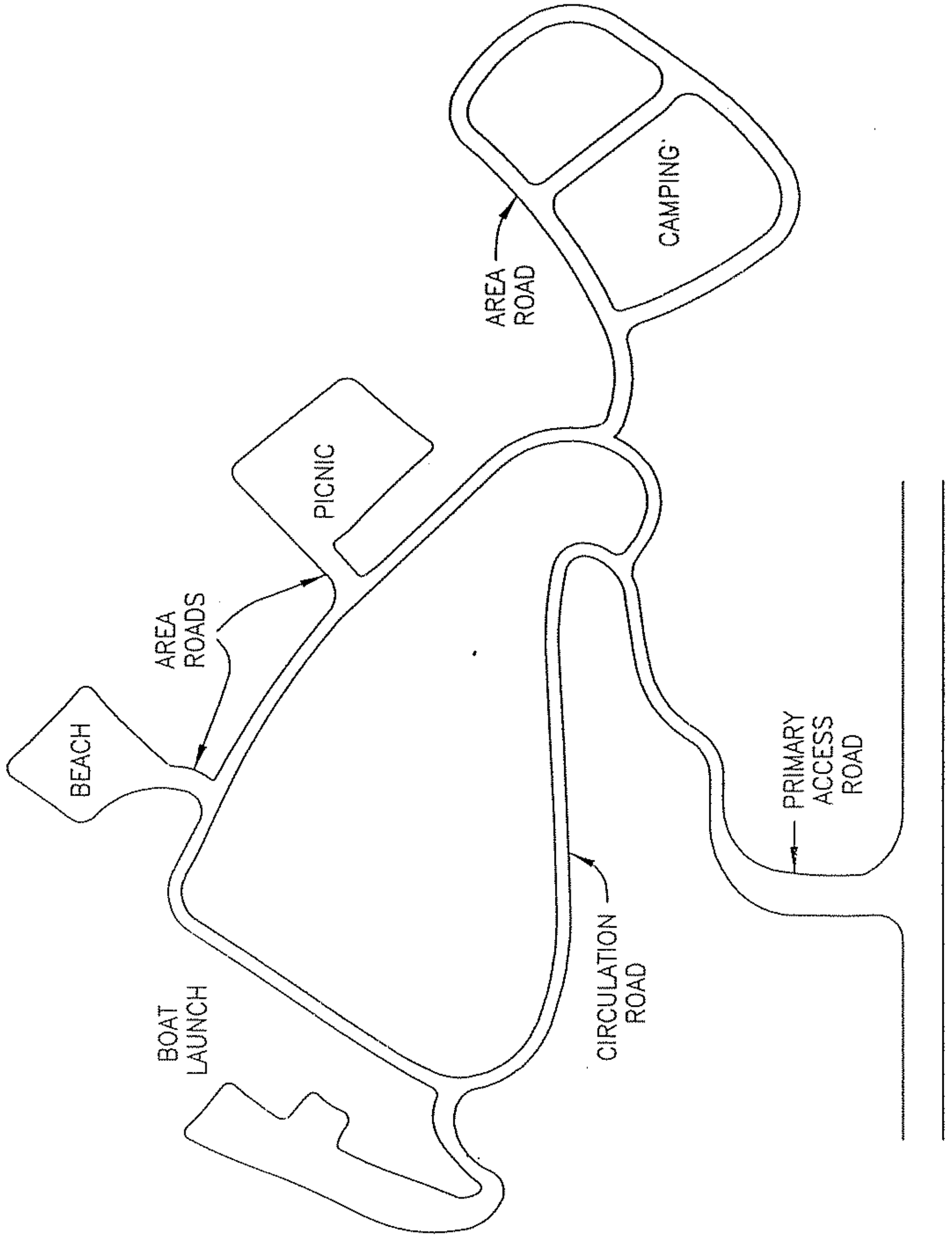
General Considerations

Roads serving recreational sites and areas are unique in that they are also part of the recreational experience. Design criteria described herein meet the unusual requirements of roads for access to, through, and within recreational sites, areas, and facilities for the complete enjoyment of the recreationist. The criteria are intended to protect and enhance the existing esthetic, ecological, environmental, and cultural amenities that form the basis for distinguishing each particular recreational site or area.

First, persons visiting a recreational area need access to the general area, usually by an external highway. Second, these persons need access from this external road system to the recreational site. This access road is the most important link in the recreational site. For roads beyond this point design criteria require that the visitor be made aware of the nature of the area, and these roads should consequently become an integral part of the recreational area. The design of these roads should be approached by a multi disciplinary team of persons with varied backgrounds and experience.

The criteria discussed in this chapter are applicable for public roads within all types of recreational sites and areas. Design criteria for recreational roads are discussed for primary access roads, circulation roads, and area roads. Primary access roads are defined as roads that allow through movement into and between access areas. Circulation roads allow movement between activity sites within an access area. Area roads allow direct access to individual activity areas such as campgrounds, park areas, boat launching ramps, picnic groves, and scenic and historic sites.

Figure V-4 depicts a potential road system serving a recreational area. Road links are labeled in accordance with the classification system noted.



POTENTIAL ROAD NETWORK

FIGURE V-4

Design Speed

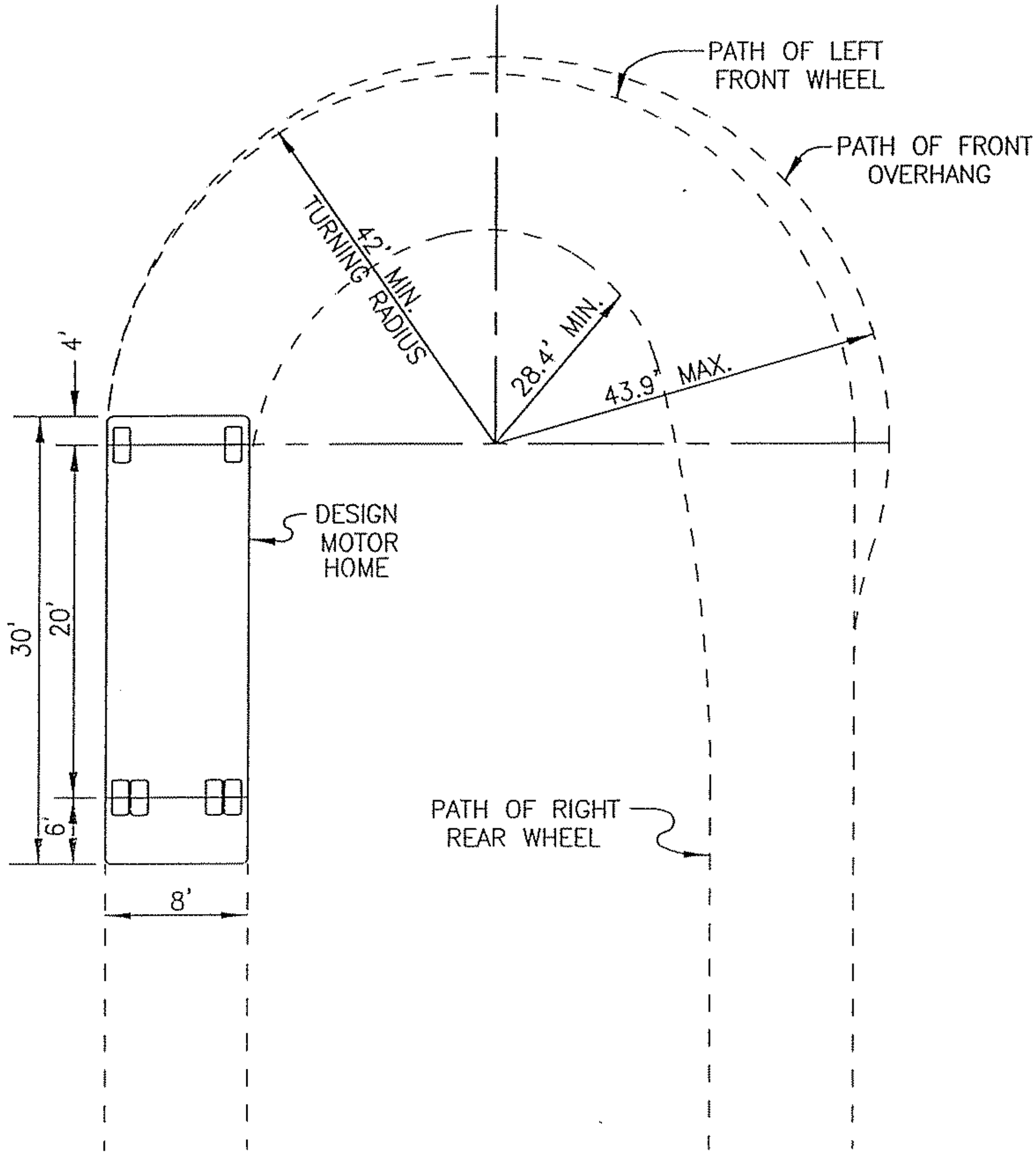
The effect of design speed on various roadway features is considered in its selection; however, the speed is selected primarily on the basis of the character of the terrain and the functional classification of the road. The design speeds should be approximately 40 mph for primary access roads, 30 mph for circulation roads, and 20 mph for area roads. There may be instances where design speeds less than these may be appropriate because of severe terrain conditions or major environmental concerns. Design speeds on one-lane roads would usually be less than 30 mph. If a design speed of greater than 40 mph is used, the first section of this chapter should be consulted.

Design speed is the principal factor that must be correlated with the physical features of design to achieve a roadway that will accommodate the traffic safely for the planned use. Once a design speed is selected, all geometric features should be related to it to obtain a balanced design. Changes in terrain and other physical controls may dictate a change in design speed in certain sections. A decrease in design speed along the road should not be introduced abruptly, but extended over a sufficient distance to allow the driver to adjust and make the transition to the slower speed.

Design Vehicle

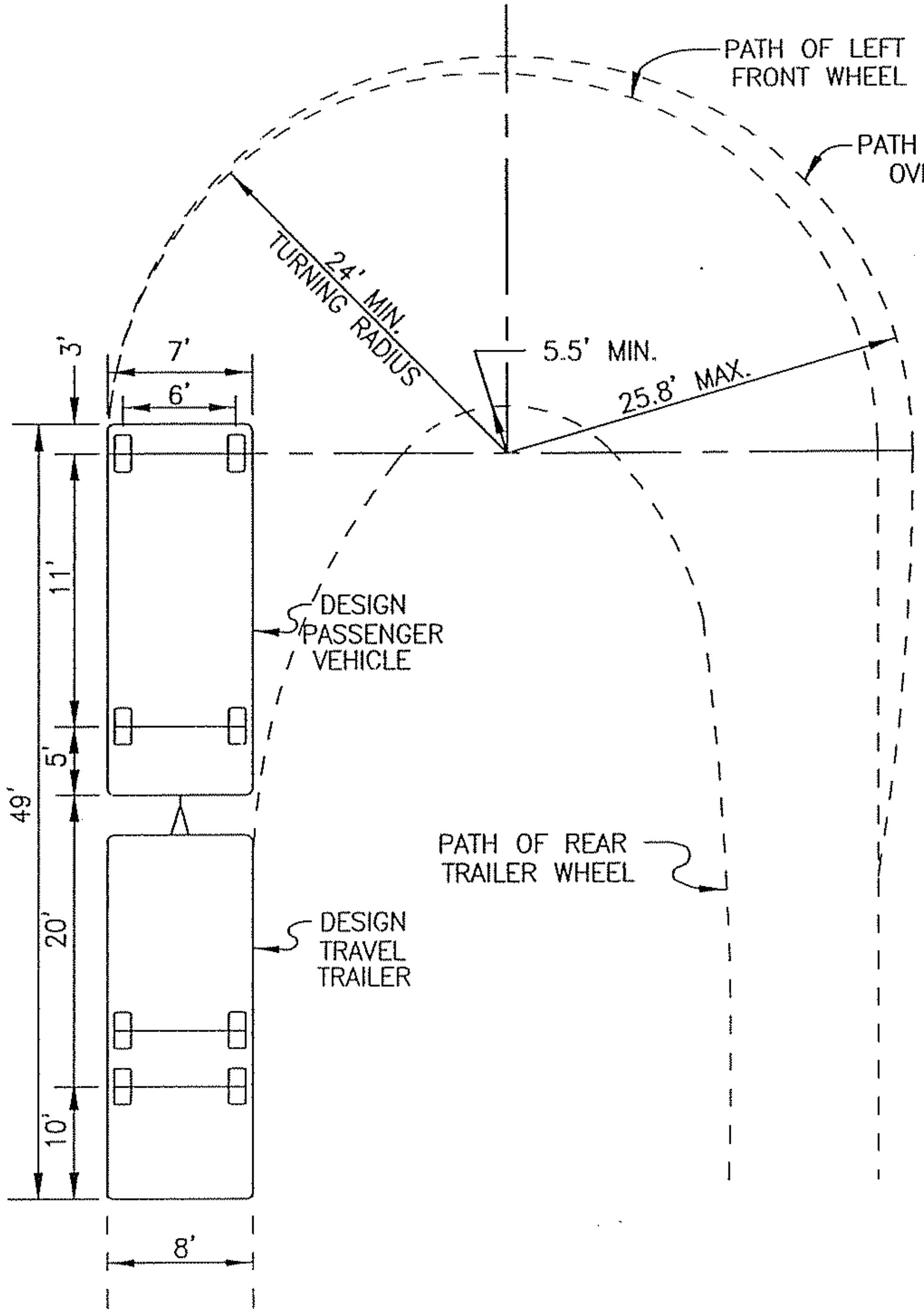
The physical dimensions and operating characteristics of vehicles and the percentage of variously sized vehicles using recreational roads are primary geometric design controls. Existing and anticipated vehicle types must be examined to establish representative vehicles for each functional roadway class. Each design vehicle considered should represent an ample percentage of the vehicles expected to use the facility during its design life.

Three categories of vehicles are common to recreational areas — motor homes, vehicles with trailers, and standard passenger vehicles. Critical physical dimensions for geometric design are the overall length, width, and height of the units. Minimum turning paths of the design vehicles are influenced by the vehicle steering mechanism, track width, and wheelbase arrangement. Figures V-5, V-6, and V-7, taken from *Design Guidelines for Recreational Roads (7)*, show minimum turn paths for motor homes (MH), passenger cars with 30-ft travel trailers (PT), and passenger cars with 20-ft boats (PB). Turning path dimensions for other vehicle types such as buses and passenger cars are covered in Chapter II.



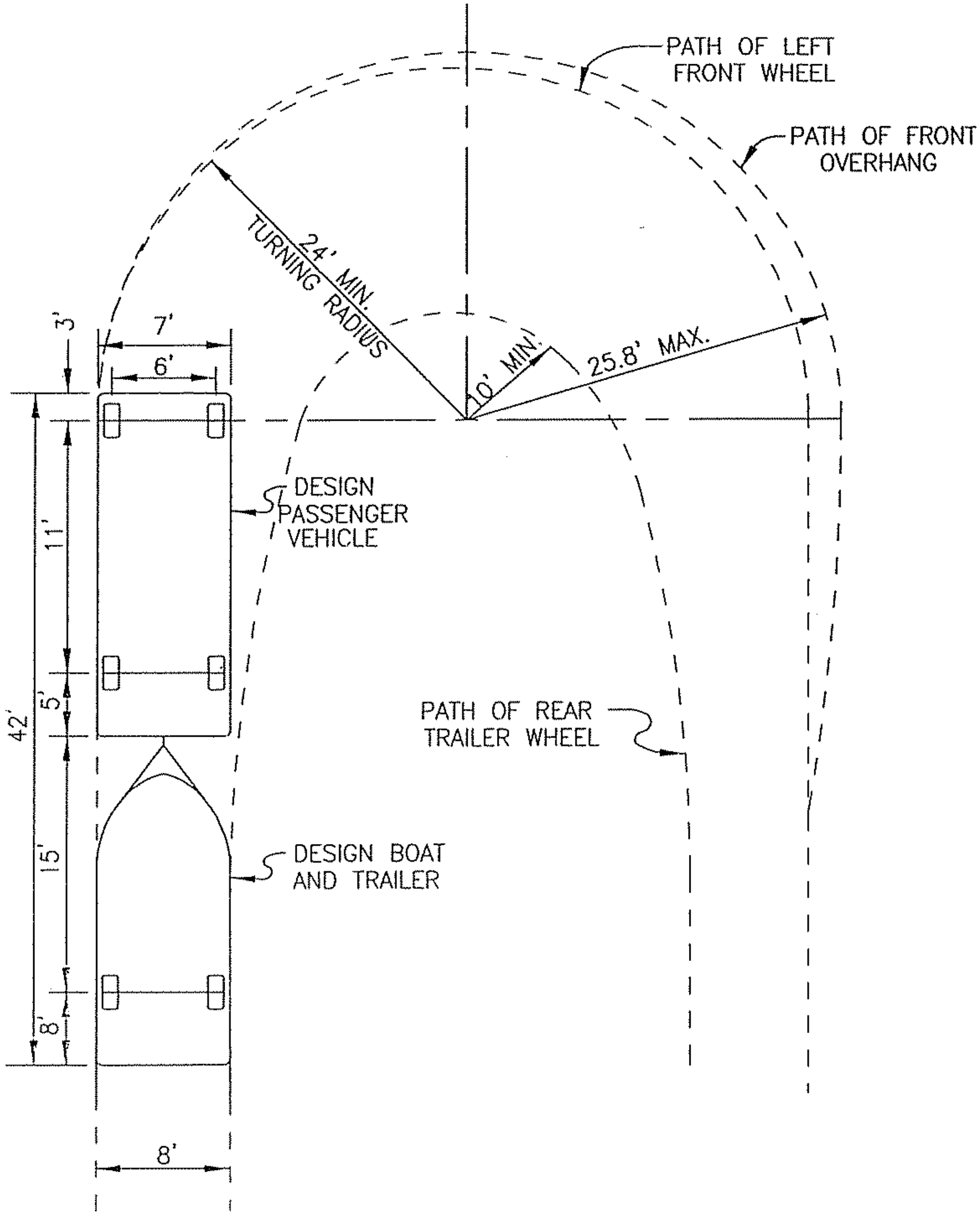
MINIMUM TURNING PATH FOR MH DESIGN VEHICLE

FIGURE V-5



MINIMUM TURNING PATH FOR PT DESIGN VEHICLE

FIGURE V-6



MINIMUM TURNING PATH FOR PB DESIGN VEHICLE

FIGURE V-7

Sight Distance

Minimum stopping sight distance and passing sight distance are a direct function of the design speed. The subject of sight distance for two-lane roads is covered in Chapter III; however, values are not included for cases of very low design speeds and two-directional one-lane roads. On one-lane roads enough sight distance must be available for one vehicle to reach a turnout or for both to stop before colliding. Criteria for measuring stopping sight distance for this type of road assumes a height of eye of 3.50 ft and a height of opposing vehicle of 4.25 ft. The stopping sight distance for a two-directional one-lane road is approximately twice the stopping sight distance for a two-lane road. Suggested stopping sight distances for two-directional one-lane roads are given in Table V-13.

TABLE V-13
MINIMUM STOPPING SIGHT DISTANCE

DESIGN SPEED (MPH)	10	20	30	40
Two-lane roads and single-lane roads (one directional)				
Stopping sight distance (ft)	50	125	200	275-325
K value[a] for:				
Crest vertical curve	2	10	30	60-80
Sag vertical curve	4	20	40	60-70
One-lane roads (two-directional)				
Stopping sight distance (ft)	100	250	400	-
K value[a] for:				
Crest vertical curve	3	20	52	-
Sag vertical curve	4	20	40	-

[a]K value is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve, which will provide minimum sight distance.

Passing Sight Distance

Because of low operating speeds and the nature of travel on recreational roads, frequent passing maneuvers are not anticipated. Nevertheless, minimum passing sight distance should be provided as frequently as possible, particularly on primary access roads where users travel considerable distances to reach activity sites. Passing sight distance is not a factor on one-lane roads. It is assumed that the slower vehicle will pull into a turnout and allow the faster vehicle to pass when necessary. Suggested minimum passing sight distances for two-lane roads are given in Table V-14.

TABLE V-14
MINIMUM STOPPING SIGHT DISTANCE
FOR TWO-LANE ROADS

DESIGN SPEED (MPH)	MINIMUM PASSING SIGHT DISTANCE (FT)[a]	K VALUE [b] CREST VERTICAL CURVE
20	800	210
30	1,100	400
40	1,500	730

[a]Minimum passing sight distance measured from driver's eye height of 3.50 ft to top of object 4.25 ft above pavement.

[b]K value is a coefficient by which the algebraic difference in grade may be multiplied to determine the length in feet of the vertical curve, which will provide minimum sight distance.

Grades

Grade design for recreational roads differs substantially from that for rural highways in that the weight/horsepower ratio of recreational vehicles (RV's) seldom exceeds 50 lb/hp, and this fact indicates that gradeability of RV's approaches that for passenger cars. Furthermore, because vehicle operating speeds on recreational roads are relatively low, large speed reductions on grades are not anticipated.

When grades are kept within the suggested limits, critical length of grade is not a major concern for most recreational roads. Critical length of grade may be a factor on recreational roads in the classification of primary access roads, and appropriate consideration should be given to this element of the design for these roads.

Table V-15 identifies suggested maximum grades for given terrain and design speed. Chapter III contains a more detailed discussion. The grades noted in Table V-15 relate primarily to operational performance of vehicles. A major item to be considered in selection of a maximum grade is the capability of the soil for erosion resistance. In many instances grades considerably less than those shown in Table V-15 should be chosen to satisfy this concern. In addition, type of surface should also be a factor in grade selection. Steep grades with dirt or gravel surfaces may cause driving problems in the absence of continued maintenance, whereas a bituminous surface will give better vehicle performance in general.

TABLE V-15
MAXIMUM GRADES (%) FOR RECREATIONAL ROADS

	DESIGN SPEED (MPH)			
TYPE OF TERRAIN	10	20	30	40
Level	8	8	7	7
Rolling	12	11	10	9
Mountainous	18	16	14	12

Vertical Alinement

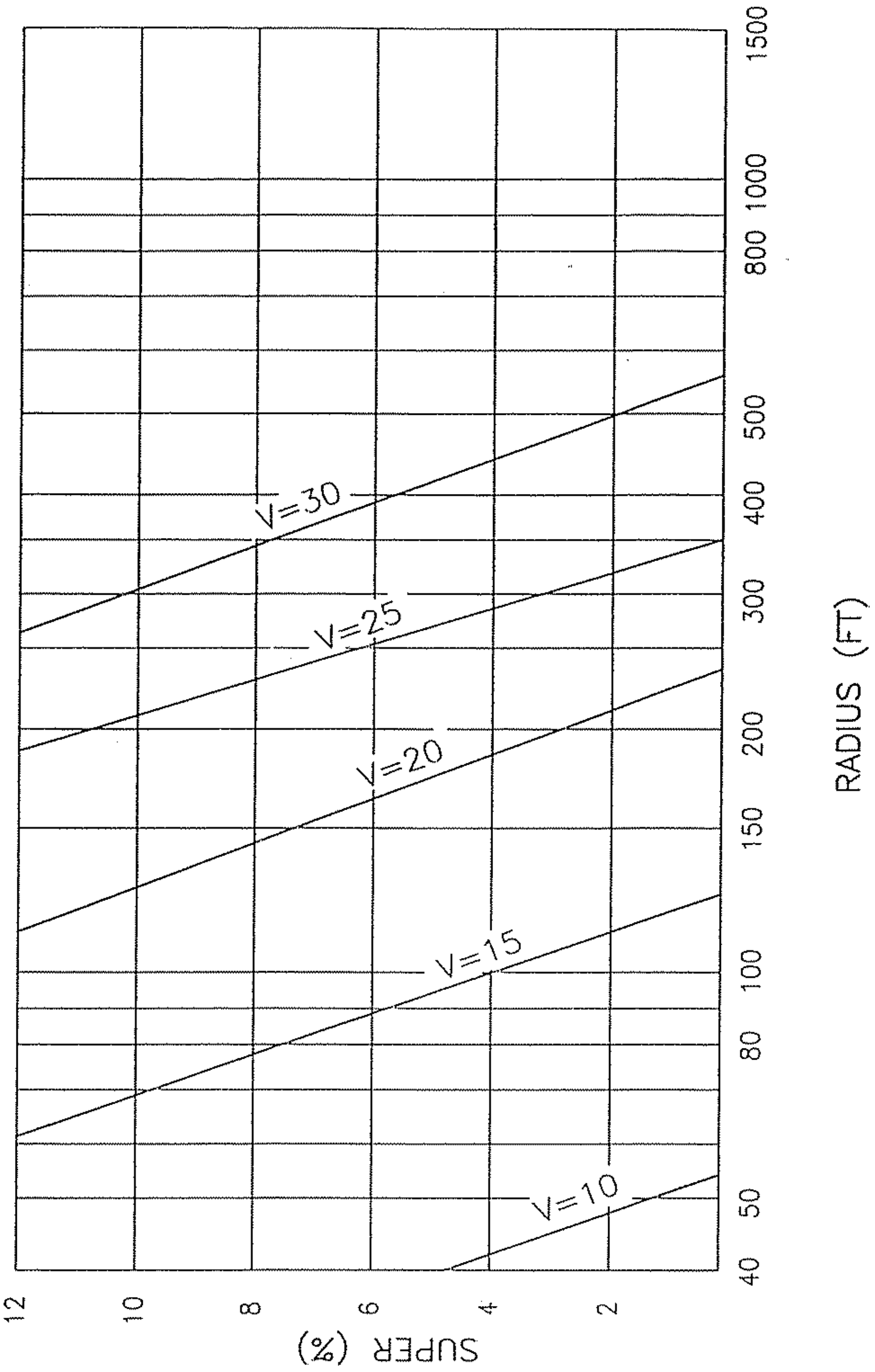
Vertical curves should be safe, comfortable in operation, pleasing in appearance, and adequate for drainage. Minimum or greater stopping sight distance should be provided in all cases. The designer must exercise considerable judgment in constructing vertical curves, because lengths in excess of the minimum may be needed at driver decision points, where drainage or esthetic problems exist, or simply to provide an additional margin of safety.

Vertical curve design for two-lane roads is discussed in Chapter III, which also contains specific design values. Table V-13 also includes additional information for very low design speeds not tabulated elsewhere. For two-directional one-lane roads, crest vertical curves are significantly longer than those for two-lane roads. As previously discussed under the section on sight distance, the stopping sight distance for a two-directional one-lane road is approximately twice the stopping sight distance for a two-lane road. Table V-13 includes K values for one-lane roads, from which vertical curve lengths can be determined.

Horizontal Alinement

Because the use of straight sections of roadway would be physically impractical and (for recreational roads) esthetically undesirable, horizontal curves are necessary elements. The proper relationship between design speed and horizontal curvature and the relationship of both with superelevation are discussed in detail in Chapter III. The guidance provided in Chapter III is generally applicable to paved recreational-type facilities; however, in certain instances variations are appropriate. At locations where there is a tendency to drive slowly, as with local and some circulation roads, a maximum superelevation rate of 0.06 is suggested. On roads with design speeds of 20 mph or less, superelevation may not be warranted.

The design values for maximum curvature and superelevation discussed in Chapter III are based on friction data for paved surfaces. Some lower volume recreational facilities may not be paved, and because friction values for gravel surfaces are less than those for paved surfaces, friction values should be considered in curvature selection. Figure V-8 shows the relationship between minimum radius and superelevation for gravel-surfaced roads. This figure was developed by using f values from 0.12 at 10 mph to 0.10 at 30 mph.



MINIMUM RADIUS FOR HORIZONTAL CURVE FOR GRAVEL SURFACE

FIGURE V-8

Number of Lanes

The number of lanes should be sufficient to accommodate the design traffic volume. For low-volume recreational roads, capacity conditions do not normally govern design; two travel lanes are appropriate. In some cases where traffic volumes are less than 100 vehicles per day, it may be feasible to use a two-directional one-lane roadway. This type of road is often desirable from an economic and environmental standpoint. When one-lane roadways with two-directional traffic are used, turnouts for passing should be provided. Traffic convenience requires that such turnouts be intervisible, provided on all blind curves, and supplemented as necessary so that the maximum distance between turnouts is no more than 1,000 ft. The turnouts should be a minimum of 10 ft. wide for a length of 50 ft. and should have a 25-ft. taper on each end. For overwide and extra-long vehicles the values should be adjusted to accommodate the usage. Figure V-9 shows a typical design that may be used for turnouts on tangent and curve sections for two-directional one-lane roads.

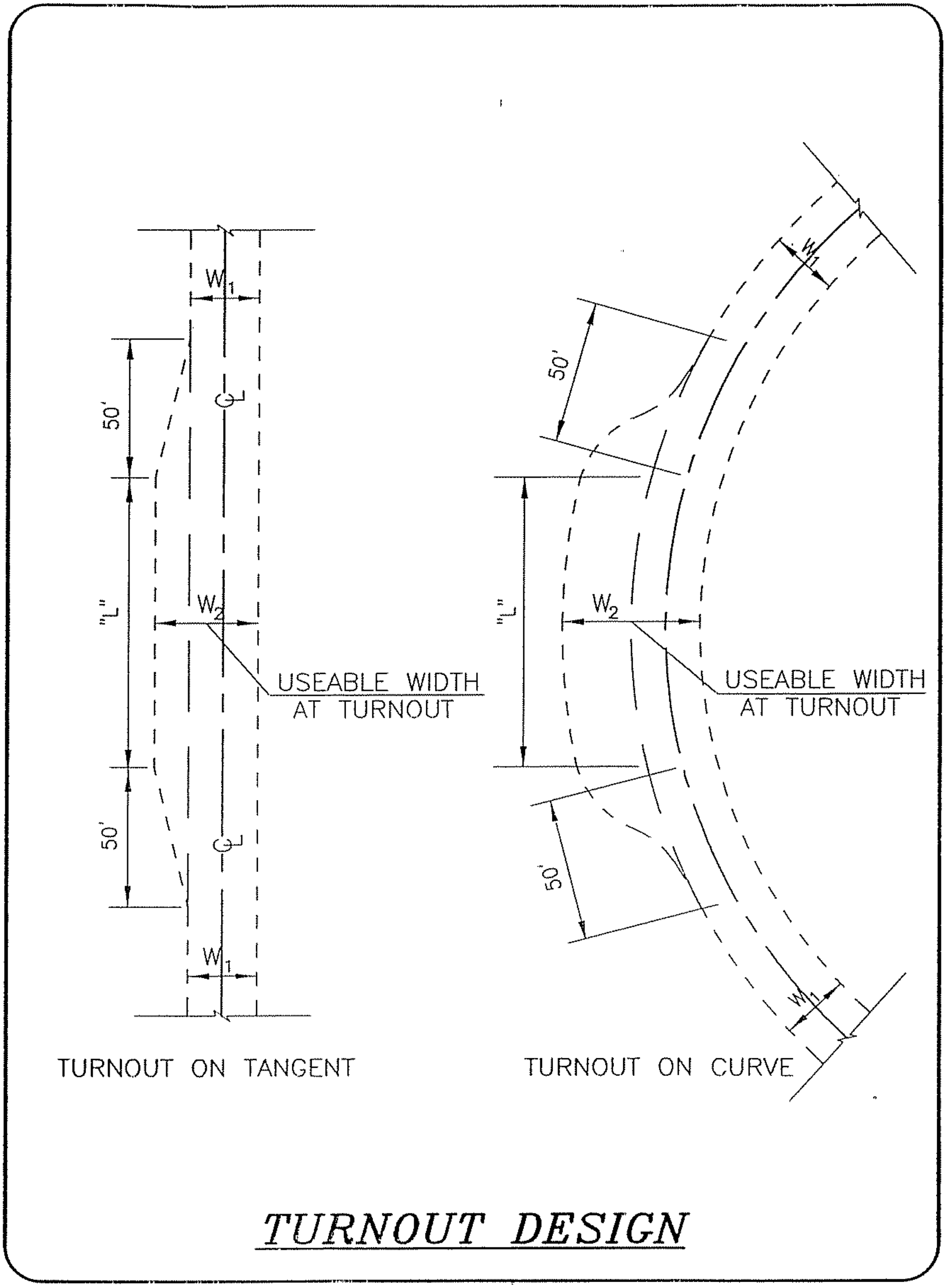

W1
50'
"L"
W2
USEABLE WIDTH AT TURNOUT
50'
W1
TURNOUT ON TANGENT
W1
50'
"L"
W2
USEABLE WIDTH AT TURNOUT
50'
W1
TURNOUT ON CURVE
TURNOUT DESIGN

FIGURE V-9

Widths of Traveled Way, Shoulder, and Roadway

A roadway is defined as that portion of the highway including shoulders for vehicular use. Proper roadway width is selected on the basis of numerous factors including existing and anticipated vehicular and bicycle traffic, safety, terrain, and design speed. Table V-16 gives recommended traveled way widths and shoulder widths for the various types of roadways. The sum of the traveled way and shoulder widths given in Table V-16 constitutes the roadway width.

The low operating speeds and relatively low traffic volumes on recreational roads do not warrant wide shoulders. In addition, wide shoulders may be esthetically objectionable. These facts and concerns are reflected in the shoulder width values given in Table V-16. Under adverse terrain conditions, intermittent shoulder sections or turnouts may be suitable alternatives to continuous shoulders, particularly on lower functional roadway classes. Where guardrail is used, the graded width of the shoulder should be increased about 2 ft.

TABLE V-16
WIDTHS OF TRAVELED WAY AND SHOULDER

TYPE	TRAVELED WAY WIDTH (FT)[a]	SHOULDER WIDTH (FT)
Primary Access Roads (two lanes)	22-24	2-4
Circulation Roads (two lanes)	20-22	2-4
Area Roads (two lanes)	18-20	0-2
Area Roads (one lane)[b]	12	0-1

[a]Widening on the inside of sharp curves should be provided. Additional width equal to 400 divided by the curve radius in feet is recommended.

[b]Roadway widths greater than 14 ft should not be used because of the tendency for drivers to use the facility as a two-lane road.

Surface Crown

Surface cross slope must be provided to ensure adequate drainage. However, excessive surface sloping can cause steering difficulties.

Cross slope rates given in the first section of this chapter are generally applicable to recreational roads.

On one-lane roads with low-type surfaces, a crown would not usually be provided. Roads of this type would be inslope graded (toward the cut ditch) or outslope graded (toward the embankment fill), depending on the resistance of the soil to erosion. Where the soil is unstable and subject to major erosion, inslope grading should be used. Foreslope or backslope grading should exceed the horizontal gradient of the road to a maximum of 5 percent.

Clear Recovery Area

Providing a clear zone adjacent to a road involves a trade-off between safety and esthetics. A driver who leaves the road should be provided a reasonable chance to regain control and avoid serious injury. On the other hand, the philosophy of recreational roads dictates that natural roadside features be preserved where possible. Because of the character of the traffic and the relatively low operating speeds on recreational roads, wide clear zones are not as important as on high-speed, high-volume facilities. For these reasons, dimensions smaller than those used on these higher order roads are appropriate. Desirably, 10 or more ft. of recovery area, measured from the edge of the traffic lane, should be provided on the higher order recreational roads, i.e., the primary access roads. These values are recommended for the general case: however, where economic and environmental concerns are great, even smaller values are appropriate. Clear zone widths on the lower order recreational roads, i.e., circulation roads and areas, are even less critical than on primary access roads. In areas where the accident potential is greater than normal, such as on the outside of sharp horizontal curves at the end of long, steep downgrades, liberal clear zone widths should be provided.

Roadside Slopes

Where terrain conditions permit, blackslopes, foreslopes, and roadside drainage channels should have gentle well-rounded transition. Foreslopes of 4:1 or flatter are safer, stable, and permit establishment and maintenance of turf. The maximum rate of foreslope depends on terrain conditions and the stability of local soils as determined by local experience. Cut sections should be designed with adequate ditches.

The ditch should be deep enough to accommodate the design flow and provide for satisfactory drainage of the pavement base and sub-base. While foreslopes of 4:1 or flatter are preferable, there are other important considerations in ditch design for recreational roads. Surrounding terrain and physical feature preservation may dictate narrow width ditches. The lower speeds prevailing on recreational roads reduce the chance of personal injury for passengers in vehicles which drive into shallow-sided ditches.

Roadside Barrier

Roadside barriers should be installed at points of unusual danger, particularly those points that are unusual compared with the overall characteristics of the road. The criteria used in freeway design do not fit the low-volume recreational road situation. The AASHTO *Guide for Selecting, Locating, and Designing Traffic Barriers* (8) provides some insight into the application of roadside barriers on low-speed, low-volume facilities.

Signing and Marking

Although safety and efficiency of operation depend to a major extent on the geometric design of a road, they should be supplemented by standard signing and marking to provide information and warning to drivers. The extent to which signs and markings are used depends on the traffic volume, the type of highway, and the frequency and use by drivers unfamiliar with the area. The MUTCD (2) contains details regarding design, location , and application of highway signs and markings.

Structures

The design of bridges, culverts, walls, tunnels, and other structures should be in accordance with the AASHTO *Standard Specifications for Highway Bridges* (1). The minimum design loading for new bridges should be H-15. Higher design loadings are appropriate for highways carrying other than just recreational traffic. The vertical clearance at underpasses should be at least 14 ft. Over the entire roadway width. The clear roadway widths for new and reconstructed bridges should be a minimum of the surface width plus 4 ft. Where the approach roadway is surfaced for the full crown width, that surfaced width should be carried across structures.

RESOURCE DEVELOPMENT ROADS

Resource development roads include mining and logging roads. Design criteria appropriate for this type of road in many areas are not significantly different from those for recreational roads. For this reason the criteria developed for recreational roads should be followed to the extent that they are applicable. Several items are unique to this category of road and deserve special attention.

Traffic on this type of road is primarily composed of large, slow-moving, heavily loaded vehicles. For this reason, particular attention should be paid to superelevation of horizontal curves. The center of gravity of trucks is much higher than that of passenger cars, and this fact increases the tendency of trucks to overturn. When semitrailers are used, only part of the payload is on the drive axles. This situation increases the tendency of the drive wheels to spin and sideslip on slippery surfaces. For these reasons the maximum superelevation should be limited to 6 percent. On long sustained grades averse to the direction of haul, the superelevation should be reduced to accommodate the slow truck.

Gradients of this type of facility have an effect on the road maintenance costs and costs to users. An economic analysis is usually necessary to determine the most economical grade for the specific conditions encountered. Such an analysis must consider the increase in culvert installations to prevent ditch erosion on steeper grades and the more frequent surface replacement needs. Adverse grades are special problems on roads planned for heavy hauling. Sections of adverse grades should not be so long that they slow a loaded truck to crawl speed. Except for short sections that can be overcome largely by momentum, adverse grades merit special analysis. In many instances, failure to use flatter grades may result in additional expenses for transportation during the life of the road far in excess of any saving in construction costs.

Geometric design features for resource development roads are similar to those for recreational roads in that they must be consistent with the design speed selected. Low design speeds 40 mph or below are generally applicable to roads with winding alinement in rolling mountainous terrain. Table V-17 lists those minimum design speeds for both one- and two-lane roads for varying terrain conditions.

Because of the mechanical limitations of many of the vehicles using these roads, special attention should be given to the need for warning signs and markings. On long descending grades, consideration should be given to providing escape lanes to decelerate heavy vehicles that lose their brakes and run out of control. Deceleration may be artificially induced by the use of loose material or providing combinations of sufficient length and upgrade for freewheeling deceleration.

Many design considerations for resource development roads are based on the economics of the equipment operating on the facility. The effects of grades and curvature on operational cost are discussed in considerable detail in the *Logging Road Handbook* (9).

In many instances, resource development roads are ultimately used for other (e.g., recreational) purposes. In instances such as these, the original design should take into account all the possible ultimate usages.

TABLE V-17
MIMIMUM DESIGN SPEEDS FOR
RESOURCE DEVELOPMENT AND LOCAL SERVICE ROADS

TYPE OF TERRAIN	SINGLE LANE 100 VPD MAXIMUM MPH)	TWO LANE (MPH)
Level	30	40
Rolling	20	30
Mountainous	10	20

LOCAL SERVICE ROADS

Local service roads are those serving isolated areas that have little or no potential for further development (or that require a higher type facility if further developed) and those serving a minimal number of parcels of land. Most of these roads will not be through roads (connected to public roads on both ends) but will dead end at the service to the last parcel on the road.

Traffic on this type of road is of very low volume (fewer than 100 vehicles per day) and is of a repeat type. The design criteria, therefore, can be basically the same as those developed for recreational roads. Those criteria should be followed where applicable.

CHAPTER 3

MAPPING

AND

SURVEYING

CHAPTER 3 - MAPPING AND SURVEYING

A. MAPPING AND SURVEYING

All final maps, parcel maps, and record of surveys shall conform to the requirements set forth in this chapter, unless provided for in the current Subdivision Map Act and Land Surveyors Act.

1. Mapping

The scale of the map shall not be less than one inch equals one hundred feet (1" = 100'), except that an alternate scale may be approved by the County Surveyor.

The minimum height of all lettering shall be 1/8 inch hand or 1/10-inch machine lettered.

When the map consists of more than three sheets, exclusive of the certificate sheet, a key map showing the relation of the sheets shall be placed on the first map sheet. The sheets shall be numbered beginning with the certificate sheets then continuing with the map sheets.

Dimensions of lots shall be given as total dimensions, corner to corner, and shall be shown in feet and hundredths of a foot. No ditto marks shall be used. Lots containing one acre or more shall show acreage to nearest hundredth. Lots of less than one acre shall show square footage. Gross and net areas will be shown on all parcels smaller than 2 acres.

Final Map and Parcel Maps shall contain a title consisting of the assigned tract number and name, and a sub-title or general description of all the property being subdivided. Reference to previous maps of record shall be given.

The map shall show clearly what stakes, monuments or other evidence were found on the ground to determine the boundaries of the subdivision. All adjoining subdivisions shall be identified by lot and block numbers, subdivision name and place of record, or other proper designation.

The bearing and length of every lot line, block line and boundary line shall be shown. Bearing and lengths of tangents, and radii, arc length, and delta for all curves as may be necessary to determine the location of the center of curves and tangent points shall be shown. All radial lines shall be identified.

All lots and or parcels shall be identified as such and/or numbered or lettered on the Final or Parcel Map. If the lots or parcels are numbered, they shall begin with the number "1" and shall continue consecutively in numeric order throughout the subdivision with no omissions or duplications. If the lots or parcels are lettered, they shall begin with the letter "A" and shall continue consecutively in alphabetical order throughout the subdivision with no omissions or duplications.

Whenever the Director of Public Works and/or City Engineer have established the center line of a street or alley adjacent to or in the proposed subdivision, the record data shall be shown on the map indicating all monuments found or not found or reset. If the points were reset by ties, the course and detail of relocation data used shall be stated.

Final Maps or Parcel Maps shall show all easements to which the lots are subject. The easements must be clearly labeled by solid capital letters and identified, and if already of record, the record reference given. If any easement is not definitely located by record, a statement of such must appear on the map sheet. Easements shall be denoted by fine dashed lines. The width of the easement and the lengths and bearings of the lines thereof and sufficient ties thereto to definitely locate the easement with respect to the subdivision must be shown. If the easement is being dedicated by the map, it shall be properly referenced in the owner's certificate of dedication.

Boundary lines of all political subdivisions crossing or bounding the subdivision shall be clearly designated and referenced.

Map accuracy shall be such that any and all calculated closures shall be 1 in 10,000 or greater.

2. Checking and Filing

A complete set of calculations shall be submitted with the initial check set for all maps submitted for review. The calculations may be done by hand or by computer. In either case, they shall include at least the following: all corresponding points shall be labeled on both the check prints and the calculations, courses and closures for all lots, roads, easements, aliquot parts of sections shown, and for the exterior boundary of the entire subdivision, and acreages for all lots.

Maps to be recorded shall be legibly drawn, printed, or reproduced by a process guaranteeing a permanent record in black on tracing cloth, or polyester base film, 18 by 26 inches. If ink is used on polyester base film, the ink surface shall be coated with a suitable substance to assure permanent legibility. A one-inch blank margin shall be left on each edge of the map.

Only copies with the original signatures will be accepted. Signatures on acknowledgements must be exactly the same as on Owner's Certificate and must be written in black permanent ink.

No certificate stick-ons will be accepted and no stick-on shaded film to denote greenbelt areas or other purposes will be accepted.

3. Fees

At the time the Final Map, Parcel Map, Parcel Map Waiver documents, Record of Survey, Amending Map, Certificate of Correction or Corner Record is submitted for checking, the map checking fees shall be deposited with the Department of Public Works in an amount established by the Board of Supervisors by resolution. Recording fees are to be paid prior to recording.

4. Surveying

a. Basis of Bearings

Each map shall contain a Basis of Bearings Note which includes the description and bearing of the line used as the basis and:

The record data of the map or document from which it was obtained, or

A statement that said bearing is based on either a solar or polaris observation.

The following are acceptable basis of bearings:

1) Recorded Maps.

2) Astronomical Observation.

3) California Coordinate System. Maps with this basis of bearing shall also include a control scheme through which the coordinates were determined from points of known coordinates.

4) Government Records and other records as approved by the County Surveyor.

b. Accuracy

All field survey accuracy shall be in compliance with acceptable surveying practices.

c. Monuments

All lot corners shall be monumented in subdivisions, with the exception of parcel maps creating four or fewer parcels which may be compiled from record data providing the criteria set forth in the Subdivision Map Act, Chapter 2 - Maps, Article 3, Parcel Maps, paragraph 66448, is met. In addition, monuments shall be set at all angle and curve points on the exterior boundaries and on the right of way line. Shasta County standard centerline monuments shall be set at all street intersections and terminations. Additional monumentation may be required if determined necessary, by the County Surveyor, to perpetuate or facilitate re-establishment of any point or line of the survey.

Permanent elevation bench marks referring to an approved datum may be required to be set at a location approved by the County Surveyor.

Any monument or bench mark, as required by these specifications that is disturbed or destroyed before acceptance of all improvements, shall be replaced by the subdivider.

All monuments shall be of a permanent type. The following are approved as permanent:

1) Concrete monument with brass cap.
2) 1/2" or larger pipe with tag or cap permanently attached.
3) 1/2" steel bar with tag or cap.
4) "T" bar with tag permanently attached.
5) Other as approved by the County Surveyor.

NOTE: Center line monuments shall meet County standards as shown in Appendix 3-1 of these Development Standards.

5. Certificates and Statements

a. The following certificates will be required on subdivisions requiring a Final Map.

OWNERS'S STATEMENT

(i) (WE) HEREBY CERTIFY THAT (i) (WE) (AM) (ARE) THE OWNER(s) OF, OR HAVE SOME RIGHT, TITLE, OR INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE BOUNDARY SHOWN UPON THIS MAP, AND THAT (i) (WE) (AM) (ARE) THE ONLY PERSON(s) WHOSE CONSENT IS NECESSARY TO PASS A CLEAR TITLE TO SAID PROPERTY, AND (i) (WE) CONSENT TO THE PREPARATION AND RECORDATION OF SAID MAP AS SHOWN WITHIN THE COLORED BORDER LINES AND HEREBY DEDICATE FOR PUBLIC USE (obtain dedication wording from county).

By ______________________________ By ______________________________

By ______________________________ By ______________________________

The Certificates of Acknowledgements must be substantially in the form of the following:

State of ____________________)
) ss.
County of __________________)

On ____________________ before me, ____,
DATE NAME. TITLE OF OFFICER, E.G "JANE DOE. NOTARY PUBLIC"
personally appeared ____,

personally known to me **OR** proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

Witness my hand and official seal.

____
SIGNATURE OF NOTARY SEAL

____
COUNTY

STATEMENT OF CLERK OF
BOARD OF SUPERVISORS

I, , CLERK OF THE BOARD OF SUPERVISORS OF COUNTY OF SHASTA, HEREBY CERTIFY THAT SAID BOARD APPROVED THE WITHIN MAP ON THE ______ DAY OF __________________, 19___, AND ACCEPTED ON BEHALF OF THE PUBLIC, ALL PARCELS OF LAND OFFERED FOR DEDICATION FOR ___________ ________________________________ (obtain wording from county).

BY____

CLERK OF THE BOARD OF SUPERVISORS
OF THE COUNTY OF SHASTA, STATE OF CALIFORNIA

BY ____
Deputy

STATEMENT OF APPROVAL BY SECRETARY OF
SHASTA COUNTY PLANNING COMMISSION

I, _________________________________, SECRETARY OF SHASTA COUNTY PLANNING COMMISSION, HEREBY CERTIFY THAT I HAVE EXAMINED THIS MAP, THAT THE SUBDIVISION AS SHOWN HEREON IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP, AND ANY APPROVED ALTERATIONS THEREOF AS APPROVED BY THE SHASTA COUNTY PLANNING COMMISSION, ON ______________, 19___.

____ ___________
SECRETARY, SHASTA COUNTY PLANNING COMMISSION DATE

STATEMENT OF APPROVAL BY COUNTY SURVEYOR

I, ______________________________, COUNTY SURVEYOR OF SHASTA COUNTY, HEREBY CERTIFY THAT I HAVE EXAMINED THIS MAP; THAT THE SUBDIVISION AS SHOWN HEREON IS SUBSTANTIALLY THE SAME AS IT APPEARED ON THE TENTATIVE MAP AND ANY APPROVED ALTERATION THEREOF AS APPROVED BY THE SHASTA COUNTY PLANNING COMMISSION ON ______________________, 19___; THAT ALL THE PROVISIONS OF THE CALIFORNIA "SUBDIVISION MAP ACT," AS AMENDED, AND OF THE SHASTA COUNTY ORDINANCE CODE, APPLICABLE AT THE TIME OF APPROVAL OF SAID TENTATIVE MAP, HAVE BEEN COMPLIED WITH AND THIS MAP IS TECHNICALLY CORRECT.

____

COUNTY SURVEYOR, SHASTA COUNTY, CALIFORNIA

BY____ ____________

DEPUTY COUNTY SURVEYOR DATE

STATEMENT OF COUNTY DIRECTOR OF ENVIRONMENTAL HEALTH

I, ______________________________, DIRECTOR OF ENVIRONMENTAL HEALTH OF SHASTA COUNTY, HEREBY CERTIFY THAT ALL HEALTH AND SANITATION CONDITIONS ESTABLISHED ON THE TENTATIVE MAP AND ANY APPROVED ALTERATION THEREOF AS APPROVED BY THE SHASTA COUNTY PLANNING COMMISSION ON _____________, 19___; HAVE BEEN MET OR GUARANTEED.

____ ____________

SHASTA COUNTY DIRECTOR OF ENVIRONMENTAL HEALTH DATE

STATEMENT OF COUNTY TAX COLLECTOR

I, ______________________________, TAX COLLECTOR OF SHASTA COUNTY, HEREBY CERTIFY THAT THERE ARE NO LIENS FOR UNPAID STATE, COUNTY, OR LOCAL TAXES OR SPECIAL ASSESSMENTS AGAINST THE LAND INCLUDED IN THE WITHIN SUBDIVISION OR AGAINST ANY PART THEREOF EXCEPT TAXES OR SPECIAL ASSESSMENTS NOT YET PAYABLE AGAINST SAID SUBDIVISION OR ANY PART THEREOF, AND THAT THIS CERTIFICATE DOES NOT INCLUDE ANY ASSESSMENTS OF ANY ASSESSMENT DISTRICT, THE BONDS WHICH HAVE NOT YET BECOME A LIEN AGAINST SAID LAND OR ANY PART THEREOF.

____ ____________

TAX COLLECTOR, COUNTY OF SHASTA, CALIFORNIA DATE

STATEMENT OF REGISTERED CIVIL ENGINEER

I, ______________________________________, A REGISTERED CIVIL ENGINEER, HAVE PREPARED A SOILS REPORT, DATED __________________________, 19___, IN ACCORDANCE WITH THE SHASTA COUNTY ORDINANCE CODE, AND SAID REPORT IS ON FILE WITH THE SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS, AND THE REPORT (DOES/DOES NOT) INDICATE THE PRESENCE OF CRITICALLY EXPANSIVE SOILS OR OTHER SOILS PROBLEMS, WHICH IF NOT CORRECTED COULD LEAD TO STRUCTURAL DEFECTS. SAID SOILS REPORT (DOES/DOES NOT) INCLUDE THE RECOMMENDED CORRECTIVE ACTION WHICH IS LIKELY TO PREVENT THE STRUCTURAL DAMAGE.

____ ____________

REGISTERED CIVIL ENGINEER OF STATE OF CALIFORNIA DATE

R.C.E. ___________

STATEMENT OF SURVEYOR OR ENGINEER

I, _____________________________________, (LICENSED LAND SURVEYOR) (REGISTERED CIVIL ENGINEER), HEREBY CERTIFY THAT THIS MAP CORRECTLY REPRESENTS A SURVEY MADE UNDER MY DIRECTION DURING ___________________, 19___, THAT THE SURVEY IS TRUE AND COMPLETE AS SHOWN (THAT THE MONUMENTS ARE OF THE CHARACTER AND OCCUPY THE POSITIONS INDICATED), (THAT THE MONUMENTS ARE OF THE CHARACTER AND THEY WILL BE SET IN SUCH POSITIONS ON OR BEFORE _________________________, 19___,) AND THAT THE MONUMENTS (ARE) (WILL BE) SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

____

(LICENSED LAND SURVEYOR L.S.)
(CIVIL ENGINEER R.C.E.)

RECORDER'S STATEMENT

FILED THIS ______ DAY OF _______________________, 19___, AT _______________ ___M., IN BOOK ______________ OF MAPS AT PAGE _________ AT THE REQUEST OF ____.

SIGNED ____
SHASTA COUNTY RECORDER

BY ____
DEPUTY

FEE: ________________

b. The following certificates will be required on subdivisions requiring a Parcel Map.

OWNER'S STATEMENT

(i) (WE) HEREBY CERTIFY THAT (i) (WE) (AM) (ARE) THE OWNER(s) OF, OR HAVE SOME RIGHT, TITLE, OR INTEREST IN AND TO THE REAL PROPERTY INCLUDED WITHIN THE BOUNDARY SHOWN UPON THIS MAP, AND THAT (i) (WE) (AM) (ARE) THE ONLY PERSON(s) WHOSE CONSENT IS NECESSARY TO PASS A CLEAR TITLE TO SAID PROPERTY, AND (i) (WE) CONSENT TO THE PREPARATION AND RECORDATION OF SAID MAP AS SHOWN WITHIN THE COLORED BORDER LINES AND HEREBY DEDICATE FOR PUBLIC USE (obtain dedication wording from county)

BY________________________ BY________________________

BY________________________ BY________________________

THE CERTIFICATES OF ACKNOWLEDGEMENTS MUST BE IN THE SAME FORM AS REQUIRED FOR FINAL MAPS.

RECORDER'S STATEMENT

FILED THIS _____ DAY OF ____________________, 19___, AT ___________ _____M., IN BOOK ____________ OF PARCEL MAPS AT PAGE ___________ AT THE REQUEST OF ____.

SIGNED ______________________________________
SHASTA COUNTY RECORDER

BY ____
DEPUTY

FEE________________

STATEMENT OF DEDICATION

(Required only when dedications appear on map)

I, ____________________, DIRECTOR OF PUBLIC WORKS OF THE COUNTY OF SHASTA, UNDER THE AUTHORITY GRANTED TO ME BY THE BOARD OF SUPERVISORS OF COUNTY OF SHASTA ON JUNE 18, 1985, BY THE ADOPTION OF RESOLUTION NUMBER 85-144 ACCEPT ON BEHALF OF THE PUBLIC ALL OFFERS OF DEDICATIONS FOR (obtain wording from county).

SIGNED ____ ____________
SHASTA COUNTY DIRECTOR OF PUBLIC WORKS — DATE

BY____
ASSISTANT DIRECTOR

(ENGINEER'S) (SURVEYOR'S) STATEMENT

THIS MAP WAS PREPARED BY ME OR UNDER MY DIRECTION (AND WAS COMPILED FROM RECORD DATA) (AND IS BASED UPON A FIELD SURVEY) IN CONFORMANCE WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE AT THE REQUEST OF (NAME OF PERSON AUTHORIZING MAP) ON (DATE). I HEREBY STATE THAT THIS PARCEL MAP SUBSTANTIALLY CONFORMS TO THE APPROVED OR CONDITIONALLY APPROVED TENTATIVE MAP, IF ANY.

(IF A FIELD SURVEY WAS PERFORMED ADD THE FOLLOWING STATEMENT)

(THAT THE MONUMENTS ARE OF THE CHARACTER AND OCCUPY THE POSITIONS INDICATED), OR (THAT THE MONUMENTS ARE OF THE CHARACTER AND THEY WILL BE SET IN SUCH POSITIONS ON OR BEFORE __________________, 19___), AND THAT THE MONUMENTS (ARE) OR (WILL BE) SUFFICIENT TO ENABLE THE SURVEY TO BE RETRACED.

____
LICENSED LAND SURVEYOR L.S. OR
CIVIL ENGINEER R.C.E.

STATEMENT OF COUNTY TAX COLLECTOR

I, ________________________________, TAX COLLECTOR OF SHASTA COUNTY, HEREBY CERTIFY THAT THERE ARE NO LIENS FOR UNPAID STATE, COUNTY, OR LOCAL TAXES OR SPECIAL ASSESSMENTS AGAINST THE LAND INCLUDED IN THE WITHIN SUBDIVISION OR AGAINST ANY PART THEREOF EXCEPT TAXES OR SPECIAL ASSESSMENTS NOT YET PAYABLE AGAINST SAID SUBDIVISION OR ANY PART THEREOF, AND THAT THIS CERTIFICATE DOES NOT INCLUDE ANY ASSESSMENTS OF ANY ASSESSMENT DISTRICT, THE BONDS WHICH HAVE NOT YET BECOME A LIEN AGAINST SAID LAND OR ANY PART THEREOF.

____ __________

TAX COLLECTOR, COUNTY OF SHASTA DATE
STATE OF CALIFORNIA

COUNTY SURVEYOR'S STATEMENT

THIS MAP CONFORMS WITH THE REQUIREMENTS OF THE SUBDIVISION MAP ACT AND LOCAL ORDINANCE.

DATED ____________________, 19_____

SIGNED ___________________________
SHASTA COUNTY SURVEYOR

BY ________________________________
DEPUTY

c. The following certificates and statements will be required on Records of Surveys.

SURVEYOR'S STATEMENT

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF THE LAND SURVEYORS ACT AT THE REQUEST OF __________(OWNER)__________, ON ______DATE____.

SIGNED AND SEALED ______________________________

L.S. (or R.C.E.) NO. ______________________________

COUNTY SURVEYOR'S STATEMENT

THIS MAP HAS BEEN EXAMINED IN ACCORDANCE WITH SECTION 8766 OF THE LAND SURVEYORS ACT THIS _____ DAY OF ________________19___.

SIGNED AND SEALED ______________________________
SHASTA COUNTY SURVEYOR

BY______________________________
DEPUTY COUNTY SURVEYOR

L.S. (R.C.E.) NO. ______________________________

RECORDERS STATEMENT

FILED THIS _________ DAY OF _______________, 19___, AT ______M., IN BOOK ________ OF LAND SURVEYS AT PAGE _________, AT THE REQUEST OF ____.

SIGNED ______________________________
SHASTA COUNTY RECORDER

BY______________________________
DEPUTY

FEE________

6. Subdivision Guarantee Letter

Submittal of a subdivision guarantee letter shall comply with Chapter 3, Article 6, Section 66465 of the California Subdivision Map Act.

This is required when the Final Map or Parcel Map is submitted for recording. Owners' signatures shall be the same on the map as on the letter.

The subdivision guarantee letter must have been issued within 10 days of the recording date of the map.

7. Subdivision Final Map Checking and Filing Procedure

Tract No. ________ Subdivision Name ______________________________

NOTE: All checking fees are due and payable upon first submittal.

_____A First Submittal (Signatures not required at this time.)

1. Four blueline sets (all sheets)

   a. One set for County Department of Resource Management's Planning Division
   b. One set for County Department of Resource Management's Environmental Health Division
   c. Two sets for Department of Public Works

2. One set of calculations with all corresponding points labeled on both the calculations and one blueline set.

   a. The calculation shall be complete and include courses and closures for all lots, roads, easements, aliquot parts of sections shown, and for the exterior boundary of the entire subdivision. The calculations shall also show all lot acreages.

_____B. Each Additional Submittal

1. Clean blueline set(s) as required for clearance by Department of Public Works, County Department of Resource Management's Planning and Environmental Health Divisions.
2. **All** previously checked blueline sets and calculations.
3. Any additional data as requested.
4. All original sheets must be taken by the applicant or his representative to each department for signature once clearance has been obtained.

_____C. Submittal for Board of Supervisors' approval when all conditions have been met and all signatures have been obtained.

1. One clean blueline set (all sheets)
2. **All** previously checked blueline sets.
3. Request scheduling for approval of Board of Supervisors

_____D. Submittal for filing **AFTER** Board of Supervisors' approval of map.

1. One original mylar set
2. One sepia set (at option of engineer)
3. One original (Final) Subdivision Guarantee Letter
4. Five blueline sets
5. Recording Fees (payable to Shasta County Recorder)
6. **All** previously checked blueline sets and calculations

Date taken to Recorder by DPW ______________________________

Recording Data ________________________

8. Parcel Map Checking and Filing Procedure

P.M.________

Engineer ______________________Sec.______T.______N.,R.______ PBRG

NOTE: All checking fees are due and payable upon first submittal.

____A. First Submittal (Signatures not required at this time.)

1. Four blueline sets (all sheets)

   a. One set for County Department of Resource Management's Planning Division
   b. One set for County Department of Resource Management's Environmental Health Division
   c. Two sets for Department of Public Works

2. One set of calculations with all corresponding points labeled on both the calculations and one blueline set.

   a. The calculation shall be complete and include courses and closures for all lots, roads, easements, aliquot parts of sections shown, and for the exterior boundary of the entire subdivision. The calculations shall also show all lot acreages.

____B. Each Additional Submittal

1. Clean blueline set(s) as required for clearance by the Department of Public works.

2. <u>All</u> previously checked blueline sets and calculations

3. Any additional data as requested.

____C. Submittal when roads are completed or bonded, all agreements signed and all fees paid and approved by the Department of Public Works.

1. One original mylar set

2. One sepia set (at option of engineer)

3. One original (Final) Subdivision Guarantee Letter

4. Recording Fee (payable to Shasta County Recorder)

5. <u>All</u> previously checked blueline sets and calculations.

6. Three clean blueline sets.

Date taken to Recorder by DPW ______________________________

Recording Data ______________________________

9. Record of Survey Checking And Filing Procedure

Engineer________________For_______________Sec.____T.___N.,R____(PBRG)

NOTE: All checking fees are due and payable upon first submittal.

_____A. First Submittal

1. One blueline set
2. One set of calculations with all corresponding points labeled on both the calculations and one blueline set.

_____B. Each Additional Submittal

1. One clean blueline set
2. **All** previously checked blueline sets

_____C. For Filing

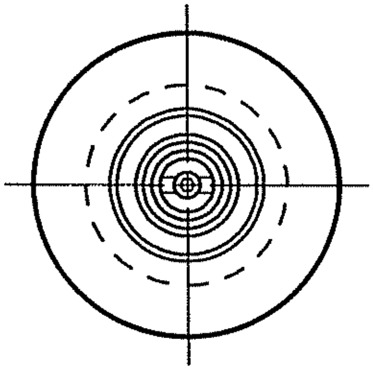
1. One original mylar set
2. One sepia set (at option of engineer)
3. **All** previously checked blueline sets
4. Recording Fee (Payable to Shasta County Recorder)

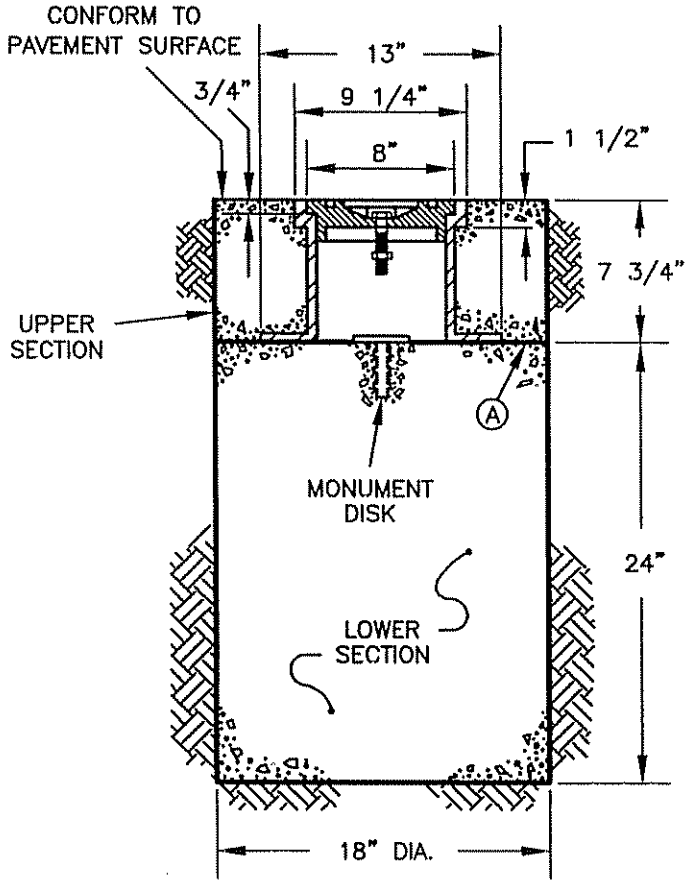
Date taken to Recorder by DPW ____

Recording Data ______________________________________

NOTES

1. LOWER SECTION TO BE POURED 12 HOURS PRIOR TO THE UPPER SECTION
2. ALL CONCRETE SHALL BE CLASS B, 5 SACKS PER CUBIC YARD.
3. MONUMENT FRAMES AND COVERS SHALL BE PHOENIX IRON WORKS, PART P-2001 OR EQUIVALENT.
4. MONUMENT FRAMES AND COVERS SHALL CONFORM TO ASTM SPEC. A159-64T-G3000 OR U.S. GOVERNMENT SPEC. QQ1-653.
5. CONCRETE SHALL BE PLACED AGAINST UNDISTURBED MATERIAL.





(A) TROWELED SMOOTH SURFACE AND APPLY AN APPROVED ANTIBONDING AGENT.

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	**CENTERLINE MONUMENT** COVER ASSEMBLY AND INSTALLATION
MARK	DATE	REVISION		

CHAPTER 4

GRADING

AND

EROSION CONTROL

STANDARDS

CHAPTER 4 - GRADING AND EROSION CONTROL

A. GENERAL

1. Purpose

The purpose of this chapter is to promote and protect the public safety, convenience, comfort, prosperity, general welfare and the county's natural resources by establishing minimum requirements for grading, excavating, and filling in order to:

a. Control erosion and sedimentation and prevent damage to off-site property and streams, water-courses, and aquatic habitat;

b. Avoid creation of unstable slopes or filled areas;

c. Prevent impairment or destruction of potential leach fields for sewage disposal systems;

d. Regulate de facto development caused by uncontrolled grading.

2. Definitions

For the purposes of this chapter, the following words and terms have the meanings indicated, unless the context in which any word or term is used or a specific provision of this code requires another meaning:

a. Earth material means any soil, sand, gravel, decomposed granite, rock organic or mulch cover, or other natural material or fill.

b. Enforcing officer is the person or body so designated by the Board of Supervisors.

c. Grading means movement of any earth materials:

(1) In excess of two hundred fifty cubic yards; or

(2) Which damages or has the potential to significantly damage directly, or indirectly through erosion, any natural or manmade watercourse, whether year-round or intermittent, including drainage channels; or

(3) To make a road, temporary access road, building pad, mobile home pad or a new sewage disposal system when the installation of the sewage disposal system requires changes in the natural contour of the land; or

(4) Which disturbs 10,000 square feet or more of surface area.

d. Grading permits are identified as "Major Project" or "Minor Project" permits. "Major Project" permits shall be required for any grading which will involve 1) the movement of more than 2,000 cubic yards of earth, 2) the disturbance of more than five acres of earth material and/or 3) is defined as a discretionary permit (excludes grading permits for a detached single-family dwelling located on one parcel).

The issuance of all "Major Project" grading permits is subject to CEQA review by the Planning Division.

"Minor Project" permits shall be required for any grading not requiring a "Major Project" permit. "Minor Project" permits will be subject to CEQA review if defined as a "project" pursuant to CEQA Guidelines Section 15378.

e. Grading standards are standards for grading, as adopted and amended from time to time by resolution of the Board of Supervisors.

f. Watercourse means any well-defined channel with distinguish-able bed and bank showing evidence of having contained flowing water indicated by deposit of rock, sand, gravel or soil, including but not limited to, streams as defined in Public Resources Code Section 4528(f). "Watercourse" also includes man-made watercourses.

3. <u>Enforcing Officer Designated</u>

In addition to any other enforcing officer designated by the Board of Supervisors, Director of the Department of Resource Management and/or the Director of the Department of Public Works is the enforcing officer with respect to work or projects under the specific administrative control of their department. The Department of Public Works and other County departments shall provide technical assistance to any enforcing officer.

4. <u>Grading Restrictions</u>

No grading shall be done or caused to be done without a grading permit. A grading permit may allow for preliminary grading as part of a valid and effective building permit, subdivision construction plan, or other development or land use entitlement. Preliminary grading permitted for a subdivision project shall limit the work thereunder to that necessary for septic testing, water well drilling, environmental assessments, or surveying; preliminary grading plans for other projects shall contain all of the information required by Section 12.12.070. The grading permit associated with any building permit, subdivision construction plan, or other development or land use entitlement shall comply with the provisions of this chapter.

5. General Exemptions

The following activities are exempt from the permit requirements of this chapter:

a. Cultivation and production of agricultural products, including but not limited to gardening, forestry regulated by the California Department of Forestry and Fire Protection under an approved Timber Harvest Plan, and the rearing and management of livestock, except as provided in subsection B of this section;

b. Brush clearing in accordance with the provisions of Public Resources Code Section 4291 et seq. or at the direction of the Fire Warden for fire prevention and safety purposes.

c. Mining, quarrying, excavating, processing, or stockpiling of rock, sand, gravel, aggregate or clay, as authorized in the Zone Plan for which a use permit and reclamation plan have been granted, except as provided in subsection B of this section;

d. Operation of refuse disposal sites for which a valid permit has been issued pursuant to Chapter 8.32;

e. Temporary excavation for installation or abandonment of underground storage tanks and associated piping when no permanent change is made in the existing terrain and the excavation is refilled;

f. Temporary trench or pit excavation for the purpose of installing underground or overhead utilities, except as provided in subsection B of this section;

g. Subsurface geologic exploration under the supervision of a licensed civil engineer, registered environmental health specialist, engineering geologist or archeologist, except as provided in subsection B of this section;

h. The construction of pits for the containment of drilling fluids, when well drilling is performed pursuant to Chapter 8.56;

i. Grading conducted during a civil or hazardous material emergency or natural disaster to relieve or correct conditions caused by such emergency or disaster or to make emergency firebreaks;

j. The removal and spreading of contaminated earth materials from underground tank excavations performed in compliance with Chapter 8.24; and

k. Grading performed on public works projects by a governmental agency.

No exemption provided in subdivisions 1, 3, 6, or 7, of subsection A of this section shall apply to any grading that will adversely affect any off-site drainage or aquatic habitat, or that will adversely affect the lateral or subjacent support of any property not owned by the owner of the land upon which such grading is performed.

B. PERMITS

1. Contents of Permit

a. The permit shall include an approved grading plan provided by the applicant and shall set forth terms and conditions of grading operations that conform to the County's grading standards. The permit's terms and conditions may incorporate or comply with the standards of other interested public agencies.

b. The permit shall require the applicant to provide a permanent erosion plan to be implemented upon completion of the project, which plan shall be approved prior to the commencement of any work. For any project which disturbs more than five acres, or where the Director of the Department of Resource Management or the Director of the Department of Public Works determines that a project may adversely impact a watercourse, the plan shall be prepared by a registered civil engineer experienced in erosion control, a certified professional soil erosion and sediment control specialist, or a soil scientist certified by the American Registry of Certified Professionals in Agronomy, Crops and Soils.

c. If work on the project will not be completed by October 15, and the permit does not allow work to continue during the period October 15 through May 1 (the "wet weather season"), a plan for closing the project during the wet weather season shall be required as a condition of permit issuance. The closure plan shall be prepared and certified by a professional listed in subsection B, above.

d. If the permit allows work to be done during the wet weather season, the permit shall contain a condition requiring a wet weather operating and erosion control plan, which plan shall be approved prior to the commencement of any work. The wet weather plan shall be prepared and certified by a professional listed in subsection B, above. That plan shall include all necessary temporary and permanent erosion control measures, including those to be followed should the work stop at any time during the wet weather season. The permit shall contain a timetable for installation of the erosion control measures.

e. Each permit shall require approval of a plan for on-going maintenance of erosion control measures during the duration of the project and for three years after completion of the project, unless the project is released earlier by the enforcing officer. The plan shall name the person responsible for such maintenance. The maintenance plan shall be approved prior to the commencement of any work.

f. The Director of the Department of Resource Management or the Planning Commission or the Board of Supervisors where such body is the issuing body, may refuse to allow any grading on a project during the wet weather season, as a condition of permit issuance.

g. The permit may require the posting of security in an amount sufficient to cover all corrective action or site restoration work and/or the cost of permanent erosion control measures for a period of up to three years from the date of completion of the permanent erosion control measures.

h. The permit shall specify who, in addition to the owner, shall be responsible for installing and maintaining erosion control measures.

2. Permit Issuance and Fee

a. Grading permits shall be issued by the Director of the Department of Resource Management.

b. The Director of the Department of Resource Management shall charge a fee established by resolution of the Board of Supervisors for issuance of the grading permit.

C. ENFORCEMENT

1. Stop Orders

a. Whenever the enforcing officer determines that any grading is occurring or has occurred in violation of the provisions of this chapter, without a grading permit, in violation of the terms and conditions for the permit, or in violation of the grading standards or other applicable law, or without compliance with the conditions of any other applicable permit or governmental approval to perform the work, the enforcing officer shall issue a stop order directing that the violation cease immediately. The order shall state the nature of the violation and that it is deemed to be a nuisance and shall contain references to applicable provisions of law, the grading standards or conditions of approval upon which the enforcing officer based his determination. The order shall include a statement of any corrective action or restoration work the enforcing officer deems necessary to abate the condition.

b. The order shall direct that the condition constituting the violation be abated within ten days after the order is posted and shall state that in the event the owner fails to abate the condition, the condition may be abated at the owner's cost as provided in this chapter. If the enforcing officer determines that the work has proceeded without a required permit or other necessary entitlement from the County, the order shall so state and shall direct that application for the permit or entitlement be made.

c. The order shall be prominently posted at the site of the work and shall be addressed and mailed to the owner of the site, as determined by the latest assessment roll, and any engineer, contractor or equipment operator known to the enforcing officer to have caused or be responsible for causing the work to be done.

d. If the enforcing officer determines that the work is being performed under the authorization of or pursuant to approval by a public agency other than the County and which has jurisdiction to regulate the work, the enforcing officer shall refer the matter to that agency.

e. If no permit or other entitlement is required to perform the work necessary to abate the condition and the condition is abated within the ten-day period, the enforcing officer shall cause the order to be removed from the site and shall mail notice that the order has been removed to the persons to whom the stop order was mailed.

2. Unlawful Acts

a. No person shall do, cause or permit to be done any work in violation of any regulatory or prohibitory provision of this chapter, or any grading permit, or the grading standards, or any stop order issued under this chapter.

b. No person shall abandon any work in violation of any regulatory or prohibitory provision of this chapter, the grading standards, or any stop order issued pursuant to this chapter.

3. Other Penalties

In addition to any other penalties provided by law, one or more of the following penalties may be imposed upon the owner or developer upon a finding by the enforcing officer, Planning Commission, or Board of Supervisors, as specified, that the owner or developer has violated a provision of this chapter.

The enforcing officer may order that no further work be done on the project until:

a. A grading permit is obtained or modified, which permit or modified permit shall include a corrective action or site restoration plan which addresses mitigation of off-site erosion hazards and prevents off-site damage, and

b. The work required by the plan is completed to the satisfaction of the enforcing officer.

If the owner or developer violates this chapter by grading without a permit (sometimes known as "pre-grading'), the official or body subsequently issuing a building permit, subdivision construction plan or a preliminary grading permit shall require that the usual permit fee be doubled.

If the owner or developer violates this chapter by grading without a permit ("pre-grading") or by failing to comply with the terms or conditions of the permit, the Director of the Department of Resource Management, the Director of the Department of Public Works, the Planning Commission or Board of Supervisors may issue an order prohibiting further work on the project until the owner or developer provides a bond, or other acceptable performance security, in a sum sufficient to cover all corrective or site restoration work and the cost of all permanent erosion control measures.

The Director of the Department of Resource Management, the Director of the Department of Public Works, the Planning Commission or Board of Supervisors may order that further development, other than erosion control and corrective action or site restoration measures, be suspended for up to two years from the date of satisfactory completion of all corrective action or site restoration work.

D. GRADING STANDARDS

1. Purpose and Limitations

The purpose of these standards is to safeguard life, limb, property and the public welfare by regulating grading on private property.

2. Definitions

Unless the context in which a word is used requires a different meaning, the following terms have the meanings indicated.

a. Definitions are as follows:

(1) Approval: a written engineering or geological opinion concerning the progress and completion of the work.

(2) As Graded: the surface conditions extent on completion of grading.

(3) Bedrock: in-place solid rock.

(4) Bench: a relatively level step excavated into earth material on which fill is to be placed.

(5) Borrow: earth material acquired from an off-site location for use in grading on a site.

(6) Civil Engineer: a professional engineer registered in the state to practice in the field of civil works.

(7) Civil Engineering: the application of the knowledge of the forces of nature, principles of mechanics and the properties of the materials to the evaluation, design and construction of civil works for the beneficial uses of mankind.

(8) Compaction: densification of a fill by mechanical means.

(9) Earth Material: any soil, sand, gravel, decomposed granite, or other natural material or fill or any combination thereof.

(10) Engineered Grading: grading in excess of 5,000 cubic yards or in variance with the Grading Standards.

(11) Engineering Geologist: a geologist experienced and knowledgeable in engineering geology.

(12) Engineering Geology: the application of geologic knowledge and principles in the investigation and evaluation of naturally occurring rock and soil for use in the design of civil works.

(13) Engineering Geology Report: a report prepared by an engineering geologist that includes an adequate description of the geology of the site, conclusions and recommendations regarding the effect of geological conditions on the proposed development, and opinions and recommendations covering the adequacy of sites to be developed by the proposed grading.

(14) Erosion: the wearing away of the ground surface as a result of the movement of wind, water, ice or a combination thereof.

(15) Excavation: the mechanical removal of earth material.

(16) Fill: a deposit of earth material placed by artificial means.

(17) Grade: the vertical location of the ground surface.

(18) Existing Grade: the grade prior to grading.

(19) Rough Grade: the stage at which the grade approximately conforms to the plan.

(20) Finish Grade: the final grade of the site which conforms to the plan.

(21) Grading: any excavating or filling or combination thereof.

(22) Key: a designed compacted fill placed in a trench excavated in earth material beneath the toe of a proposed fill slope.

(23) Site: any lot or parcel of land or contiguous combination thereof, under the same ownership, where grading is performed or permitted.

(24) Slope: an inclined ground surface, the inclination of which is expressed as a ratio of horizontal distance to vertical distance.

(25) Soil: naturally occurring surficial deposits overlying bedrock.

(26) Soil Engineer: a civil engineer experienced and knowledgeable in the practice of soil engineering.

(27) Soil Engineering: the application of the principles of soil mechanics in the investigation, evaluation and design of civil works involving the use of earth materials and the inspection and testing of the construction thereof.

(28) Soil Engineering Report: a report prepared by a soil engineer that includes data regarding the nature, distribution and strength of existing soils, conclusions and recommendations for grading procedures and design criteria for corrective measures when necessary, and opinions and recommendations covering adequacy of sites to be developed by the proposed grading.

(29) Terrace: a relatively level step constructed in the face of a graded slope surface for drainage and maintenance purposes.

(30) Vertical Height: the vertical distance between the toe of a slope and a line level with the top of that slope.

3. Cuts

a. General. Unless otherwise recommended in a soil engineering and/or engineering geology report, cuts shall conform to the provisions of this subsection.

b. Slope. The slope of cut surfaces shall be no steeper than is safe for the intended use. Cut slopes shall be no steeper than two horizontal to one vertical.

c. Drainage and Terracing. Drainage and terracing shall be provided as required by Subsection 6.

4. Fills

a. General. Unless otherwise recommended in an approved soil engineering report, fills shall conform to the provisions of this subsection.

b. Fill Location. Fill slopes shall not be constructed on natural slopes steeper than two to one.

c. Preparation of Ground. The ground surface shall be prepared to receive fill by removing vegetation, noncomplying fill, top-soil and other unsuitable materials and scarifying to provide a bond with the new fill, and where slopes are steeper than five to one, and the height is greater than 5 feet, by benching into sound bedrock or other competent material. The bench under the toe of a fill on a slope steeper than five to one shall be at least 10 feet wide. The area beyond the toe of fill shall be sloped for sheet overflow or a paved drain shall be provided. Where fill is to be placed over a cut, the bench under the toe of fill shall be at least 10 feet wide but the cut must be made before placing fill.

d. Compaction. All fills shall be compacted to a minimum of 90 percent of maximum density as determined by U.B.C. Standard No. 70-1. Field density shall be determined in accordance with U.B.C. Standard No. 70-2 or equivalent.

e. Slope. The slope of fill surfaces shall be no steeper than is safe for the intended use. Fill slopes shall be no steeper than two horizontal to one vertical.

f. Drainage and Terracing. Drainage and terracing shall be provided and the area above fill slopes and the surfaces of terraces shall be graded and paved as required by subsection 6.

5. <u>Setbacks</u>

a. General. The setbacks and other restrictions are minimum and may be increased by the recommendation of a civil engineer, soils engineer or engineering geologist, if necessary for safety and stability or to prevent damage of adjacent properties from deposition or erosion or to provide access for slope maintenance and drainage. Retaining walls may be used to reduce the required setbacks.

b. Setbacks from Property Lines. The tops of cuts and toes of fill slopes shall be set back from the outer boundaries of the property line, including slope right areas and easements, in accordance with Figure and Table 1.

c. Design Standards for Setbacks. Setbacks between graded areas (cut or fill) and structures shall be provided in accordance with Figure 2 and Table 1.

6. <u>Drainage and Terracing</u>

a. General. Unless otherwise indicated on a grading plan prepared pursuant to Subsection 8, drainage facilities and terracing shall conform to the provision of this subsection.

b. Terrace. Terraces at least 6 feet in width shall be established at not more than 30-foot vertical intervals on all cut or fill slopes to control surface drainage and debris except that where only one terrace is required, it shall be at mid-height. For cut or fill slopes greater than 60 feet and up to 120 feet in vertical height one terrace at approximately mid-height shall be 12 feet in width. Terrace widths and spacing for cut and fill slopes greater than 120 feet in height shall be designed by a civil engineer. Suitable access shall be provided to permit proper cleaning and maintenance.

Swales or ditches on terraces shall have a minimum gradient of 5 percent and must be paved with reinforced concrete not less than 3 inches in thickness or an approved equal paving. They shall have a minimum depth at the deepest point of 1 foot and a minimum paved width of 5 feet.

A single run of swale or ditch shall not collect runoff from a tributary area exceeding 13,500 square feet (projected) without discharging into a downdrain.

c. Subsurface Drainage. Cut and fill slopes shall be provided with subsurface drainage as necessary for stability.

d. Disposal. All drainage facilities shall be designed to carry waters to the nearest practicable drainage way or other appropriate jurisdiction as a safe place to deposit such waters. Erosion of ground in the area of discharge shall be prevented by installation of nonerosive downdrains or other devices.

Building pads shall have a drainage gradient of two percent toward approved drainage facilities, provided that the gradient from the building pad may be one percent if all of the following conditions exist throughout the permit area:

1) no proposed fills are greater than 10 feet in maximum depth, and

2) no proposed finish cut or fill slope faces have a vertical height in excess of 10 feet, and

3) no existing slope faces, which have a slope face steeper than 10 horizontally to 1 vertically, have a vertical height in excess of 10 feet.

e. Interceptor Drains. Paved interceptor drains shall be installed along the top of all cut slopes where the tributary drainage area above slopes towards the cut and has a drainage path greater than 40 feet measured horizontally. Interceptor drains shall be paved with a minimum of 3 inches of concrete or gunite and reinforced. They shall have a minimum depth of 12 inches and a minimum paved width of 30 inches measured horizontally across the drain.

7. Erosion Control

When construction activities propose to disturb areas of existing vegetation and ground cover by grading, effective erosion and sediment control measures shall be employed.

a. Erosion Control Plan. Whenever a grading permit requires an erosion control plan, it shall be submitted with the grading plan as per stipulations in the grading permit.

For any project which disturbs more than five acres, or where the Director of the Department of Resource Management determines that a project may adversely impact a watercourse, the plan shall be prepared by a registered civil engineer experienced in erosion control, a certified professional soil erosion and sediment control specialist, or a soil scientist certified by the American Registry of Certified Professionals in Agronomy Crops and Soils.

The permit shall require the applicant to provide a permanent erosion control plan, which shall be approved prior to the commencement of any work, and shall be implemented upon completion of the project.

If work will not be completed by October 15, and the permit does not allow work to continue during the wet weather season (October 15 through May 1), then a closure or interim erosion plan shall be required as a condition of the permit.

If the permit allows work to be done during the wet weather season, the permit shall require a wet weather operating and erosion control plan. This plan must be approved prior to the commencement of any work and include all necessary temporary and permanent erosion control measures, including those to be followed should the work stop at any time during the wet weather season.

If the site or portion of the site is planned to be idle for more than 45 days, then vegetative stabilization must be accomplished within seven days. The wet weather plan shall include a plan for the immediate (within 24 hours of the first forecast of a storm front) installation of emergency erosion control measures.

b. Design Standards. Practices, standards, and specifications for preparing permanent, closure, and wet weather erosion control plans presented in the manual entitled "County of Shasta, Erosion and Sediment Control Standards - Design Manual" prepared by John McCullah, shall be adhered to.

8. Grading Plan and Inspection

All engineered grading requires a grading plan prepared prior to commencement of work by a civil engineer or with the assistance of the Soil Conservation Service of the United States Department of Agriculture.

The civil engineer who prepares a grading plan shall incorporate all recommendations from the soil engineering report and any engineering geology report into the grading plan. He shall also be responsible for the professional inspection and approval of the grading within his area of technical specialty. This responsibility shall include, at a minimum, grade and drainage of the development area.

A soil engineering report shall be prepared for each grading plan prepared by a civil engineer.

The soil engineer's area of responsibility shall include, at a minimum, the professional inspection and approval concerning the preparation of ground to receive fills, testing for required compaction, stability of all finish slopes and the design of buttress fills, where required, incorporating any data supplied by an engineering geologist.

If an engineering geologist is retained for the work, his area of responsibility shall include, at a minimum, professional inspection and approval of the adequacy of natural ground for receiving fills and the stability of cut slopes with respect to geological matters, and the need for subdrains or other ground water drainage devices. He shall report his findings to the soil engineer and the civil engineer for engineering analysis. If an engineering geologist is not retained, the civil engineer who prepares the grading plan shall assume the responsibilities of the engineering geologist.

9. Archeological Sites

If in the course of development, any archeological or cultural remains are encountered, work shall cease and a qualified archeologist contacted immediately.

REQUIRED SETBACKS (FEET)

H	SETBACKS a	SETBACKS b
UNDER 5	0	1
5 TO 30	H/2	H/5
OVER 30	15	6

TABLE 1

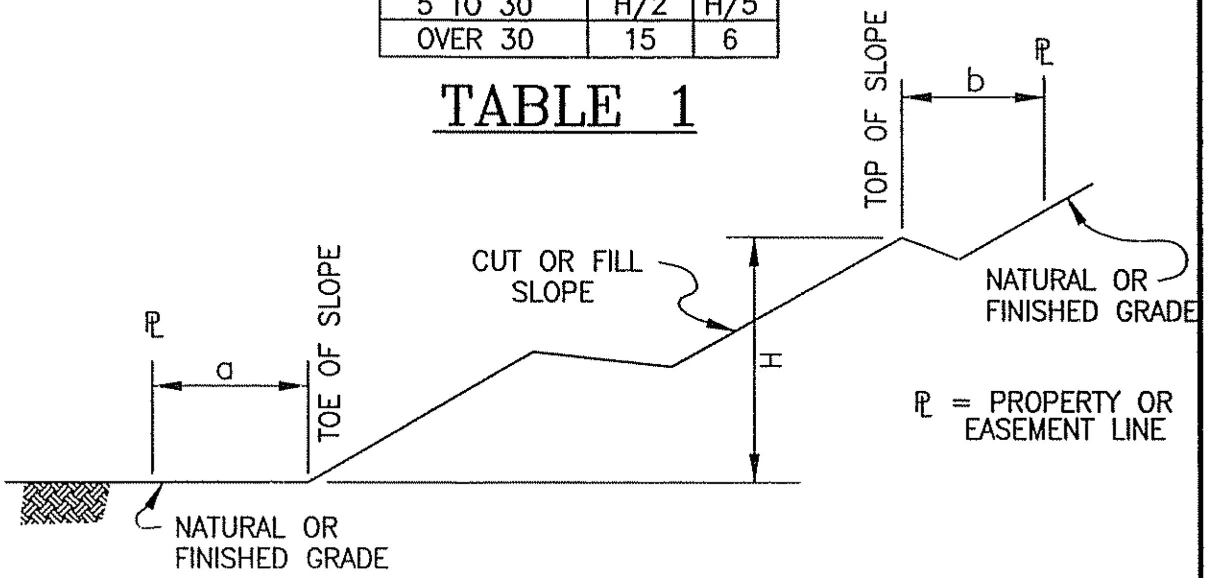


FIGURE 1

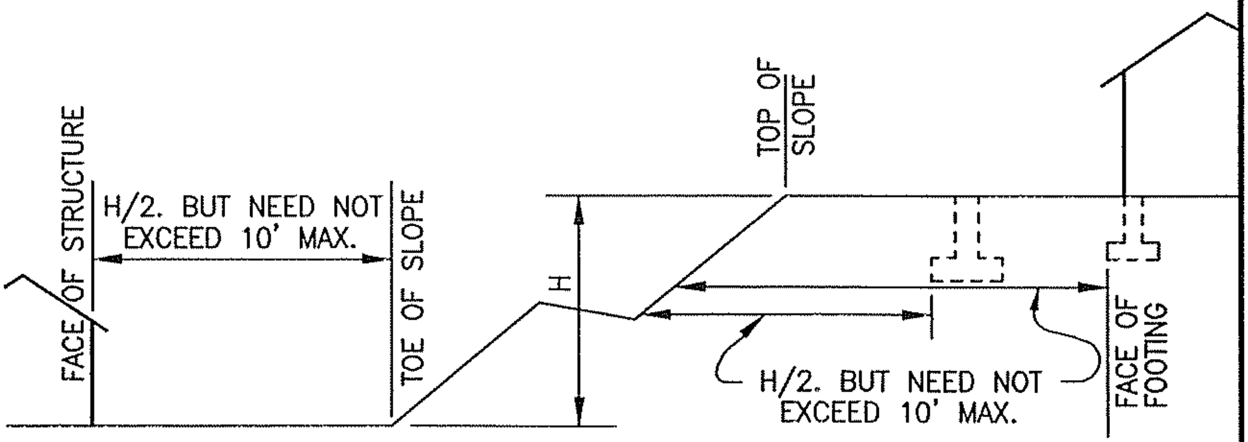


FIGURE 2

SCALE: NTS		DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**SLOPE SETBACKS**
MARK	DATE	REVISION		

CHAPTER 5

SHASTA COUNTY
ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS) STANDARDS

Revised: May 14, 2018
August 12, 2019

SHASTA COUNTY
LOCAL AGENCY MANAGEMENT PROGRAM FOR ONSITE WASTEWATER TREATMENT SYSTEMS

LAMP SECTION 1 REQUIRED POLICY ELEMENTS

1. A. BACKGROUND

The California Water Code authorizes the State Water Resources Control Board (SWRCB) to regulate all discharges, including those from Onsite Wastewater Treatment Systems, which could adversely impact water quality. The policies of the SWRCB are implemented locally through nine Regional Water Quality Control Boards. Historically, each regional board developed basin plans that outlined water quality objectives in their respective jurisdictions as well as policies and programs to achieve those objectives.

Discharges are regulated through the use of Waste Discharge Requirements (WDRs). Shasta County is in Region Five which is the Central Valley Regional Water Quality Control Board (CVRWQCB). The SWRCB regulatory authority extends to individual Onsite Wastewater Treatment Systems (OWTS). General guidelines for the Siting, Design, and Construction of OWTS were part of each regional board's basin plans. The SWRCB and the regional boards recognize the advantages and efficiencies of OWTS regulation by local agencies. Consequently, while the regional boards retained primacy over large and specialized systems, direct regulatory authority for individual OWTS has been delegated to individual counties that implement the regulations through a Local Agency Management Program (LAMP).

The State OWTS Policy and LAMP are the culmination of the actions required by Assembly Bill 885 (AB 885). AB 885 as introduced to the California State assembly on February 25, 1999, would have impacted only coastal counties. However, the final version approved on September 27, 2000, was more inclusive, affecting all California counties. This legislation directed the SWRCB to develop regulations or standards for OWTS to be implemented statewide by qualified local agencies that issue sewage disposal system permits, which in Shasta County is the Environmental Health Division of the Department of Resource Management (SCEHD).

The SWRCB adopted the Water Quality Control Policy (State OWTS Policy) for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems on June 19, 2012. The Policy was subsequently approved by the Office of Administrative Law on November, 13, 2012, and became effective on May 13, 2013. The OWTS Policy allows local agencies to approve OWTS, based on a local ordinance, and LAMP after approval by the applicable regional board.

Without an approved LAMP the County could only issue septic system permits for those few sites meeting the restrictive soil requirements of State OWTS Policy Tier 1. All other sites would potentially be subject to the WDR process. However, under an approved LAMP, the requirement to obtain WDRs is conditionally waived for OWTS that are in conformance with the LAMP.

1. B. POLICY TIERS

The State OWTS Policy places OWTS in California into one of the following Tiers:

TIER 0 – Existing OWTS. These are defined as existing OWTS that are properly functioning, and do not meet the conditions of failing. These do not require corrective action as specifically described in Tier 4, and are not contributing to an impairment of surface water as specifically described in Tier 3.

TIER 1 - Low-risk new or replacement OWTS. These are new or replacement OWTS that meet low risk siting and design requirements as specified in Tier 1. Minimum soil depths to groundwater and minimum soil depth from the bottom of a dispersal system range from 5 to 20 feet, based on soil percolation rates.

TIER 2 - Local Agency Management Program for new and replacement OWTS. California is known for its extreme range of geological and climatic conditions. As such, the establishment of a single set of criteria for OWTS would either be too restrictive so as to protect the most sensitive case, or would have broad allowances that would not be protective enough under some circumstances. To accommodate this extreme variance, local agencies may submit management programs known as Local Agency Management Programs (LAMP) for approval by the Regional Water Quality Control Board, then upon approval, manage the installation of new and replacement OWTS under that Program. An approved LAMP allows local agencies to develop customized management programs that address the soil conditions and groundwater depths specific to that jurisdiction. Under an approved LAMP, separation of the bottom of a dispersal system to groundwater of as little as two feet may be allowed with an approved OWTS utilizing supplemental treatment and/or an alternate dispersal system. Once approved, the standards contained in an approved LAMP supersede the Tier 1 standards. However, standard systems meeting Tier 1 soil and siting criteria could still be constructed.

TIER 3 - Impaired Areas. Systems that are within 600 feet of impaired water bodies. There are no such water bodies identified within Shasta County.

TIER 4 - OWTS Requiring Corrective Action. OWTS that require corrective action or fail at any time while the State OWTS Policy is in effect are automatically in Tier 4 and must follow Tier 2 requirements pending completion of corrective action.

1. C. INTENT

The Shasta County Environmental Health Division (SCEHD) is committed to protecting public health and water quality while allowing continued development in Shasta County.

In conformance with the State OWTS Policy, Shasta County intends to regulate wastewater flows of normal domestic strength up to 10,000 gallons per day for dispersal underground only. Regulation of projects that may have waste strength greater than normally found in domestic flows usually evaluated by SCEHD staff and any project with a projected flow nearing or exceeding 10,000 gallons per day will be coordinated with the CVRWQCB staff. (OWTS Policy 9.2) (OWTS Policy 9.4.2) (OWTS Policy 9.4.3)

This LAMP includes a number of different system design options, including a variety of supplemental treatment systems and alternate dispersal systems, which are described in the Technical Standards Manual, to allow for the construction of the least complicated and least costly system that meets the intent of the State OWTS Policy.

1. D. DEFINITIONS

"303 (d) List" means the same as Impaired Water Bodies.

"State OWTS Policy" or Policy means the OWTS Policy adopted by the State Water Resources Control Board requiring the preparation of a Local Agency Management Program (LAMP).

"Alternative treatment systems" include intermittent and recirculating sand filters, proprietary treatment units, and other alternative treatment systems approved by the Director. Generally referred to as "supplemental" treatment systems in this LAMP.

"Alternate dispersal systems" include shallow trench pressure distribution, mound, At-grade, drip dispersal, and other alternative dispersal systems approved by the Director. Some alternate dispersal systems can be used without the need for a supplemental treatment system.

"At-grade system" means an OWTS dispersal system with a discharge point located at the preconstruction grade (ground surface elevation) with qualifying fill material used to cover the dispersal system. The discharge point of an At-grade system is, therefore, always subsurface.

"Average" means the number calculated by dividing the sum of the values in the set by their number.

"Average annual rainfall" Means the average annual amount of precipitation for a location over a year as measured by the nearest National Weather Service station for the preceding three decades. For example, the data set used to make a determination in 2015 would use the data from 1984 to 2013.

"Bedrock" means the rock, usually solid, that underlies soil or other unconsolidated, surficial material.

"Biomat" is a bacterial slime layer which forms in soil at the bottom of leach lines and other dispersal systems. It is responsible for much of the treatment and reduction of biological solids and bacteria present in onsite wastewater treatment system effluent (from either a septic tank or supplemental treatment system) discharged to the soil.

"Building Sewer" means that part of the horizontal piping of a drainage system that extends from the end of the building drain and that receives the sewage discharge of the building drain and conveys it to the OWTS.

"CEDEN" means California Environmental Data Exchange Network and information about it is available at the State Water Board or its website or at the CEDEN website which is located at http://www.ceden.org/index.shtml at the time of adoption of this LAMP.

"Cesspool" means an excavation in the ground receiving domestic wastewater, designed to retain the organic matter and solids, while allowing the liquids to seep into the soil. Cesspools have not been approved for use in Shasta County. Cesspools do not have septic tanks and are not authorized under this Policy. Any cesspool found in use will be required to be destroyed and replaced by a properly designed and constructed OWTS.

“Chroma” is a measure of color purity in the Munsell color system.

“Clay” means a fine-grained natural rock or soil particle that combines one or more clay minerals with traces of metal oxides and organic matter. This term also refers to a soil texture. Particle size would not exceed 0.002 nm.

“Cobbles” means rock fragments 76 mm or larger using the USDA soil classification system.

“Community disposal fields” are fields that serve more than two (2) dwelling units.

“Conventional onsite water treatment system” means an OWTS constructed in soil meeting Tier 1 specifications. A conventional OWTS consists of a septic tank and a series of subsurface dispersal trenches for subsurface dispersal of effluent into the soil. A conventional OWTS may utilize gravity flow or a pump system to convey effluent from the septic tank to the drain field.

“Curtain drain or French drain” is a gravel trench that is excavated down to a relatively impermeable soil layer and installed to intercept, collect, and remove shallow subsurface groundwater as it flows above the impermeable layer.

“Cut or embankment” means any altered area of land surface having a distinctly greater slope than the adjacent ground surface, over 24 inches in vertical height or the OWTS dispersal system backfill cover depth, whichever is greater, and any part of which is lower in elevation than the ground surface at the nearest point of the OWTS. Cuts supported by retaining walls or other similar structures shall be included in this definition, as shall be steep natural ground surfaces where a sharp break in the ground slope is discernable.

“Director” means the Director of Environmental Health or his/her designee in the Shasta County Environmental Health Division of the Department of Resource Management.

“Dispersal system” means a series of trenches, beds, subsurface drip lines, or other approved method for subsurface infiltration and absorption of wastewater effluent, including all component parts such as piping, valves, filter material, chambers, dosing pumps, siphons, and other appurtenances.

“Domestic wastewater” means wastewater with a measured strength less than high-strength wastewater and is the type of wastewater normally discharged from, or similar to, that discharged from plumbing fixtures, appliances, and other household devices including, but not limited to toilets, bathtubs, showers, laundry facilities, dishwashing facilities, and garbage disposals. Domestic wastewater may include wastewater from commercial buildings, such as office buildings, retail stores, and some restaurants, or from industrial facilities where the domestic wastewater is segregated from the industrial wastewater. Domestic wastewater does not include industrial wastewater or wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations.

“Domestic well” means a groundwater well that provides water for human consumption and is not regulated by the California Department of Public Health.

“Drainage way” for purposes of this Policy means an intermittent, seasonal, or perennial waterway which continues to flow at least five (5) days after a storm and as measured from the top of the bank or other physically evident high water line.

“Drain field” means a system of rock-filled trenches or beds that distribute treated effluent for subsurface dispersal into the soil. A drain field is also known as a “leach field” or “soil absorption or dispersal system”.

“Dredger tailings” for purposes of this Policy means the accumulated gravels and sands separated from soil primarily in gold dredging operations.

“Dump Station” means a facility intended to receive the discharge of wastewater from a holding tank installed on a recreational vehicle. A dump station does not include a full hook-up sewer connection similar to those used at a recreational vehicle park.

“Earthen material” means a substance composed of the earth’s crust (i.e., soil and rock).

“EDF” or Electronic Deliverable Format means the data standard adopted by the State Water Board for submittal of groundwater quality monitoring data to the State Water Board’s internet-accessible database system GEOTRACKER (located at http://geotracker.waterboards.ca.gov as of the time of adoption of this LAMP).

“Effluent” means sewage, water, or other liquid, partially or completely treated or in its natural state, flowing out of a septic tank, aerobic treatment unit, dispersal system, or other OWTS component.

“Engineered fill” means a designed placement of specified imported soil over existing native soils on an existing parcel with inadequate soil depth to meet the minimum two (2) to three (3) feet of soil depth required beneath a dispersal system, and a minimum of two (2) to three (3) feet of separation between the bottom of a dispersal system and a water table.

“Ephemeral drainage” for purposes of this LAMP, means a stream, or other drainage such as a roadside ditch, that flows for less than five days after the passage of a storm. An ephemeral stream only carries water in direct response to a precipitation event and it contains no water from a spring, snow, or other long-continuing surface source. Setback measurements are made from the edge of the channel.

“Existing OWTS” means an OWTS in which a valid construction permit has been issued or that was constructed and operated prior to the adoption of standards developed in response to the State OWTS Policy.

“Existing Parcel” means any legally established vacant or developed parcel that was in existence prior to the adoption of standards developed in response to the State OWTS Policy.

“Failure” means the ineffective dispersal of waste resulting in the surfacing of sewage or inadequately treated sewage effluent and/or the degradation of surface or groundwater quality.

“GeoTracker” is the SWRCB data management system for managing sites that impact groundwater, especially those that require groundwater cleanup.

"Gleying" is the process of waterlogging and reduction in soils. Gleyed soils are soils developed under conditions of poor drainage and can generally be found as surface water and ground water gleys.

"Groundwater" means water that is below the land surface that is at or above atmospheric pressure.

"High-strength wastewater" means wastewater having a 30-day average concentration of biochemical oxygen demand (BOD) greater than 300 milligrams-per-liter (mg/l) or of a total suspended solids (TSS) greater than 330 mg/l or a fats, oil, and grease (FOG) greater than 100 mg/l prior to the septic tank or other OWTS treatment component.

"IAPMO" means the International Association of Plumbing and Mechanical Officials.

"Impaired water bodies" means those surface water bodies or segments thereof that are identified on a list approved first by the State Water Board and then approved by the US EPA pursuant to Section 303(d) of the federal Clean Water Act.

"Intermittent sand filter" means a packed-bed filter of medium-grained sand used to treat septic tank effluent to an advanced level. Wastewater is dosed to the surface of the sand through a pressure-distribution network and allowed to percolate through the sand where BOD is reduced and suspended solids are removed; treatment is accomplished by physical filtration as well as microbial growth on the surface of the sand grains. After a single pass, the effluent is collected in an underdrain system for further processing or dispersal.

"Intermittent Stream" is a stream or other drainage that flows for more than 5 days per year but does not continue to flow the entire year.

"Irrigation ditch or canal" means a man-made lined or unlined ditch intended to supply dry land with water and must meet the setbacks specified for ephemeral, intermittent, or seasonal drainage ways except as allowed otherwise.

"Linear Loading Rate" is defined as the amount of effluent, in gallons, applied per day, per lineal foot of the dispersal system. The "amount" is the total of all parallel dispersal systems along a contour. The design linear loading rate is a function of effluent movement rate away from the dispersal system and the direction of flow away from the dispersal system.

"Local agency" for purposes of this Policy means the Environmental Health Division of the Shasta County Department of Resource Management.

"Local Agency Management Program (LAMP) means this document to be used for siting, evaluation, design, operation, and management of onsite wastewater systems within Shasta County.

"Major repair" means either (1) for a dispersal system, repairs required for an OWTS dispersal system due to surfacing wastewater effluent from the dispersal field and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is leaking out of or groundwater is infiltrating. A permit to repair a major failure is required from SCEHD and all systems, after repair, must be in compliance with their respective sections of this LAMP.

“Minor repair” means a failure of a component other than a septic tank, treatment system, or dispersal system such as a distribution box or broken piping connection. A permit to repair this failure is required from SCEHD.

“Mottling” means a soil condition that results from oxidizing or reducing minerals due to soil moisture changes from saturated to unsaturated over time. Mottling is characterized by spots or blotches of different colors or shades of color (grays and reds) interspersed within the dominant color as described by the USDA soil classification system. The soil condition can be indicative of historic seasonal high groundwater level, but the lack of this condition may not demonstrate the absence of groundwater.

“Mound system” means a dispersal system (covered sand bed with effluent leach field elevated above original ground surface inside the mound) used to enhance soil treatment, dispersal, and absorption of effluent from an OWTS treatment unit such as a septic tank. Mound systems are considered subsurface discharge.

“New OWTS” means an OWTS permitted after the approval date of this LAMP.

“Non-conventional OWTS” means a system that is not a conventional septic tank/leach field system, and uses an alternative treatment and/or dispersal system to mitigate shallow soil depth and/or depth to groundwater.

“NSF” means NSF International (a. k. a. National Sanitation Foundation), a not for profit, non-governmental organization that develops health and safety standards and performance product certification.

“Onsite wastewater treatment system(s) (OWTS)” means individual treatment and dispersal systems, community treatment and dispersal systems, and alternative treatment and dispersal systems that collect and treat wastewater for subsurface dispersal. The short form of the term may be singular or plural. OWTS do not include “gray water” systems pursuant to Health and Safety Code section 17922.12.

“Ped” means an individual natural soil aggregate.

“Perennial Waterway” is a stream or other drainage which has continuous flow in all or parts of its stream bed all year during normal rainfall years but may flow only intermittently in drought years.

“Percolation test” means a method of testing the water absorption ability of the soil. The test is conducted with clean water and test results are used to establish a percolation rate and facilitate the dispersal system sizing and design.

“Permeable soil” means soil that has a percolation rate of 120 minutes per inch or faster or having a clay content of less than 60 percent, and shall not contain solid rock formations or those that contain continuous channels, cracks, or fractures.

“Permit” means a document issued by SCEHD that allows the installation and use of an OWTS.

"Permitting authority" for purposes of this Policy means the Environmental Health Division of the Shasta County Department of Resource Management.

"Person" means any individual, firm, association, organization, partnership, business trust, corporation, company, State agency or Department, or unit of local government who is, or that is subject to this Policy.

"Pit-privy" (a. k. a. outhouse or pit-toilet) means self-contained waterless toilet used for disposal of non-water carried human waste; consists of a shelter built above a pit in the ground into which human waste falls. Unlined pits are not allowed by this LAMP.

"Policy or State OWTS Policy" means the Water Quality Control Policy adopted by the State Water Resources Control for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems on June 19, 2012, requiring the preparation of a Local Agency Management Program (LAMP).

"Pollutant" means any substance that alters the waters of the State to a degree that it may potentially affect the beneficial uses of water, as listed in a Basin Plan.

"Precipitation" means measureable amounts of rain, snow, hail, and other similar natural phenomenon.

"Projected flows" means wastewater flows into the OWTS determined in accordance with any applicable methods for determining average daily flow as approved by the Director, in accordance with this LAMP.

"Public water system" is a water system regulated by the California Department of Public Health or a local Primacy agency pursuant to Chapter 12, Part 4, California Safe Drinking Water Act, Section 116275(h) of the California Health and Safety Code.

"Public water well" is a ground water well serving a public water system. A spring which is not subject to the California Surface Water Treatment Rule (SWTR), Title 22 of the California Code of Regulations, Sections 64650 through 64666, is considered a public well.

"Qualified Professional" means an individual licensed or certified by a State of California agency to design OWTS and practice as professionals for other associated reports, as allowed under their license or registration. Depending on the work to be performed and various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer. For the purposes of performing site evaluations, Soil Scientists certified by the Soil Science Society of America are considered qualified professionals. Qualified professionals would be expected to conduct onsite surveys for OWTS suitability, evaluate potential pathways of wastewater-sourced phosphate and other nutrients toward potentially threatened nearby wells or surface bodies of water, consider hydraulic mounding and linear loading at the site, complete all necessary soils tests, prepare system designs and drawings, meet with owners and installers, and conduct necessary inspections. No other person, license, or registration/certification will be approved as a Qualified Professional. (OWTS Policy 9.1.7)

"Regional Water Quality Control Board (RWQCB)" for purposes of this Policy, means the Region 5 board. Any reference to the RWQCB in this document also refers to an action of its Executive Officer.

“Replacement OWTS” means an OWTS that has its treatment capacity expanded, or its dispersal system replaced or otherwise added onto, after the effective date of this Policy. An OWTS may be replaced for a variety of reasons including failure, home additions increasing the number of occupants/water use, relocation to accommodate home additions, home sales, and other reasons.

“Sand” means a soil particle; this term also refers to a soil texture. As a soil particle, sand consists of individual rock or mineral particles in soil having diameters ranging from 0.05 to 2.0 millimeters.

“Saprolite” means soft, thoroughly decomposed and porous rock, often rich in clay, formed by the in-place chemical weathering of igneous, metamorphic, or sedimentary rocks.

“SCEHD” means the Environmental Health Division of the Shasta County Department of Resource Management.

“Seepage pits” means a vertical excavation constructed to receive effluent from a septic tank. As the State OWTS Policy requires a minimum of ten (10) feet of adequate soil and separation between the bottom of the pit and highest anticipated groundwater level and increased horizontal separation distances, it is not anticipated that permits will be issued for their construction and use in Shasta County.

“Septage” is the term used for the partially treated and settled solid and liquid material removed from the septic tank (and some treatment systems) by septic tank pumper trucks. Septage includes settled solids, fats oils grease and other floating materials, and liquid.

“Septic tank” means a water tight, covered receptacle designed for primary treatment of wastewater and constructed to:

1. Receive wastewater discharged from a building or other use;
2. Separate settleable and floating solids from the liquid;
3. Digest organic matter by anaerobic bacterial action;
4. Store undigested solids; and
5. Clarify wastewater for further treatment/subsurface discharge.

“Service provider” means a person capable of operating, monitoring, and maintaining an OWTS in accordance with this Policy.

“Silt” means a soil particle; this term also refers to a soil texture. As a soil particle, silt consists of individual rock particles in soil having diameters ranging between 0.05 and 0.002 mm.

“Site” means the location of the OWTS and, where applicable, a reserve dispersal area capable of disposing of 100 percent of the design flow from all sources the OWTS is intended to serve.

“Site plan” means a site plot plan showing, at a minimum, all existing topographic features, the locations of all required soil tests, and all proposed site grading, structures and other existing/planned improvements.

"Site evaluation" means an assessment of the characteristics of the site and onsite soils sufficient to determine suitability for an OWTS to meet the requirements of this Policy.

"Slope" means the rise or fall of vertical elevation in feet, per one hundred (100) feet of horizontal distance. Slope is expressed as a percent of grade. For example a rise of 30 feet in a 100 foot run is a 30 percent slope. A rise of 40 feet in a 100 foot run is a slope of 40 percent.

"Soil" means the naturally occurring body of porous mineral and organic materials on and at the land surface, which is composed of unconsolidated materials, including sand-sized, silt-sized, and clay-sized particles mixed with varying amounts of larger fragments and organic material. The various combinations of particles differentiate specific soil textures identified in the soil textural triangle developed by the United States Department of Agriculture (USDA) as found in Soil Survey Staff, USDA; *Soil Survey Manual, Handbook 18,* U. S. Government Printing Office, Washington, DC, 1993, p. 138. For purposes of this Policy, soil shall contain earthen material of particles smaller than 0.08 inches (2mm) in size. For the purposes of this LAMP, soil is the ultimate receiver of wastewater and the most important part of an OWTS. Therefore, in addition to the depth to groundwater, the proper evaluation of soil structure, permeability, and overall useable soil depth is critical in the proper choice and design of an OWTS for any particular site.

"Soil profile" is a natural sequence of layers, or horizons, in the soil as described in a suitable manner acceptable to SCEHD.

"Soil structure" means the arrangement of primary soil particles into compound particles, peds, or clusters that are separated by natural planes of weakness from adjoining aggregates.

"Soil texture" means the soil class that describes the relative amount of sand, silt, and clay and combinations thereof as defined by the classes of the soil textural triangle developed by the USDA.

"State Water Board" means the State Water Resources Control Board.

"Storm" for purposes of this policy means the receipt of measureable precipitation at the nearest measuring/reporting station.

"Substandard system" means any existing OWTS that does not conform to the system sizing, setbacks, soil depth, or groundwater separation requirements of this Policy.

"Supplemental Treatment" means any OWTS or component of an OWTS, except for a septic tank or dosing tank, that performs additional wastewater treatment so that the effluent meets a predetermined performance requirement prior to discharge of the effluent into the dispersal field. Also known as an alternative OWTS. Some supplemental treatment units are passive and can be placed directly onto a leach bed for direct dispersal into the soil.

"SWAMP" means Surface Water Ambient Monitoring Program and more information is available at State Water Resources Board's web site which is located at http://www.waterboards.ca.gov/water_issues/programs/swamp/ as of the time of adoption of this LAMP.

"TMDL" is the acronym for "total maximum daily load". Section 303(d)(1) of the Clean Water Act requires each state to establish a TMDL for each impaired water body to address the pollutant(s) causing the impairment. In California, TMDL's are usually adopted as Basin Plan amendments and contain implementation plans detailing how water quality standards will be attained.

"USDA" means the U.S. Department of Agriculture.

"Usable leaching material" for land division purposes has the following characteristics:

- Percolation rates greater than one (1) and less than one hundred twenty (120) minutes per inch when tests are conducted by the method specified in the Manual of Septic Tank Practice, U.S. Department of Health and Human Services or other similar method specified in this LAMP;
- Depth to a seasonal water table, as determined by the procedures specified in this LAMP, shall be at least four (4) feet for lots of one (1) or more acres and at least eight (8) feet for lots less than one (1) acre; and,
- The area with these soils must meet all applicable treatment and/or dispersal system setbacks including setbacks from property lines.

"Vulnerable surface water" means surface water vulnerable to biological and chemical contamination from an OWTS.

"Waste Discharge Permit" or "WDR" means an operation and discharge permit issued for the discharge of waste (including septic system effluent) pursuant to Section 13260 of the California Water Code.

1. E. PROHIBITIONS (OWTS Policy 9.4)

a. Pursuant to the State OWTS Policy, the following will not be authorized in this LAMP:

- Cesspools of any kind or size. (OWTS Policy 9.4.1)

- OWTS receiving a projected flow over 10,000 gallons per day. (OWTS Policy 9.4.2)

- OWTS that utilize any form of effluent dispersal that discharges on or above the post installation ground surface such as sprinklers, exposed drip lines, free-surface wetlands, a pond, or any other similar surface discharge. (OWTS Policy 9.4.3)

- Slopes greater than 30 percent without a slope stability report approved by a registered professional. (OWTS Policy 9.4.4)

- Decreased leaching area for IAPMO certified dispersal systems using a multiplier less than 0.70. (OWTS Policy 9.4.5)

- OWTS utilizing supplemental treatment without requirements for periodic monitoring or inspections. (OWTS Policy 9.4.6.)

- OWTS dedicated to receiving significant amounts of wastes dumped from RV holding tanks. (OWTS Policy 9.4.7)

- Separation of the bottom of dispersal system to groundwater less than two feet. (see Technical Standards Manual) (OWTS Policy 9.4.8)

- Installation of new or replacement OWTS where public sewer is available. The public sewer may be considered unavailable when such public sewer or any building or exterior drainage facility connected thereto is located more than 200 feet from any proposed building or exterior drainage facility on any lot or premises that abuts and is served by such public sewer. We recognize that some local agencies have a policy requiring connection within 200 feet of property lines rather than the 200 feet from proposed buildings or exterior drainage facility and will use this standard where a conflict exists. This requirement to connect provision does not apply to replacement OWTS where the connection fees and construction costs are greater than twice the total cost of the replacement OWTS and the local agency determines that the discharge from the OWTS will not affect groundwater or surface water to a degree that makes it unfit for drinking or other uses nor will it apply if the agency operating the public sewer will not allow connections. Where a local agency with jurisdiction requires connection to public sewer the policy of the local agency shall govern. (OWTS Policy 9.4.9)

b. Except as provided in the noted exceptions below, and pursuant to the State OWTS Policy, SCEHD may not approve new or replacement OWTS with the minimum horizontal setbacks less than any of the following: (OWTS Policy 9.4.10)

- 150 feet from a public water well where the depth of the effluent dispersal system does not exceed 10 feet in depth. (OWTS Policy 9.4.10.1)

- 200 feet from a public water well where the depth of the effluent dispersal system exceeds 10 feet in depth. (OWTS Policy 9.4.10.2)

- Where the effluent dispersal system is within 600 feet of a public water well and exceeds 20 feet in depth, the horizontal setback required to achieve a two-year travel time for microbiological contaminants shall be evaluated. A qualified professional shall conduct this evaluation. However, in no case shall the setback be less than 200 feet. (OWTS Policy 9.4.10.3)

- Where the effluent dispersal system is within 1,200 feet from a public water system's surface water intake point, within the catchment of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 400 feet from the high water mark of the reservoir, lake, or flowing water body. (OWTS Policy 9.4.10.4)

- Where the effluent dispersal system is located more than 1,200 feet but less than 2,500 feet from a public water system's surface water intake point, within the catchment area of drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 200 feet from the high water mark of the reservoir, lake, or flowing water body. (OWTS Policy 9.4.10.5)

Exceptions

1. For replacement OWTS that do not meet these horizontal separation requirements, the replacement OWTS shall meet the horizontal separation to the greatest extent practicable. In such cases, the replacement OWTS shall utilize treatment and other mitigation measures, unless the permitting authority finds that there is no indication that the previous system is adversely affecting the public water source, and there is limited potential that the replacement system could impact the water source based on topography, soil depth, soil texture, and groundwater separation. (OWTS Policy 9.4.11)

2. For new OWTS, installed on parcels of record at the time of effective date of this LAMP, that cannot meet the above horizontal separation requirements, the OWTS shall meet the horizontal separation to the greatest extent practicable and shall utilize supplemental treatment for pathogens and any other mitigation measures prescribed by the permitting authority (SCEHD). (OWTS Policy 9.4.12)

1. F. EXISTING PARCELS (OWTS Policy 9.1.11) (OWTS Policy 9.1.12) (OWTS Policy 9.2.3)

There are thousands of existing parcels within Shasta County that have been developed using OWTS for sewage disposal/treatment purposes. SCEHD is aware that many existing OWTS may now be considered substandard as a result of their development prior to the adoption and implementation of current or historical Shasta County Sewage Disposal Standards (under standards less stringent than those required by the State OWTS Policy). Those systems may be on small lots, may not meet the new groundwater separation requirements of the State OWTS Policy, or may not meet some or all required setbacks. Existing OWTS that are properly functioning and do not meet the conditions of failing systems will not be required to comply with the State OWTS Policy. It is only after receiving a report of a failing system that can be verified, when the system is evaluated after receipt of a repair/replacement permit application, or as part of a request to further develop the parcel(s) that SCEHD staff will evaluate these existing parcels. The intent of SCEHD would be to allow the continued use or uses on the parcel while bringing the OWTS serving the parcel into compliance with the State OWTS Policy to the greatest extent practicable.

As development occurs of the many existing undeveloped parcels in the County, they will be evaluated under this LAMP for compliance with the horizontal setback requirements to the greatest extent practicable. The minimum two-foot vertical separation between the bottom of the trench and groundwater, required by the State OWTS Policy, cannot be waived through the County's LAMP. Parcels created by subdivision or parcel maps with existing soil testing would not be required to be re-tested unless additional tests are needed to support the type of OWTS proposed for the parcel.

1. G. SEPTAGE CAPACITY AND SEPTIC PUMPER TRUCK APPLICATIONS AND REGISTRATIONS (OWTS Policy 3.3.2) (OWTS Policy 9.2.6)

Septage is the term used for the partially treated solid and liquid material removed from septic tanks, and some treatment systems, by septic tank pumper trucks. This material includes settled solids, fats, oils, grease, other floating materials, and some amount of liquid. This solid material must be removed from septic tanks to prevent the tank from filling up and potentially damaging the dispersal system or any supplemental treatment system that may be in use. Removal frequency is different for each system, based on tank capacity and use but generally is not less than every three years.

Septage. Counties must ensure that a disposal site for septage is available. Shasta County has the following two septage disposal sites available:

1. Redding Regional Septage Impoundments have a capacity to receive 13 million gallons of septage annually. Average use is approximately 7.3 million gallons per year.

2. Fall River Mills Septage Impoundments have a capacity to receive in excess of 676,000 gallons of septage per year. Average use is approximately 280,000 gallons per year.

Each site has multiple ponds available for the discharge of septage from pumper trucks. When one pond fills, it is taken out of use and the liquid is evaporated. The dried sludge is removed to a permitted solid waste facility, restoring the impoundment for continued use.

Septic Pumper Truck Applications and Registrations

SCEHD requires applications from, issues registrations for, and annually inspects all registered septage pumper trucks operating within Shasta County. Inspections of pumper trucks by SCEHD primarily focus on health, sanitation, and safety issues relating to the trucks and equipment, and operator's knowledge of procedures. Pumper/haulers are requested to notify SCEHD within 24 hours of the discovery of a failing OWTS with surfacing sewage.

1. H. DATA COLLECTION/REPORTING/NOTIFICATIONS/RESPONSIBILITIES (OWTS Policy 9.3) (OWTS Policy 9.3.1) (OWTS Policy 3.3.1)

As a condition of SCEHD oversight of OWTS within Shasta County, SCEHD has certain responsibilities related to data collection and reporting to the CVRWQCB as well as, in some cases, the owners/operators of public water systems and the State Water Resources Control Board's Division of Drinking Water (SWRCB-DDW). This Section details the data that must be collected by SCEHD and the procedures for reporting to the CVRWQCB and notifications to owners of public water systems and the SWRCB-DDW.

Water Quality Assessment Program (OWTS Policy 9.3.2) (OWTS Policy 9.3.2.1) (OWTS Policy 9.3.2.2) (OWTS Policy 9.3.2.3) (OWTS Policy 9.3.2.4) (OWTS Policy 9.3.2.5) (OWTS Policy 9.3.2.6) (OWTS Policy 9.3.2.7) (OWTS Policy 9.3.2.8) (OWTS Policy 9.3.2.9)

SCEHD will maintain a water quality assessment program to evaluate the extent to which groundwater and local surface water may be impacted by discharges from existing OWTS and OWTS permitted under this LAMP. The program will focus on areas with shallow soils, fractured bedrock, shallow depth to water table, and where a concentration of domestic water wells and OWTS are in close proximity. SCEHD will use data collected from investigations of failing OWTS, routine inspections of operating OWTS (by SCEHD staff and service providers), sample results from the SCEHD Public Water System regulatory program, sample results from local watershed management groups, and other samples of surface and ground water reported to or obtained by SCEHD staff (to include, but not be limited to home loan well inspections, data from Geotracker, GAMA, beaches, and monitoring wells from SCEHD or state agency permitted facilities. This monitoring program may identify areas of the County that warrant additional soil tests, designs and more frequent inspections and maintenance for new and replacement OWTS, and repairs or expansion of existing OWTS.

Records Retention (OWTS Policy 3.4)

SCEHD will retain permanent records of permits and will make them available to CVRWQCB staff within ten working days upon written request for review. The records for each permit shall reference the Tier (1, 2, 4) under which the permit was issued. Shasta County Department of Resource Management uses a computer database to track permits for all projects evaluated by the four Divisions of the Department including current Sewage Disposal Systems Permits issued by the SCEHD and future OWTS permits. Paper copies of completed system applications, soil test data, final drawings, and other related documents are kept in the SCEHD office until the system has been granted final approval and then these documents are scanned into an electronic database.

Reporting to the RWQCB (OWTS Policy 3.3) (OWTS Policy 9.3.3)

A. On an ongoing basis, SCEHD will collect data and prepare a report by February 1st annually, in a format prescribed by the State OWTS Policy to include the following information:

1. The number and location of complaints pertaining to OWTS operation and maintenance, and identification of those which were investigated and how they were resolved.
2. The number, location, and description of permits issued for new and replacement OWTS and under which Tier the permit was issued, noting any variance allowed for systems otherwise in substantial conformance with the standards.
3. The applications and registrations issued for sewage pumpers/haulers as part of the septic tank cleaning registration program.
4. Results of the Water Quality assessment Program intended to evaluate the impact of OWTS on local surface water and groundwater. Any groundwater monitoring data collected shall be submitted in Electronic Deliverable Format (EDF) for inclusion into GeoTracker, the SWRCBs database of which this data will have exclusive view by CVRWQCB staff. Surface water monitoring shall be submitted to the California Environmental Data Exchange Network (CEDEN) in a Surface Water Ambient Monitoring Program (SWAMP) comparable format. At this time, at a minimum, it is expected that groundwater monitoring will include, but not be limited to, any samples collected from small public water systems regulated by SCEHD and any other samples collected in response to home loan inspection requests, complaints, and samples that may be required from OWTS monitoring wells.

B. Every five years, per the State OWTS Policy, an evaluation of the monitoring program and an assessment of whether water quality is being impacted by OWTS in use within Shasta County must be completed by SCEHD and submitted to the CVRWQCB. This evaluation would need to identify any changes in the Shasta County LAMP required to address any impacts from OWTS.

Reporting to Owners of Public Water Systems and Division of Drinking Water at the SWRCB (OWTS Policy 3.5) (OWTS Policy 9.2.11) (OWTS Policy 9.2.12)

SCEHD shall notify the owner/operator of a public well or water intake and the Division of Drinking Water at the SWRCB as soon as is practicable, but not later than 72 hours, upon verification of a major failure of an OWTS component within:

- 150 feet of a public water well; and
- Within 2,500 feet from a public water system surface water intake.

Additionally, SCEHD will notify the public water system owner/operator upon receipt of an application and before the issuance of a permit for a new installation, replacement, repair or expansion of an OWTS within 1200 feet of a surface water intake or within the drainage catchment of the intake point if it is located such that it may impact water quality at the intake point, or if the proposed OWTS is within the horizontal sanitary setback from a public well. All notifications will be in letter format and mailed and/or sent by electronic mail to the water system owner/operator.

For OWTS permit applications for dispersal systems within the horizontal sanitary setback of a public well or a surface water intake point SCEHD shall first work with the owner of the proposed OWTS to see if relocation of the dispersal system outside the setback is possible. Per the State OWTS Policy, an OWTS with supplemental treatment for nitrogen reduction and supplemental treatment for pathogen reduction may be required if the dispersal system cannot be relocated to meet the required setback (see the Technical Standards Manual for discussion of treatment systems).

Reporting to SCEHD by OWTS Owners and/or Service Providers
As a condition of operating permits for OWTS with supplemental treatment, property owners and/or service providers are required to perform and document routine inspections, maintenance, and monitoring of those OWTS every six (6) to twelve (12) months, depending on the complexity of the system and recommendations of the manufacturer. The results will be reported to SCEHD on a frequency specified in their OWTS operating permit. The typical time intervals for inspections, maintenance, monitoring, and reporting for various types of supplemental treatment systems are provided at the end of each section's discussion in more detail in the Technical Standards Manual.

Outreach Program (OWTS Policy 9.2.5)
SCEHD has copies of sewage disposal standards, percolation test instructions and data sheets, and other related documents are available to the public in our office and/or on the County website. All newly developed materials will be made available when completed.

With few exceptions, documents in SCEHD files are public records. These include copies of OWTS documents such as permitting/installation records, site location drawings, soil test data, applications for permits to drill wells, public water system sample results, water sample results for real estate loans, results of soils tests conducted for a proposed land division, and other records that may relate to OWTS.

Upon request, SCEHD staff can provide presentations to local homeowner or industry groups or organizations regarding OWTS standards, use, operation, design, construction, and maintenance.

In addition to OWTS construction permits, SCEHD will be issuing Operating Permits for OWTS requiring supplemental treatment. Operating permits will be issued to ensure compliance with the State OWTS Policy requirements for periodic monitoring or inspections of supplemental treatment systems. These permits will require notification, within time frames specified in the permit, of any failure or upset conditions with the permitted system. Additionally, SCEHD will require that an Operations and Maintenance Manual be prepared for each of these systems by the Qualified Professional designing the system. This Manual shall be provided to the property owner and will include procedures to ensure maintenance, repair, or replacement of failing systems or critical system components within 48 hours following discovery. To assist system owners in providing proper maintenance and repairs and in reporting upset conditions, SCEHD will post a list of service providers, in addition to a list of Qualified Professionals on its website. This will include 24-hour contact numbers when available.

Should SCEHD implement a voluntary well monitoring program at some future date, the outreach program will include information on how well owners may participate.

SCEHD Responsibility

SCEHD will establish and maintain a record keeping and reporting system to ensure that current records are kept detailing the location, ownership, site evaluation, and design details of all systems, along with O & M reports for systems with supplemental treatment so that the performance of the systems approved under Tier 2 can be monitored.

SCEHD will monitor and analyze the performance of OWTS within the County by reviewing O & M data submitted pursuant to operating permits

SCEHD will assure timely follow-up and correction, including enforcement action when necessary, when problems are encountered with treatment or dispersal technologies which are being monitored through the Operating Permit program.

SCEHD may perform O & M inspections on systems using supplemental treatment, as needed, for quality assurance/quality control, surveys, and investigations.

Property Owner, Qualified Professional, and Service Provider Responsibility

Property owners, Qualified Professionals and Service Providers all have responsibilities with respect to the use, operation, maintenance, inspection, and reporting related to all OWTS permitted in Shasta County. The failure of one of these team members to abide by their respective responsibilities may result in premature upset or failure of the OWTS. Failure of an OWTS can lead to surface water or groundwater contamination with untreated or partially treated wastewater and potential public health hazards. Another result of a failing OWTS is the expense to repair or replace the system. This can be equal to, or more than, the construction cost of the original system.

Property Owner

Every onsite wastewater treatment system requires care with use and timely maintenance to continue to function as designed. An OWTS is sized for an expected use. A number of OWTS have failed due to misuse or use beyond that expected when the system was designed and constructed. Using the system beyond its design flows will lead to premature failure. Using the system to dispose of large quantities of household cleansers or disposal of a wastewater stream different from that which the system was designed for can significantly reduce the life span and effectiveness of the OWTS. A property owner must be accurate with the proposed use, quantity and quality of the wastewater stream, when discussing the proposed OWTS with their Qualified Professional and with SCEHD staff.

All OWTS require some maintenance. It can be as simple as having the septic tank inspected and pumped on a regular basis to the more complicated inspection and maintenance of supplemental treatment systems. Operating Permits, when required, will include specific inspection, maintenance, monitoring, and reporting requirements depending on the complexity of the system installed and the recommendations of the manufacturer. An owner of an OWTS using supplemental treatment must adhere to these requirements at their specified timeframes to assist in keeping these OWTSs operating as designed and must correct deficiencies in the OWTS that have been identified by SCEHD or a Service Provider.

SCEHD does not currently regulate the construction and use of graywater systems. These systems are permitted by the Shasta County Building Division (SCBD) under a plumbing permit. SCBD will consult with SCEHD as necessary. An OWTS is designed for a specified wastewater strength and quantity. Property owners should be aware that, in the extreme, the use of a graywater system may have an impact on an OWTS in use at a site. Be sure that the Qualified Professional and SCEHD staff are aware that a graywater system may be constructed or consider an alternative OWTS, such as a drip dispersal system, allowing OWTS liquid waste to assist in watering vegetation at the site. SCEHD does not allow a reduction in the size of an OWTS when a graywater system is proposed at a site.

Qualified Professional (OWTS Policy 9.1.7) (OWTS Policy 9.1.10) (OWTS Policy 9.2.4)
Every new/proposed OWTS, and most onsite system repairs, must be designed by a Qualified Professional (see definitions). Qualified Professionals will test each site, recommend a system for the site based on test results and site soil and groundwater depths, and design and provide specifications for that system. The Qualified Professional must be certain that the system is being designed for the proper wastewater strength and flow.

The Qualified Professional will consider potential pathways of wastewater-sourced phosphate and other nutrients toward potentially threatened nearby surface water bodies, when present. They will also consider hydraulic mounding, nitrate and pathogen loading, and sufficiency of potential OWTS replacement areas. The OWTS, potential replacement areas, and all proposed site improvements and structures must fit onto existing and proposed parcels while meeting or exceeding all appropriate setbacks and would be verified by the Qualified Professional on the site plan.

The Qualified Professional must work with the installer to ensure that the system, as constructed, meets the specifications of their design and the construction permit issued by SCEHD. Accurate site plans, showing the proposed and actual installed system locations must be prepared and provided to the property owner and SCEHD.

An Operation and Maintenance Manual prepared by the Qualified Professional system designer, and made available to the system owner is required for every OWTS with an alternate dispersal or supplemental treatment system installed on parcels in Shasta County. Proper use and routine maintenance at regular intervals is necessary and recommended for all systems, but is required by SCEHD and noted in a valid OWTS Operating Permit for systems with supplemental treatment. The OWTS Qualified Professional shall prepare the following operations and maintenance plan for every OWTS with an alternate dispersal or supplemental treatment system:

- An accurate scale drawing showing the actual location of the OWTS and all system components installed on a parcel for ease in locating the system for inspections, maintenance, and monitoring;
- An Operations and Maintenance Manual specific to the type of system installed. It shall contain a narrative describing how the system achieves its treatment standards/goals. The manual shall note homeowner or service provider procedures to ensure maintenance for continued operation, repair, or replacement within 48 hours of identifying a failing system. The manual is to detail the type of maintenance or monitoring required and when these tasks should be done;
- Identify the tasks that can be performed by an owner and those that require additional expertise where a Service Provider is the more appropriate choice to perform them;
- The plan shall include the names and contact information of the Qualified Professional, licensed system installer, and OWTS Service Provider, and;
- Identify the reporting required by owners with an OWTS with supplemental treatment, to SCEHD as a result of these inspections, monitoring, and maintenance or actual failure conditions;
- The plan is to be amended to reflect any system upgrade or repair.

Service Provider (OWTS Policy 9.2.4)

The property owner shall contract with a Service Provider to provide necessary inspection, maintenance, monitoring, and reporting services as specified in a valid OWTS Operating Permit issued by SCEHD for systems with supplemental treatment. It is extremely important that the Service Provider completes the required tasks to keep the system operating as designed. Most OWTS owners may not understand how a system functions and recognize signs that the system needs maintenance or is failing so SCEHD recommends that all systems be inspected, maintained, and monitored by informed owners or Service Providers to maintain the system in proper working order.

The Service Provider shall provide all maintenance records to the property owner and report any system malfunction that results in surfacing sewage to the owner and SCEHD within 48 hours.

1. I. OWTS NEAR IMPAIRED WATER BODIES (OWTS Policy 9.1.8) (OWTS Policy 9.2.2)

Currently, there are no impaired water bodies in Shasta County listed in Attachment 2 of the State OWTS Policy. At such time as an impaired water body is listed, SCEHD will follow the applicable specific requirements of the State OWTS Policy.

Onsite Maintenance Districts (OWTS Policy 9.2.7)

There currently are no onsite maintenance districts or zones within Shasta County nor are any anticipated in the foreseeable future.

Regional Salt and Nutrient Management Plans (OWTS Policy 9.2.8)

There are no existing regional salt or nutrient management plans within Shasta County nor are any anticipated in the foreseeable future.

Watershed Management Groups (OWTS Policy 9.2.9)

Currently, SCEHD has no formal agreements with any watershed management groups within Shasta County.

1. J. PARCEL/LOT SIZE REQUIREMENTS (OWTS Policy 9.1.2) (OWTS Policy 9.1.10)

Shasta County has a two-acre minimum for new residential parcels that use individual OWTS and onsite wells. It should be noted that there has not always been a minimum lot size for existing lots to be served by an OWTS and many small parcels have been created over the years. Either way, the OWTS, including the 100 percent replacement area, shall meet all applicable setbacks to all proposed structures which include, but are not limited to, dwellings, wells, pools, barns, shops, garages, driveways, and other graded/paved/concrete areas which shall fit on the property without interfering with the OWTS.

See the Technical Standards Manual in the Appendices for related documents that provide specific requirements regarding the creation of new parcels (land divisions) within Shasta County. Minimum parcel sizes are required by the County and the cities land use agencies per specific site zoning. Any proposal for a development with acreage less than these minimums would receive greater scrutiny by SCEHD of pathogen transport and cumulative nitrogen and hydraulic mounding impacts.

1. K. HIGH DOMESTIC WELL USAGE AREAS (OWTS Policy 9.1.4) (OWTS Policy 9.1.9) (OWTS Policy 9.1.11) (OWTS Policy 9.1.12)

A majority of Shasta County residents are served by public or privately operated water systems. These include systems operated by the three incorporated cities, the unincorporated communities of Burney, Johnson Park, and Fall River, several larger public water systems such as the Bella Vista, Clear Creek, Mountain Gate, and Centerville Water Districts, a number of County-operated service area water systems, and approximately 160 small public water systems regulated by SCEHD. An estimated 160,000 Shasta County residents receive water from these public systems.

Overall, the population of Shasta County is estimated at nearly 190,000 leaving approximately 30,000 persons served by private domestic wells and some individual spring and surface water systems. The majority of these individual wells are on parcels with an OWTS. Staff must carefully evaluate the water supply for parcels served by an OWTS, whether the source is a well, spring, or surface water supply when considering the potential construction and use of an OWTS.

SCEHD staff are not aware of any nitrogen impacts to groundwater as a result of the OWTS density in the county. There are vast areas of Shasta County developed on wells and OWTS but the density is not high enough to be defined as high domestic well usage areas.

1. L. CESSPOOLS (OWTS Policy 9.2.13) (OWTS Policy 9.4.1)

A cesspool is a hole excavated into the ground to receive domestic wastewater from a structure. A cesspool does not have a tank or other water tight settling chamber nor does it have a proper pipe inlet/outlet, or a dispersal system to assist in effluent treatment and safe disposal. Cesspools have not been approved for use in Shasta County per our Sewage Disposal Standards dating to the mid 1970's. Cesspools are not authorized by this LAMP.

Any existing cesspool discovered by SCEHD through our repair or complaint process or through an application to increase the capacity of any existing OWTS shall be properly destroyed and replaced with an OWTS acceptable under this LAMP under the same process noted in Section 3, Failing OWTS and Corrective Action. Permits will not be issued for the construction of any cesspool.

1. M. RV HOLDING TANK WASTE (OWTS Policy 9.4.7)

Under the State OWTS Policy, SCEHD is prohibited from issuing permits for systems that receive a significant amount of wastes from RV holding tanks. Such systems are regulated by the RWQCB. SCEHD may issue permits for OWTS that receive RV holding tank wastes as long as those wastes are incidental to a more "normal" waste stream, such as a home with an RV waste dump station for use by the homeowner.

LAMP SECTION 2. ONSITE WASTEWATER TREATMENT SYSTEMS PERMITTING PROCESS (OWTS Policy 9.2.1)

2. A. STATE, COUNTY, AND CITY ROLES

State / County Coordination

OWTS discharge pollutants to groundwater and, therefore, are regulated by the State Water Code. Water Code Section 13282 allows the CVRWQCBs to authorize a local public agency to issue permits for and to regulate OWTS "to ensure that systems are adequately designed, located, sized, spaced, constructed, and maintained." The

CVRWQCB, with jurisdiction over Shasta County, authorizes only the SCEHD to issue certain OWTS permits throughout the County including areas within the three incorporated cities, when necessary.

Through the State OWTS Policy, the CVRWQCB has imposed conditions and restrictions on the County's permit program. SCEHD is authorized to issue permits for conventional OWTS and alternative OWTS with or without supplemental treatment within the County. The State OWTS Policy requires a minimum of five feet and up to twenty feet of separation maintained between the bottom of a dispersal system point and the highest anticipated groundwater level for conventional OWTS, and at least two feet of separation be maintained for alternative dispersal systems, including some with supplemental treatment.

The goal of SCEHD's LAMP is to ensure that installed OWTS will last the life of any structure they serve and not cause any public exposure to surfacing sewage or potential contamination of groundwater or surface waters. The separation requirements are a condition of the State's authorization for Shasta County to issue OWTS permits locally. The Technical Standards Manual describes in detail how the County ensures that these State-imposed separation requirements are determined and met.

SCEHD / Land Use Agency Coordination

A fundamental point that persons seeking OWTS permits must remember is that the County OWTS permit process and local agency land use approval and permitting are related but separate processes. While they are coordinated to a great extent, persons seeking OWTS permits from SCEHD should also review and ensure compliance with applicable site grading, land use, and building requirements.

Similarly, no local land use approval or permit, including, but not limited to, approved land divisions, property line adjustments, and conditional and use permits, is a substitute for a County OWTS permit, or a guarantee that such a permit will be issued.

2. B. SYSTEM DESIGN CONSIDERATIONS

The most common type of conventional OWTS found in Shasta County consists of a septic tank connected to leach lines. In all cases, the majority of solids, fats, oil, and grease are removed in the septic tank and effluent from the septic tank is discharged below the ground surface, and organic material present in this effluent is digested by bacteria in unsaturated soil zones for treatment of the effluent underground. These systems are designed to operate in all weather conditions with minimal maintenance, other than periodic septic tank pumping to remove accumulated sludge and floating scum that form in the septic tank. Under this LAMP, sites with Tier 1 minimum of 5 to 20 feet of soil beneath a dispersal system trench, based on soil percolation rates, would not require mitigation or monitoring and a conventional septic tank and leach line dispersal system could be constructed as authorized by a valid OWTS construction permit.

In addition to conventional OWTS, Shasta County currently allows the use of alternative or non-conventional systems. These systems are generally used for those sites that cannot support the use of a conventional OWTS due to shallow ground water, soil permeability problems, or soil depth problems. A variety of OWTS mitigations were accepted in the past to deal with these specific site conditions including shallow trenches, pumps, curtain drains, dual leach fields, and other systems and these were known as non-conventional systems. At a minimum, some of these systems within Shasta County may have had as little as one foot of separation between the bottom of a dispersal system and the highest elevation of groundwater, primarily a perched seasonal water table resulting from precipitation and/or irrigation. The State OWTS Policy now sets a minimum soil depth and separation from groundwater at two feet with the use of a supplemental treatment and/or alternate dispersal system to treat septic tank effluent prior to discharge into the soil. The SCEHD Director may allow the use of other systems not otherwise prohibited by the State OWTS Policy.

The size and type of OWTS necessary for a residence or other use will nearly always be a function of the following factors:

1. <u>Soil Permeability.</u> Permeability determines the degree to which soil can accept septic tank or supplemental treatment system effluent over a period of time. Permeability is determined by a percolation test and is reported as a percolation rate, in minutes per inch.

2. <u>Unsaturated Soil Interval.</u> The distance between the bottom of the OWTS dispersal field and the highest anticipated groundwater level or the impervious subsurface layer at the site.

3. <u>Peak Daily Flow.</u> The anticipated peak sewage flow in gallons per day. In many cases the number of bedrooms for a proposed home is used as an indicator of peak daily flow. Daily flow in non-residential uses is calculated from expected flows from charts in the Uniform Plumbing Code, adopted by Shasta County, and other similar charts or actual flows of similar projects acceptable to the Director.

4. <u>Net Useable Land Area.</u> The area available that meets all setback requirements from structures, easements, property lines, watercourses, or other geologic limiting factors for the design/placement of an OWTS. A site may not be developed beyond its capacity to properly treat and disperse the amount of liquid waste expected/generated.

5. <u>Wastewater Strength.</u> Wastewater strength has been of some importance with non-residential systems such as restaurants or other commercial or industrial systems. This is because there may be less water in the waste stream or more solid material, oils, fats, grease, or cleansing or sanitizing materials may be present when compared to those things expected in residential wastewater. Wastewater strength with residential systems may be more important in the future as graywater systems divert a large part of the liquid component of residential wastewater flow from the septic tank.

Some sites may not be acceptable for conventional or alternative OWTS based on high or low soil permeability regardless of the unsaturated soil interval available at the site but may possibly be rendered suitable with the addition of engineered soil fill. Parcels with limited net useable area may require redesign of the proposed project to make the OWTS physically fit on the property.

All conventional Tier 1 OWTS in Shasta County will require five feet to twenty feet, based on soil percolation rates, between the bottom of the dispersal system and the highest anticipated groundwater level for the site. An alternative Tier 2 OWTS will require a minimum of two (2) feet and sometimes more. Depth to groundwater varies tremendously with the amount of precipitation and soil types for specific sites and areas within Shasta County, therefore, the highest anticipated groundwater level must be established for any OWTS design in order to meet this separation requirement. Details in determining depth to groundwater and overall soil depth are provided in the Technical Standards Manual.

The net useable land area required for an OWTS will usually depend on soil permeability, soil depth, expected peak daily flows and the required 100 percent dispersal system replacement area.

2. C. PERMITS ISSUED (OWTS Policy 3.3.3)

Historically, SCEHD issues an average of approximately 225 Sewage Disposal System Permits annually, depending on development, as follows:

- 3 permits to abandon systems no longer needed;
- 103 new standard or conventional system permits;
- 7 new non-standard or non-conventional permits, and;
- 112 permits to replace failing or inadequate systems.

Under the County's approved LAMP, we would expect to continue to issue a similar number of total construction permits in different categories annually, depending on development, as follows:

- 3 permits to abandon systems no longer needed;
- 45 new conventional system permits (not requiring treatment or alternate dispersal);
- 65 new Tier 2 permits (with supplemental treatment and/or alternate dispersal);
- 40 repair permits (without supplemental treatment or alternate dispersal), and;
- 72 repair permits (with supplemental treatment and/or alternate dispersal).

An operating permit would be issued for any system requiring supplemental treatment. (OWTS Policy 9.4.6)

Under the previous Sewage Disposal Systems Ordinance, all non-conventional systems were required to be included in an inspection/monitoring program. Under the Tier 2 LAMP, the term "non-conventional system" will no longer be used and those systems will be integrated into an expanded variety of mitigation options to protect public health and water quality within Shasta County. These mitigations and system requirements are contained in the Technical Standards Manual which includes guidance on a variety of supplemental treatment and/or alternate dispersal systems. For any OWTS with supplemental treatment an operating permit will be issued that will require the completion of inspections, maintenance, water monitoring/sampling, and reporting as detailed in the "Management Requirements" at the end of each specific supplemental treatment and alternate dispersal system section of the Technical Standards Manual.

2. D. PERMIT APPLICATION PROCESS

All OWTS permit applications for new construction, replacements, repairs, or additions within Shasta County will be submitted to SCEHD.

Permitting Process

In general, a "complete" OWTS permit application contains a completed application form, an accurate site plan, soils test results, and appropriate fees.

Soil Test Data

Soil test data may include a soil profile, percolation tests, groundwater monitoring results, and/or soil boring logs. The specific test data required is determined by the type of system proposed and may be modified as the results of those tests are being evaluated. Soil tests are typically required when:

- An existing parcel, created prior to soil test requirements for land divisions, is proposed for development;

- Grading or other soil disturbance has occurred in the previously tested/approved area;
- The system is being shifted out of the previously tested/approved area;
- An OWTS other than the type of system previously approved is being considered;
- An existing septic system fails or is proposed for expansion and no previous soil test data is available for the specific parcel.

As is the current practice, SCEHD staff will review soil percolation and other test data submitted with the application and determine if the tests are adequate or if additional tests are needed. Parcels created since 1982 (and on some earlier dates for a few land divisions) would have been created with five-foot deep soil profiles to verify that at least four feet of suitable soil exists. Groundwater monitoring in five-foot deep monitoring wells (or other alternate method), was required when the inspection of the five - foot deep pits did not clearly delineate the depth of a seasonal water table. Water was allowed to be present at depths of four feet but possibly as shallow as two feet for up to two weeks at a time. This soil test data does not expire and this data should be adequate to allow a permit to be issued for an OWTS with an alternate dispersal or supplemental treatment system without the requirement for additional testing. Additional soil tests (deeper soil profiles or deeper groundwater monitoring) may allow for the installation of less complicated and less expensive OWTS.

Additional tests would be required if the construction of a specific type of OWTS proposed for a site cannot be supported by the data on hand. All required soils tests shall be conducted by, or under the supervision of, a Qualified Professional.

With percolation tests and other soil data in hand, the applicant must develop and submit an accurate site plan for the proposed building project and the proposed OWTS. The site plan must take percolation and other soil test data and this guidance into account.

Application Site Plan

The application form identifies the location of the property, owner, applicant if not the owner, contractor, proposed use, parcel size, specific assessor parcel number, and proposed water supply for the project. The application identifies any previous land use projects that may have required that soil tests be conducted. The application also identifies the OWTS project as a new installation, a replacement, or a repair.

A complete OWTS permit application includes a detailed, accurate site plan which at a minimum depicts the following:

- The outline and dimensions of the parcel.
- The property owner's name.
- The assessor's parcel number for the property.
- The address of the property.
- A North arrow and scale.
- The acreage of the property.
- Dimensions/square footage/footprint and use of all structures.
- Indicates whether there are mobile homes or houses and indicate whether there is a garage attached to the house.
- Easements shown and labeled.

- All OWTS and well locations, both existing and proposed. Also shows the distance to all neighboring OWTS and well(s).
- Shows the required 100 percent dispersal system replacement area.
- All roads and driveways shown and labeled, list length, width, and turn radius, and estimate grade.
- Drainages and waterways shown and labeled, including roadside ditches, seasonal or dry creek beds, and distance(s) from existing and proposed OWTS.
- Indicates distances to toe and/or top of slopes and cuts, whichever is appropriate.
- Delineates areas and depth of fill.
- Shows the locations of all percolation tests, soil profile pits, borings, and groundwater monitoring wells. An accurate plan showing all percolation tests, soil profile pits, groundwater monitoring wells, and/or soil borings must be prepared by a qualified consultant for submittal with the permit application.
- Shows all existing and proposed grading including depths of cuts and fills.
- Additional information may be requested for a proposed OWTS based on specific site features or conditions.
- Delineates flood plain, when applicable.

2. E. PERMIT APPLICATION REVIEW AND PERMIT ISSUANCE

SCEHD staff would review all available soil test data, the site plan, and application to determine if adequate information exists to issue an OWTS permit. Typically, SCEHD staff would make a site visit of the property to perform a site evaluation to verify that the soils data and site plan accurately reflect conditions at the site. After review, if it appears likely that the proposed OWTS (including 100% replacement area) will fit into the site and will function properly, SCEHD will issue an OWTS Permit. Shasta County requires, and typically the city land use agencies require, an approved OWTS permit before any building permits are issued.

SCEHD may allow variances from the State OWTS Policy with regards to horizontal separation. New installations and repairs shall conform to the State OWTS Policy to the greatest extent practicable. SCEHD staff will work with applicants to determine if relocation of the proposed OWTS is possible to potentially avoid the requirement to add a supplemental treatment system. Setback variances will not be allowed for the creation of new parcels after the effective date of this LAMP. Records of the number, location, and description of permits issued for OWTS where a variance is granted shall be maintained for the annual report to the RWQCB. (OWTS Policy 9.2.3) (OWTS Policy 9.3.1)(9.4.11)

Grading or clearing of brush for the purpose of conducting a site evaluation and soil tests may require a grading permit issued by the Department of Resource Management Building Division or city permitting agency. The requirements for this grading permit in the unincorporated area of Shasta County and the three cities are available from the appropriate building agency. Any grading which damages or alters an approved or proposed sewage treatment dispersal area may be costly to correct, may delay the approval of a project, or may preclude the issuance of an OWTS permit.

2. F. FINAL INSPECTION (OWTS Policy 9.2.1)

Once an OWTS permit has been issued (and the permit is accepted by the city if applicable), the OWTS can be installed. Such installation must meet all applicable requirements for OWTS construction and any special conditions specified for that site or permit. SCEHD staff may require a meeting with the system designer, property owner, SCEHD and OWTS installer at a pre-construction conference, as specified in the permit. Once installed, the Tier 2 system must first be inspected by the system designer/qualified professional. If the qualified professional finds the system to be in compliance with the system design and issued permit, they would request a final inspection by SCEHD staff. The system installation must be inspected and approved by SCEHD before the system can be backfilled. If this (or any subsequent inspections) is satisfactory, SCEHD will provide a final approval for the OWTS permit. Occasionally, SCEHD will hold final approval on the OWTS permit pending the completion of specific conditions such as placement of backfill materials or final site grading.

Shasta County and the cities' land use agencies require that OWTS are installed and final approval granted by SCEHD before occupancy of structures is allowed. OWTS permits, once issued, will be valid for a period of two years. Extensions and renewals of these permits will follow appropriate policy.

2. G. PRIMARY AND REPLACEMENT/RESERVE AREA REQUIREMENTS

In addition to primary system design criteria, all OWTS design proposals, for both new construction and additions to an existing structure or approved use, must show 100 percent reserve area for eventual replacement of the active OWTS dispersal system when it reaches the end of its useful function and/or fails. The Director may require that the 100 percent replacement leach field be installed at the time the primary system is installed in the following situations:

1. The lot is less than one acre;
2. The lot is otherwise a difficult site upon which to conduct a leach field repair;
3. Adequate replacement space is limited;
4. Sites with slopes greater than 30 percent;
5. The percolation rates are greater than 60 minutes per inch;
6. The use is a commercial project, including food facilities;
7. As required by the Director when determined to be necessary to protect public health and safety.

A switching or alternating valve, to allow easy switching between fields, shall be installed at the time of construction where dual leach fields have been constructed to allow alternating use of fields at specified intervals.

2. H. SEPTIC TANKS

All conventional OWTS require the use of a water-tight septic tank to allow for the removal of solids and fats, oils, and grease from the wastewater prior to being discharged to a dispersal field. Most alternative or supplemental treatment OWTS will also require the use of a septic tank unless a settling chamber is a component of the treatment unit or treatment process. For specific information on the requirements for and sizing septic tanks, see the Technical Standards Manual.

2. I. ALTERNATE OWTS TREATMENT SYSTEMS

On parcels not meeting the groundwater separation in Tier 1 of the State OWTS Policy, an alternative treatment system or dispersal system may be used to reduce the required separation to as little as two to three feet between the bottom of the dispersal system and the highest anticipated depth to groundwater. Intermittent sand filters and recirculating sand filters can be constructed at sites from readily available materials or can be purchased as complete units from various manufacturers. Other alternative treatment units, commonly known as proprietary treatment units, can be purchased for installation and use at sites. See the Technical Standards Manual for more information on the sizing, construction and design criteria, criteria for the selection of the appropriate system, and monitoring of supplemental treatment systems. The qualified professional hired by the property owner to conduct the necessary soils tests shall designate and properly size any treatment unit required for an OWTS on a particular parcel.

2. J. OWTS LEACH LINE DISPERSAL SYSTEMS

Dispersal systems for conventional Tier 1 OWTS in Shasta County typically consist of leach lines which are described in detail in the Technical Standards Manual. Dispersal systems for alternative Tier 2 OWTS can also include subsurface drip dispersal, mounds, shallow pressure distribution trenches (with rock or sand), and At-grade systems. The Technical Standards Manual includes more specifics on the sizing, construction, design criteria, and monitoring of these systems. The Qualified Professional hired by the property owner to conduct the necessary soils tests shall designate and properly size the type of dispersal system to be used, including, but not limited to, construction trench and backfill depths. The State OWTS Policy prohibits the installation of dispersal systems with less than 2 feet of separation between the bottom of the dispersal system and the highest elevation of a seasonal water table and this is reflected in the siting criteria of each specific dispersal system as discussed in the Technical Standards Manual.

2. K. SETBACKS/VARIANCES (OWTS Policy9.2.3)

Setbacks required in the siting and construction of septic tanks, alternative treatment units, and dispersal systems are given in TABLE 2. C. following in the Technical Standards Manual. It is anticipated that repairs to some failing OWTS will require a variance from these setbacks. Variances are evaluated by staff, and if deemed necessary and safe, may be approved. SCEHD is committed to meeting setbacks to the greatest extent practicable while maintaining the continued use or occupation of the property by owners.

2. L. PROXIMITY TO PUBLIC SEWERS (OWTS Policy 9.2.10) (OWTS Policy 9.4.9)

SCEHD staff will require connection to a public sewer whenever a project abuts and is served by such public sewers. SCEHD staff will rely on the agency operating the public sewer to make the determination of availability as guided by Section 1. E. of this LAMP

LAMP SECTION 3. FAILING OWTS AND CORRECTIVE ACTION (OWTS Policy 9.1)

All OWTS have the potential to fail due to age, misuse, improper design, or improper construction. The failure may result in waste water backing up into plumbing fixtures, waste water discharge to the ground surface, effluent surfacing over a dispersal system area, or wastewater or effluent discharge into, and contamination of, potable groundwater or surface water. These failure conditions will require corrective action to mitigate potential risk to public health and/or contamination of the groundwater and the environment. Local agency enforcement actions may be necessary if corrective action is not completed within acceptable time frames.

Traditional leach field systems, even when designed and constructed correctly, progressively fail over time resulting in diminished capacity of some or all of the leach lines. Effluent from septic tanks distributed into leach lines eventually forms a clogging biomat, restricting the flow of effluent into the soil for treatment. Effluent would then need to travel further into a leach line to find porous soil. Eventually, all of the leach lines would be clogged by this biomat-coated soil and the system would no longer accept liquid, resulting in a failing system with sewage backing up into a structure or surfacing above a leach field.

Tree roots are another cause for system failure. Tree roots can enter the pipe and rock of a leach line and over time totally plug the leach line, again resulting in either a sewage backup to structures or surfacing effluent.

Less frequently, some change may have been made to site contours or drainage that adversely impacted the leach field, such as site grading or driving vehicles over the leach field, or shallow groundwater was present at the site but was not evident in soil pits or other tests again resulting in a failing system. These causes of system failure are referred to as a major failure and usually result in the need to replace the entire leach line or other dispersal system as corrective action.

Other examples of a major failure would be a septic tank that was somehow damaged or was no longer watertight allowing the discharge of untreated sewage or the infiltration of groundwater into the tank. Tank failure could be the result of the tank settling over time, the growth of tree roots into the tank, driving heavy vehicles or storing heavy items over the top of the tank, or improper setting of the tank when the system was originally constructed and would require replacement of the tank as corrective action.

Examples of less serious or minor failures, and more easily repaired defects, would be a cracked distribution box or a crushed solid line between the septic tank and the distribution box. In such cases, corrective action would be limited to the proper repair or replacement of the damaged component.

Whatever the reason or severity, a failing system, or component, that may result in surface or groundwater contamination or a public health hazard shall be corrected, without delay, under a valid OWTS permit issued by SCEHD.

3. A. FAILURE OF A LEACH FIELD

As discussed above, a newly constructed leach field progressively fails through normal use over time. Every system is different, depending on the soil type and construction variables, as is every household's use of a system. Progressive failure(s) may take several years to many decades to result in a failing leach field with sewage backups or surfacing onto the ground surface. Progressive failure or diminished capacity is expected and is normal. Short of excavating into a leach field, or measuring liquid levels in inspection wells, there is no accepted test that can demonstrate the degree to which a system has progressed towards total failure or measure how the capacity of the leach field has diminished.

Today, there are some simple actions that can be taken to limit or delay this diminished capacity by progressive failure and extend the life of a leach field or other dispersal system. One inexpensive action is to install an outlet filter on a septic tank or pump tank. This filter will remove larger solids particles not removed in the septic tank to delay the formation of a thick, plugging biomat in a dispersal system. Another, but more costly method, is to pressure dose the entire leach or dispersal system equally. This will dose the entire dispersal system equally instead of dosing only the first few feet of a leach line as has been the practice up to now. Many alternate dispersal systems use one or both of these methods to extend the life span of dispersal systems by delaying the formation of a thick biomat.

All OWTS require periodic pumping, inspections, or maintenance to keep the system in proper working order and assure adequate treatment of effluent. Owners of property served by an OWTS must maintain their OWTS in good working order as failures may result in groundwater or local surface water contamination, health hazards, and costly corrective actions. Owners of OWTS that utilize a supplemental treatment system shall contract with a Service Provider, who is capable of operating the OWTS in compliance with this LAMP, and carrying out the appropriate inspections, maintenance, monitoring, and reporting required in the OWTS Operating Permit conditions.

3. B. CORRECTIVE ACTION REQUIREMENTS (OWTS Policy 3.3.1) (OWTS Policy 9.2.1) (OWTS Policy 11.0)

SCEHD will follow the corrective action procedure outlined below, and when necessary, will use the abatement proceedings of Chapter 8.28 of Shasta County Code to gain compliance and protect public health:

1. SCEHD will conduct an inspection/investigation in a timely manner to determine the onsite conditions in response to an OWTS repair/replacement permit application, complaint report, or other notification of a failing OWTS or component, or the discovery of a cesspool in use and, when necessary, initiate a violation file with an assigned tracking number.

2. Upon confirmation of a failing OWTS, SCEHD will issue an Inspection Report or Warning Notice directing the property owner to eliminate the immediate health hazard through pumping of the septic tank by a licensed septic tank pumper or by the elimination of wastewater flows emanating from the structure. These actions shall continue until the system has been repaired or replaced as necessary and final approval granted by SCEHD. If known, the Inspection Report or Warning Notice shall note why the system is failing and with specific corrective actions needed. SCEHD will also require proper destruction of any cesspool found in use. A new OWTS will be required for continued use of the structure.

   The Inspection Report or Warning Notice shall be issued at the time of inspection requiring repairs to the OWTS, as needed, within a reasonable time frame. Subsequently, a Notice of Violation – Order to Comply detailing required corrective actions and time frames may be issued if the identified failure cannot be corrected immediately.

3. SCEHD will conduct an inspection/investigation in a timely manner to determine the onsite conditions in response to an OWTS repair/replacement permit application, complaint report, or other notification of a failing OWTS or component, or the discovery of a cesspool in use and, when necessary, initiate a violation file with an assigned tracking number.

4. Upon confirmation of a failing OWTS, SCEHD will issue a Notice of Violation – Order to Comply directing the property owner to eliminate the immediate health hazard through pumping of the septic tank by a licensed septic tank pumper or by the elimination of wastewater flows emanating from the structure. These actions shall continue until the system has been repaired or replaced as necessary and final approval granted by SCEHD. SCEHD will also require proper destruction of any cesspool found in use by issuing a Notice of Violation – Order to Comply directing proper destruction of the cesspool. A new OWTS will be required for continued use of the structure.

5. The proposed repair or replacement by a property owner and/or contractor in an OWTS Permit Application shall be evaluated by SCEHD to ensure it meets the minimum design requirements of this LAMP or that the proposed repair is otherwise in substantial conformance to the greatest extent practicable.

6. Other OWTS component failure, such as a broken distribution box or broken piping connection (a minor failure), shall have that specific component repaired in a timely manner, under permit and inspection from SCEHD, so as to return the OWTS to proper functioning condition without the requirement to bring the entire OWTS into compliance with this LAMP.

7. In the event of failure of a septic tank (a major failure), such as a baffle, “tee”, or loss of structural integrity, or groundwater intrusion or sewage/effluent discharge, SCEHD will require that the septic tank be repaired or replaced to bring the tank into compliance with the septic tank specifications in this LAMP within a timely manner. An OWTS construction permit application will be required and a permit must be issued by SCEHD noting the corrections required. The system may not be backfilled or placed into use without an inspection and final approval from SCEHD.

8. In the event of the failure of a supplemental treatment system or a dispersal system (a major failure), the failing system and/or components shall be brought into compliance with this LAMP in a timely manner. Replacement of the failing system with a conventional or alternate dispersal system or supplemental treatment system will be specified in an OWTS Permit issued by SCEHD. The system may not be backfilled or placed into use without an inspection and final approval from SCEHD. Supplemental treatment may be required in situations where ground or surface waters have been impacted by the failing OWTS.

9. Failure of either the septic tank, supplemental treatment system, or dispersal system may also lead to the failure and required replacement of other components of the OWTS. Proper pumping, inspections, maintenance, and monitoring of the OWTS would be expected to reduce the frequency and severity of a failing component or multiple components.

10. Soils test by a qualified professional are required to properly characterize the site with a failing OWTS. Groundwater separation requirements from the bottom of the dispersal system and the highest

anticipated groundwater level for repairs are the same as newly constructed systems and must be repaired to meet the LAMP requirements to the greatest extent practicable.

11. Required correction(s) shall be completed under permit and inspection from SCEHD within specified time frames. No component of an OWTS shall be backfilled and placed into use until authorized in writing by SCEHD staff after an inspection confirms substantial compliance with a valid SCEHD permit conditions and the standards in this LAMP.

12. Failure to complete the required corrective action within the time frames given may result in enforcement action which may include SCEHD availing itself of all available legal or equitable remedies including, but not limited to, referral to the Shasta County District Attorney or City Attorney for prosecution or Code Enforcement staff for administrative remedies.

3. C. SUBSTANDARD SYSTEMS

The Shasta County Building Permit Waiver process allows SCEHD to evaluate sizing, construction, and operation of an onsite system to ensure it is adequate for a new or replacement residence or bedroom additions. Parcels with OWTS that are found to be substantially out of compliance with this LAMP shall be prohibited from having future additions to structures or other modifications to the property that would potentially increase wastewater flow to the OWTS or decrease the amount of useable area available for the OWTS. A new OWTS permit may be required to repair, replace, or add OWTS components to accommodate the proposed new development or additions or to bring a substandard system into compliance with this LAMP to the greatest extent practicable.

APPENDICES INDEX

TECHNICAL STANDARDS MANUAL

TABLES

TECHNICAL STANDARDS MANUAL (OWTS Policy 9.5)

This TECHNICAL STANDARDS MANUAL (TSM) is intended to assist property owners, qualified professionals, service providers, system installers, regulatory agency staff, and the public in properly evaluating, selecting, designing, and permitting the use of the various treatment and dispersal system options which are included in this document. After completing a site evaluation, a treatment option and/or dispersal system is chosen by the qualified professional that will meet or exceed the goals of the State OWTS Policy. Each treatment and dispersal system combination is to be tailored to the depth of the seasonal water table and overall soil depth and percolation rate at the specific site proposed for development. For example, the type of treatment and dispersal system deemed acceptable for a site with only two feet of soil would vary from that required for a site with four feet. The soil depths and percolation rates where a system is acceptable (whether or not a supplemental treatment system is needed) is included in each specific dispersal system section in this Manual. Additional treatment, dispersal systems, or combinations thereof, not included in this document may be considered by the Director as long as the Director finds that the system meets the stated purpose of the State OWTS Policy – to allow the continued use of OWTS, while protecting water quality and public health.

Each alternate treatment and alternate dispersal system has specified requirements for inspections, maintenance, monitoring and associated water sampling, and reporting (to SCEHD) that will be required by the construction and/or operating permits issued by SCEHD. These specific requirements are included at the end of each supplemental treatment and alternate dispersal system section of this Manual. Inclusion of these system "management" requirements justifies some reduction in the depth to a seasonal water table. This is extremely important where the vast majority of Shasta County cannot meet the groundwater separation requirements of Tier 1 of the State OWTS Policy.

TSM SECTION A. GROUNDWATER SEPARATION REQUIREMENTS FOR ONSITE WASTEWATER TREATMENT SYSTEMS AND OVERALL SOIL DEPTH DETERMINATIONS (OWTS Policy 9.5)

I. BACKGROUND

These requirements will be used for determining soil depths and groundwater levels when siting and designing Onsite Wastewater Treatment Systems (OWTS) on existing parcels to accomplish the following:

a. Protect the groundwater quality by ensuring proper treatment of the sewage effluent prior to its entering into groundwater.

b. Protect the public health from failing OWTS caused by high groundwater.

c. Provide a methodology for the evaluation of potential building sites using OWTS with regards to maintaining minimum groundwater separation requirements of the State OWTS Policy.

II. MINIMUM DEPTHS TO GROUNDWATER AND MINIMUM SOIL DEPTH FROM THE BOTTOM OF THE DISPERSAL SYSTEM (OWTS Policy 9.4.8)

Pursuant the State OWTS Policy, SCEHD has adopted Tier 2 standards for regulating a system without either a supplemental treatment system or an alternate dispersal system, the minimum depth to the anticipated highest level of groundwater below the bottom of the leaching trench, and the native soil depth immediately below the leaching trench, shall not be less than the following:

Percolation Rate 1 to 5 MPI	Supplemental treatment and/or alternative dispersal required
Percolation Rate >5 to 10 MPI	Five (5) feet
Percolation Rate >10 to 30 MPI	Four (4) feet
Percolation Rate >30 to 120 MPI	Three (3) feet

MPI = Minutes per Inch (the time it takes for a column of water to drop one (1) inch in a controlled percolation test).

It is our intent, through this Tier 2 LAMP, to allow installation of systems in soils between 1 MPI and 120 MPI. The specific dispersal system sections of the Technical Standards Manual discuss in detail the minimum soil depth and separation from groundwater (at least two feet), supplemental treatment, and alternate dispersal systems that may be allowed for various soil percolation rates.

For Tier 2 OWTS with supplemental treatment and/or for some alternate dispersal systems, the required separation may be reduced from that shown above but must not be less than two (2) feet. This reduction is allowed due to the level of pretreatment provided by the supplemental treatment and/or alternate dispersal system to replace, or enhance, treatment of effluent by soil.

Groundwater typically fluctuates seasonally depending on local geology and precipitation levels. Groundwater levels fall in response to drought and well extraction and rise in response to precipitation, flood agricultural practices, and possibly irrigation from residential development. OWTS failures due to high groundwater result in sewage effluent backing up into homes and/or surfacing on the ground creating public health hazards, and can contribute to the contamination of potable groundwater and surface water resources.

The overall soil depth and depth to the highest anticipated groundwater level must be determined for each site proposed for an OWTS.

TSM SECTION B. SOIL PROFILE PITS AND GROUNDWATER MONITORING (OWTS Policy 9.1.1) (OWTS Policy 9.1.3) (OWTS Policy 9.1.5) (OWTS Policy 9.1.6)

I. BACKGROUND

a. Parcels created prior to 1982 were not routinely tested for OWTS suitability prior to creation and shall have soils tests performed to determine suitability for wastewater dispersal. This may include, depending on the type of OWTS proposed, soil profile pits, soil borings, percolation tests, and/or may require groundwater monitoring. The soil test guidelines detailed in the Technical Standards Manual are applicable to all untested and inconclusively tested parcels created before 1982.
b. Parcels created after 1982, but before the implementation of this LAMP, were tested to a previous soil standard and may require some additional testing on a case by case basis depending on the type of dispersal or supplemental treatment system proposed. The soil test guidelines detailed in the Technical Standards Manual are applicable in these situations.
c. Tests required to be performed to create new parcels (land divisions) are discussed in the Technical Standards Manual and the Shasta County Land Development Standards.

II. SOIL PROFILE PITS

The results of soil profile pits and borings will assist in determination of site soil depth and the highest anticipated depth to ground water. Soil borings, conducted by a Qualified Professional, with experience in boring interpretation, must be used to determine overall soil depth and depth to groundwater where deeper depths or unsafe site or soil conditions exist.

At least one test pit shall be excavated on each lot. It shall be at least two (2) feet wide and five (5) feet deep. It shall slope towards one end at a rate no greater than 3:1. Soil borings are not limited to this five (5) foot depth. The soil profile shall be logged by a Qualified Professional and backfilled. At the request of the Director, pits/borings will be excavated for examination by SCEHD staff.

The profile or boring shall have enough information to allow a determination of whether or not groundwater is present and, if so, the highest anticipated depth to water and the overall depth of soil at the site. Soil pits/borings are to be excavated a minimum of five feet in depth. Deeper borings to determine overall soil depth and depth to groundwater may be recommended to confirm that soils at the site meet the minimum depth beneath the bottom of the dispersal system for a conventional Tier 1 OWTS.

All soil profile pits and deep borings shall have soils described as follows:

a. For each pit or deep boring identify the property owner, pit/deep boring number, the slope percent of the area of the pit/boring, the date logged, and the qualified professional logging the pit/boring.

b. All pit or deep boring logs, including failing pits/borings are to be submitted to EHD for review.

c. Within each pit/boring, from the surface to bottom of the excavation, the following is to be provided for each horizon:

1. Depth of each horizon within the pit/boring;

2. Color(s) within each horizon;
3. Amount (by percent) and size of gravels;
4. Soil texture;
5. The number, size, and prominence of soil redoximorphic features, where present;
6. Soil structure;
7. Consistence;
8. Roots by number and size;
9. Pores by number and size; and,
10. Boundary thickness between horizons.

The end result is to have knowledge of the useable soil depth and depth to groundwater at the site. It is not always possible to determine the depth to a seasonal water table by observing soil pits or borings. If the site is subject to seasonal groundwater it may be necessary to have water table depth determined by actual measurements in groundwater monitoring wells.

III. GROUNDWATER MONITORING

When the highest anticipated depth to groundwater cannot be determined with the use of pits or borings, or is in dispute, groundwater monitoring wells, for monitoring and determining the highest anticipated depth to groundwater, will be required. Examples of the need for groundwater monitoring in wells include, but are not limited to:

a. Vegetation tolerant of, or indicative of, a high water table present on or in the vicinity of the parcel.
b. High groundwater has previously been found in the vicinity.
c. The test pits show cracked or creviced formations but no clear delineation of the top of the water table.
d. Other conditions or historical data preclude accurate determination of the groundwater levels by dry weather observations.
e. The test pits indicate less than five feet of disposal material over an impervious stratum (for a proposed land division).
f. Free water from seepage is observed in the test pit.

Maps showing the locations of monitoring wells constructed at the site, and their monthly or weekly monitoring results, are to be submitted to SCEHD along with soil profile information and percolation test results. Groundwater monitoring, as with other soil tests, is to be conducted by a Qualified Professional.

The height of seasonal high groundwater shall be determined by actual measurements of observation wells during periods of maximum soil moisture content, or by mathematical modeling after sufficient precipitation has occurred to meet or exceed field capacity of the soil, and produce a response in observation wells acceptable to the Director.

IV. WELL CONSTRUCTION

Groundwater monitoring wells, for OWTS purposes, are typically completed as follows:

a. Soil test pits. Soil profile test pits are converted to groundwater monitoring wells by placing a perforated pipe into the pit prior to backfilling with native soil.

b. Drilled or bored hole. A hole is drilled or bored to a desired depth, a perforated pipe is placed into the hole, clean pea gravel is placed around the perforated pipe, and a surface concrete seal is placed.

1. Perforations will be saw slots, rather than drilled holes;
2. Filter fabric is used to cover the perforations in soil pits;
3. Use solid pipe for the upper two (2) feet of the well;
4. A minimum of 12 inches of concrete will be placed in the upper annular space of drilled/bored wells;
5. A minimum 2 mil plastic sheet may be draped over the excavated area of a soil pit used as a monitoring well to exclude direct access of surface water into the backfilled pit.
6. At no time is a pit or bored/drilled hole to extend through a restrictive layer.

V. OBSERVATION

Groundwater monitoring well placement and depth must be representative of site conditions, soil percolation rate, and the type of OWTS proposed for the site/project. For example, a five (5) foot deep well is not adequate if you are proposing to install a conventional OWTS (no alternate treatment or dispersal system) if the percolation rate at the site is between 5 and 10 MPI, which requires five (5) feet of soil beneath the bottom of a dispersal system.

Generally, at least 80% of the amount of rainfall normally received in an area for the period from December 1st to April 30th must be received for monitoring to be accepted by SCEHD. The Director may accept monitoring in years with less than the required amount of rainfall as long as the results appear, to the Director, to represent the highest groundwater depth for the site.

a. Direct Observation - Measurements shall be taken at the times and intervals specified by the Director in response to local conditions. Except as the Director may otherwise allow, measurements (excluding land within the A.C.I.D.) shall be taken at monthly/weekly intervals from January 1 to April 30. Land requiring groundwater monitoring caused by A.C.I.D., or other areas under irrigation, shall have monthly/weekly measurements beginning May 1 and ending August 31.

At least one observation well shall be included within each proposed effluent dispersal area suspected of having groundwater below the ground surface where that groundwater depth cannot be determined by observation of a soil pit. Groundwater ideally would not be less than that specific depth required for the type of system proposed. A dispersal mound, may be constructed to provide the necessary soil depth and separation from a seasonal water table (see Technical Standards Manual Section G.VIII).

If these monthly depth measurements are within one foot of the depth required for the specific type of system proposed, weekly observations shall be recorded throughout the remainder of the wet weather or irrigation season to better define the seasonal water table.

b. Mathematical Modeling – This approval is to be based on the results of calculations that demonstrate that the site meets the conditions required for the type of system proposed. Calculations shall be provided by a qualified professional knowledgeable in groundwater hydrology and be based on using a 10-year rainfall return interval for the most critical situations. It is recommended that this method be discussed with the qualified professional prior to the monitoring season to determine actual well placement, depth, construction, tracking of precipitation amounts, and frequency of measurements as these may differ from the minimum requirements for groundwater depth monitoring during a “normal” rainfall year.

VI. WELL DEPTH

Wells should be constructed at a depth of at least five feet, to a restrictive layer, or at depths deemed necessary for the type of system proposed at a site. In no case is a well to be constructed through a restrictive layer such as hardpan, bedrock, impervious clay stratum, or similar layer. A log/profile of soil strata encountered during construction is to be submitted with the monitoring results.

The number, placement, and depth of wells for mathematical modeling should be discussed with a Qualified Professional prior to well construction as should the frequency of readings.

There have been years that there has not been the minimum 80% of rainfall for groundwater monitoring to be accepted by SCEHD. And in other years, the reverse has been observed with ground water monitoring failing when above average rainfall is received. SCEHD is exploring other options for monitoring to determine depth to groundwater.

a. Soil Analysis of Conditions Associated with Saturation

As an alternative to direct observation or mathematical modeling, an application may be submitted to the Director to evaluate individual sites where conditions associated with saturation exist.

1. Conditions associated with saturation include:
- (a). Reddish brown or brown soil horizons with gray (chromas of three or less)
- (b). and/or red or yellowish red mottles; or Gray soil horizons, or gray soil horizons with red, yellowish red, or brown mottles; or
- (c). Dark-colored highly organic soil horizons; or
- (d). Soil profiles with concentrations of soluble salts at or near the ground surface.

2. If conditions associated with saturation do not occur in “soils with rapid or very rapid permeability,” saprolite or fractured bedrock, soils predictions of the highest level of the water table shall be based on direct observation or mathematical modeling.

3. “Soil with rapid or very rapid permeability” means

(a). Soil which contains thirty-five (35) percent or more of course fragments two (2) millimeters in diameter or larger by volume with interstitial soil of sandy loam texture or coarser, as defined in the Soil Textural Classification Chart; or

(b). Coarse textured soil (loamy sand or sand as defined in the Soil Textural Classification Chart; or,

(c). Stone, cobbles, gravel, and rock fragments with too little soil material to fill interstices larger than one (1) millimeter in diameter.

4. Saprolite means weather material underlying the soil that grades from soft thoroughly decomposed rock to rock that has been weathered sufficiently so that it can be broken in the hands or cut with a knife. It does not include hard bedrock or hard fractured rock. It has rock structure instead of soil structure.

b. Site evaluation procedures for determination of groundwater using "Conditions associated with Saturations"

Applications for site evaluation shall be made to the Director on approved forms. Each application must be completed in full, signed by the owner or his legally authorized representative, and be accompanied by all required exhibits and appropriate fee. Applicants shall provide at least two (2) test pits dimensions at least two (2) feet wide and which slope toward one end at a rate of no greater than 3 : 1 and be five (5) feet deep and located approximately seventy-five (75) feet apart and within the proposed effluent dispersal area of a proposed parcel or an existing parcel. A new application and fee shall be submitted for each additional set of two test pits per parcel.

The Director shall be the sole determiner of groundwater levels based on "conditions associated with saturation". Evaluation of pits under this procedure must show conclusive evidence of the highest groundwater elevation. This shall not preclude the applicant from conducting direct observations or mathematical modeling.

TSM SECTION C. PERCOLATION TEST PROCEDURE (OWTS Policy 9.1.1) (OWTS Policy 9.1.3) (OWTS Policy 9.1.5) (OWTS Policy 9.1.6) (OWTS Policy 9.5)

This procedure establishes clear direction and methodology for percolation testing in Shasta County. The objectives are to determine the area necessary to properly treat and disperse sewage underground; to size the OWTS with adequate infiltration surface area based on expected hydraulic conductivity of the soil and the loading rate; and to provide for a system intended to allow for a long-term expectation of satisfactory performance.

All percolation testing for dispersal systems shall be conducted through the use of these percolation test procedures. The tests shall be performed by or be under the supervision, of a qualified professional. Any deviation shall be allowed only after receiving written approval by the Director.

I. PERCOLATION TEST HOLES PROCEDURES

a. Number of Percolation Holes

1. A minimum of three (3) percolation tests are required when percolation rates are 60 minutes per inch (MPI) or less. Four (4) tests are required when percolation rates exceed 60 minutes per inch.

2. Additional tests may be required on a site specific basis for reasons that include the following:

- **(a)**. Unacceptable or failed tests;
- **(b)**. Areas of the dispersal field requiring defined limits for exclusion;
- **(c)**. The dispersal field is located out of a concentrated area;
- **(d).** Soil conditions are variable or inconsistent;
- **(e).** To verify suitable soil permeability beneath the chosen leach field depth.

b. Depth of Percolation Test Holes

1. Percolation test-hole depth shall be representative of the proposed dispersal system trench bottom depth or twelve (12) inches for systems such as a mound, at-grade or drip dispersal system.

2. For each lot of proposed land divisions, two to three tests are to be conducted at a depth of 36 inches and two at a depth of 12 inches.

3. Conditions which may require percolation testing deeper than dispersal depth include:

- **(a).** Consolidated rock or suspected low permeability soil layers beneath the site;
- **(b).** Slopes exceeding 30 %;
- **(c).** Other factors as might be determined by sound site evaluation practices.

c. Location of Percolation Test Holes

Percolation test holes shall be excavated in the area representing the proposed location of the dispersal system or within an expected designated effluent dispersal area of a proposed parcel to be created by a land division. Percolation tests shall be conducted in soils suitable for dispersal of effluent that otherwise meet soil depth and groundwater depth for the type of system proposed for construction.

Test holes shall be representative of the dispersal area demonstrating site conditions throughout the entire wastewater treatment system or proposed designated effluent dispersal area (land divisions) with equal consideration of primary and reserve dispersal systems.

d. Identification of Percolation Test Holes

1. When specifically requested, locations are to be staked and flagged so the test-hole locations can be located.
2. They are to be identified as to location on the site plan with:
(a). A test hole number or letter;
(b). Depth of the test hole;
(c). Proposed lot/parcel number or letter if associated with a subdivision or other land use project requiring soil testing.

e. Construction of Percolation Test Holes
1. Diameter of percolation test holes shall be six (6) to eight (8) inches.
2. If a shallow backhoe excavation is used, a percolation test hole at 12 – 14 inches in depth shall be excavated into the bottom of the backhoe bucket trench (the bottom of the percolation hole within this trench is to be at the percolation test-hole depth required for the project).

f. Preparation of the percolation test holes
1. Scarify the sides and bottom of the holes, as needed, to remove the soil surface areas that became smeared by the auger or other tool used to excavate the hole.
2. Remove as much loose material as possible from the hole.
3. Add two (2) inches of clean pea gravel to protect the bottom from scouring.

g. Presoaking the percolation test holes
1. Procedure
(a). Carefully fill the test hole with a minimum of 12 – 14 inches of clear water over the gravel or to the ground surface in shallower test holes.
(b). Refill the test hole as needed or otherwise maintain clear water in the hole for a minimum of four (4) hours. After four (4) hours, allow the water column to drop overnight. Testing must begin 24 hours after water was first added to the hole.
(c). A presoak is not necessary in sandy soils, with little or no clay, where the hole is filled twice with 12 inches of clear water that seeps away completely in less than 10 minutes.

2. Saturation and swelling
(a). Saturation means that the void spaces between soil particles are full of water. This can be accomplished in a short period of time.
(b). Swelling is caused by the intrusion of water into the individual soil particles. This is a slow process, especially in clay-type soil, and is the reason for requiring a prolonged soaking.

3. Sleeved Percolation Test Holes
To prevent sloughing of the sidewall in unstable soils, the following options may be employed:
(a). Hardware cloth such as a 1/8 inch grid;
(b). Perforated pipe or other rigid liner;
(c). Gravel pack with either of the above. (NOTE: a correction factor is necessary if a gravel pack is used. See sample correction factors for common scenarios following or show all calculations with test results.)

II. DETERMINATION OF PERCOLATON RATES

Depending on the soil type and permeability, and the results of the presoak, variations in the procedures used for determining percolation rates can be allowed. Testing shall proceed based on the conditions outlined in following cases.

Case 1 - Water remains overnight in the test hole following initiation of the 24 hour presoak.

1. Adjust the depth of water over the gravel to six (6) inches.
2. Measure the drop in the water level over a single thirty (30) minute period and calculate the percolation rate.

Case 2 - No water remains 24 hours after the presoak period was initiated.

1. Begin the test 24 hours after presoak was initiated.
2. Fill the hole with six inches of water over the gravel. If, after the first two fillings, the water column seeps away in less than 30 minutes go to **Case 3**. If water remains after 30 minutes complete the test by adjusting the water depth to 6 inches over the gravel and record the drop at the end of every 30 minute period.
3. Including the first two readings above, continue the readings and refilling every 30 minute interval for four hours.
4. The last water level drop is used to calculate the percolation rate.

Case 3 - No water remains in the hole after the first <u>two</u> 30 minute periods.

1. Refill the test hole to six (6) inches above the gravel.
2. Record the water level drop at ten (10) minute intervals for a period of one (1) hour, refilling to the six inch depth after each reading.
3. The last water level drop us used to calculate the percolation rate.

NOTE: In all three of these cases, readings shall be taken from a fixed reference point, shall be accurate to 1/16th of an inch and the final three readings shall be within ten percent of each other.

III. CALCULATIONS AND MEASUREMENTS

a. Calculation Example

1. The percolation rate is reported in minutes per inch. For example, a 30 minute time interval with a ¾ inch fall would be as follows:

30 minutes divided by ¾ inch equals 40 minutes per inch (MPI).

In the example of a 10 minute interval with a 2 inch drop, the calculation is as follows:

10 minutes divided by 2 inch equals 5 minutes per inch (MPI).

b. Measurement Principles

1. The time interval for readings are to reflect the actual times and are to be maintained as near as possible to the intervals outlined for the test (10 or 30 minutes).

2. Measurements to the nearest $1/8^{th}$ to $1/16^{th}$ inch should be adjusted to the slowest rate, e.g., a reading observed between 3/8 inch and 5/16 inch (80 MPI and 96 MPI) would be reported as the slower of the two, or 96 MPI.

c. Special Considerations

1. Percolation rate measurements are to be made from a fixed reference point and shall be from a platform that is a stable and represents the center of the test hole. Perc-o-meter devices are encouraged and are required when conducting tests greater than thirty six (36) inches below the ground surface.

Common correction factors to be applied to percolation test results when gravel pack is used are as follows:

Pipe Diameter	Hole Diameter	Adjustment Factor (AF)
4”	6”	1.57
4”	8”	1.95
4”	10”	2.20
4”	12”	2.37

With the adjusted percolation rate equal to MPI x AF

Calculation formula for correction factors above is as follows: (TT equals $\pi \approx 3.14$)

- X-section area of test hole, $A_H = .25TT\ D_H^2$
- X-section area of pipe, $A_P = .25\ TT\ D_P^2$
- X-section area of gravel pack, $A_G = A_H - A_P$
- Drainable voids in gravel pack = $n\ (A_G)$ (Typical value for n = 0.35) **
- Total voids = $A_P + n\ (A_G) = A_P + n\ (A_H - A_P)$
- Adjustment Factor, AF:
-
$$AF = \frac{A_H}{A_P + n\ (A_H - A_P)}$$

$$AF = \frac{.25TT\ D_H^2}{.25\ TT\ D_P^2 + n\ (.25TTD_H^2 - .25\ TT\ D_P^2)}$$

$$AF = \frac{D_H^2}{D_{P2} + n\ (D_{H2} - D_{P2})}$$

**or run test for void ratio (n) in actual rock used

d. Results Reporting

1. All test data and other required information is to be submitted to the SCEHD on forms and format acceptable to the SCEHD with appended data or information as needed.

2. Reports shall be signed with an original signature from the qualified professional who either performed or supervised the testing.

3. Qualified professionals who employ technicians are responsible for the work performed by the technician. It is incumbent upon the qualified professional to properly train, equip, and supervise anyone performing work under his or her direction and license.

4. The percolation test is only one of several critical factors in siting an OWTS. Site considerations may require special evaluation by a qualified professional to technically address issues such as high groundwater, steep slope, nitrate impacts, and cumulative impacts such as mounding and loading.

TSM SECTION D. SEPTIC TANKS, SUMPS, AND PUMPS

I. SEPTIC TANKS

a. All conventional OWTS require the use of a septic tank to allow for the removal of solids in the wastewater stream prior to being discharged to the dispersal field. Alternative OWTS also require a septic tank to serve as a settling tank unless a settling chamber is a component of the treatment unit. This Section will provide the minimum design specifications and requirements for septic tanks. Septic tanks, in general, must comply with the most recent California Plumbing Code adopted by Shasta County and the following:

   1. Septic tanks must be certified as meeting the requirements of the International Association of Plumbing and Mechanical Officials (IAPMO). As an alternative, plans for all septic tanks, stamped and certified by a California registered civil engineer, shall be submitted to the Director for approval and show all dimension, reinforcing, structural calculations, and such other pertinent data as may be required. Independent laboratory tests and calibrations shall be provided on prefabricated septic tanks as required by the Director.

b. The tank shall be water tight and constructed of sound and durable materials that are not subject to excessive corrosion or decay. Wooden and steel septic tanks are prohibited. Each tank shall be structurally designed to withstand all anticipated earth or other loads and shall be installed level on a solid bed.

   1. Septic tank design shall be such as to produce a clarified effluent consistent with accepted standards and shall provide adequate space for sludge and scum accumulations.

   2. Septic tanks shall be installed and backfilled under the manufacturer's instructions.

   3. Septic tanks shall have a minimum of two (2) compartments. The inlet compartment of any septic tank shall not be less than 2/3 the capacity of the septic tank. The secondary compartment shall be a maximum of 1/3 the capacity of such tank and shall have a minimum capacity of two hundred and fifty (250) gallons. The inlet compartment of every septic tank shall be equipped with a four (4) inch inspection port extended to finish grade and capped.

c. Access to each septic tank shall be provided by at least two (2) manholes, twenty (20) inches in minimum dimension or by an equivalent removable cover slab. One (1) access manhole shall be located over the inlet compartment and one (1) access manhole shall be located over the outlet. Wherever a first compartment exceeds twelve (12) feet in length, an additional manhole shall be provided over the baffle wall. Septic tank locations must take into consideration maintenance and pumping requirements including vehicle access; and distance and elevation lift to pumper truck.

d. The inlet and outlet pipe tee shall extend four (4) inches above and at least twelve (12) inches below the liquid surface. The invert of the inlet shall be at a level not less than two (2) inches to a maximum of four (4) inches above the invert of the outlet. The inlet and outlet "T" shall be the same diameter as the connecting sewer pipe.

e. Each compartment shall be provided with a riser extended from each manhole cover to the surface of the ground so as to facilitate inspection and maintenance of the septic tank. The riser shall be of equal size or larger than the manhole cover and shall be constructed of durable material. All joints shall be properly sealed with a sealant and/or an interlocking mechanism approved by SCEHD. Risers shall be lockable or require tools to be opened.

f. Septic tank risers must have a current IAPMO certification or must be reviewed and approved by the Director prior to use. Concrete risers and lids must be constructed of Type V concrete or be protected from corrosion or sewer gases. The interior diameter of the riser shall be a minimum of eighteen (18) inches.

g. Septic tanks shall be designed to prevent solids from passing to the dispersal system. Septic tanks that use a National Sanitation Foundation/American National Standard Institute (NSF/ANSI) Standard 46 certified septic tank filter at the final point of effluent discharge from the septic tank and prior to the dispersal system shall be deemed in compliance with this requirement. An OWTS using an effluent pump system may have an effluent filter as part of a pump basket in place of the septic tank outlet. A septic tank that is connected to a NSF 40 approved supplemental treatment system that reduces total suspended solids below 30 mg/L may not require an effluent filter on the septic tank outlet as long as the supplemental treatment system does not require an effluent filter and the exclusion of a filter is approved by SCEHD.

h. Septic tanks installed in areas of vehicular traffic must be certified to withstand the proposed loads or have an engineered traffic slab installed to accommodate the proposed loads. They must also have risers and provision for access as with other tanks.

i. Septic tanks in Shasta County shall be sized according to anticipated wastewater flows from the structure(s) to provide roughly three (3) days transit time for solids settling/retention purposes.

j. The following minimum standard sizing apply:

1. One-bedroom single-family dwelling - 750 gallons
2. Two or three-bedroom single-family dwelling - 1100 gallons
3. Four-bedroom single-family dwelling - 1500 gallons
4. Five-bedroom single-family dwelling - 2000 gallons
5. An additional 400 gallons/bedroom capacity for each bedroom beyond this.

Use the next larger tank size for the number of proposed bedrooms when a garbage disposal unit is to be used to provide storage for the added solids load.

In general, each bedroom may have up to two (2) occupants with a potential wastewater flow of 75 gallons per person or 150 gallons per bedroom per day;

For purposes of determining expected daily flow rates, use the following;

One-bedroom – 150 gallons
Two-bedroom – 300 gallons
Three-bedroom – 450 gallons
Four-bedroom – 600 gallons
With an additional 150 gallons per bedroom per day for larger residential structures.

k. For all non-residential projects use the appropriate septic tank sizing formula:

Flow x 1.5 = tank size in gallons (for flows up to 1500 gallons per day), or
Flow x .75 + 1,125 = tank size in gallons (for flows above 1500 gallons per day.
Flow means the daily expected flow in gallons.

II. SUMPS AND PUMPS

Effluent pump systems may be considered when they offer a better alternative for the protection of public health and safety, when they are an integral part of the treatment or dispersal system chosen, or are the only means to utilize a dispersal area situated at an elevation higher than the structure or septic tank. The pump system shall be appropriate for sewage applications, shall be of the size and type to meet the hydraulic design requirements, and designed and constructed in accordance with this section. A construction permit is required from SCEHD.

a. Construction

1. The sump shall meet the same basic structural requirements as a septic tank, including access risers, must be watertight, and have water tight provisions for inlets and outlets.

2. The pump shall be of a type manufactured for sewage applications.

b. Sizing

1. The sump shall be a minimum one-third (1/3) the size of the septic tank or 400 gallons, whichever is greater.

2. The pump shall be sized for the design flow of the OWTS or OWTS component and provide the required GPM at the designed head.

3. Piping used with pump systems shall be of the appropriate strength and be sized by the system designer for the pump output and flow requirements.

c. Alarms. The pump system shall be equipped with audio and visual alarms to warn of pump failure or excess liquid depth. A minimum 200-gallon storage capacity shall be provided between the high water alarm float activation level and sump inlet.

d. Floats/controls. The pump shall be controlled by floating switches to turn the pump on and off and identify high water conditions. The float valves must be installed such that the float valves and wires do not become entangled. Clamps holding floats must be of non-corrosive material. Where required by a supplemental treatment or alternate disposal system, control of the pump shall be from a control box.

e. Filter. Where filtration is not already a part of the OWTS (septic tank effluent filter, sand filter, or other treatment system) the pump and float valves shall be contained within an effluent filter basket.

f. Union. The pump shall be attached to the outlet pipe by an easily removed connector or union to facilitate repairs.

g. Check valve. A check valve is required at the pump to prevent effluent in the pipeline from draining back into the sump.

h. Pump Inlet. The pump inlet shall be off of the bottom of the sump to prevent any accumulated solids from entering the pump.

i. Permit. An electrical permit will be required from the appropriate Building Inspection Agency for work to provide a circuit and bring electrical power to the location of the sump/pump. Check with the appropriate Building Inspection Agency to determine what is required for this type of permit.

III. ABANDONED SEPTIC TANKS AND SUMPS

Abandoned systems or improperly destroyed tanks and sumps can pose a hazard and create undesirable situations. Tanks that have collapsed pose safety hazards for people, pets, and other animals. Tanks that are not properly destroyed may fill with water over time and cause an entrapment or drowning hazard. Improperly destroyed tanks may not be able to support the weight of vehicular traffic, building foundations, or other structures built on the property.

An abandoned septic tank or sump shall be destroyed in the following manner:

a. The septic tank or sump must be pumped out by a permitted Septic Tank Pumper to remove all contents. A copy of the pumping receipt shall be submitted to SCEHD upon request.

b. The septic tank or sump shall be destroyed as follows:

  1. Collapse one side to the bottom of the tank or puncture the bottom of the tank,

  2. If possible, the tank top shall be collapsed or removed, or

  3. If the septic tank top cannot be collapsed or removed, the tank will be filled with pea gravel or other similar material (after tank bottom has been punctured) free of organic material so that there is not a void remaining representing a collapse or other structural hazard, or

  4. The tank may be removed to an appropriate location, and

  5. The tank or excavation hole must be filled with earth, sand, gravel, or other material approved by SCEHD.

c. When the tank is to be destroyed and subsequently covered with a foundation or other structure, a structural engineer shall determine the method of destruction and degree of site compaction.

TSM SECTION E. LEACH LINE WASTEWATER DISPERSAL SYSTEMS (OWTS Policy 9.5)

I. BACKGROUND

Leach line dispersal systems are currently the primary means of effluent dispersal for the majority of OWTS within Shasta County and this Section will establish procedures for the design and construction of leach line dispersal systems. These systems are currently referred to as conventional systems. These procedures are specific for leach line dispersal systems and do not apply to alternate dispersal systems. Leach line systems provide limited treatment but are an economical means of dispersing septic tank effluent. Alternate dispersal systems provide much better treatment and dispersal of septic tank or supplemental treatment system effluent, and as a result, may be constructed with less separation between the bottom of a leaching device and a water table. See Section G of the Technical Standards Manual for alternate dispersal systems that may be used as a result of specific site conditions and limitations.

For proper sizing of leach line dispersal systems, percolation tests shall be performed in accordance with the test procedures as discussed in this LAMP. Soil test pits, deep borings, depth to groundwater, and percolation tests may all be used to demonstrate that the dispersal system is located in an area of suitable uniform soil, and that no conditions exist which could adversely affect the performance of the system or result in groundwater degradation.

Leach line systems are limited to soils with percolation rates from 1 to 120 minutes per inch. Soils with percolation rates less than 1 and greater than 120 are unsuitable for the installation of an OWTS leach line dispersal system. A scale of minimum depth to groundwater and minimum overall soil depth beneath the bottom of a dispersal system trench (from the State OWTS Policy) is used and is based on soil percolation rates as follows:

- Percolation rates between 1 MPI and 5 MPI require **supplemental treatment and/or alternative dispersal;**
- Percolation rates between 5 MPI and 10 MPI require **5 feet of soil**;
- Percolation rates between 10 MPI and 30 MPI require **4 feet of soil;**
- Percolation rates between 30 MPI and 120 MPI require **3 feet of soil**.

The installation of OWTS on sites with less than the above required soil depth and groundwater separation distances is discussed in Section G of the Technical Standards Manual.

II. SOIL COVER REQUIREMENTS

a. The maximum soil cover allowed over the rock or chambers in the dispersal trench is thirty six (36) inches, measured from the top of the leach rock, chamber, or similar unit but will be less in most installations.
b. The minimum cover required over the top of the infiltrative surface is twelve (12) inches unless otherwise allowed by a valid SCEHD construction permit.
c. Soil cover placement and depth must also conform to those allowed by the manufacturer of any gravel-less/chamber design.
d. Unless otherwise specified, soil used to cover leach lines is onsite soil stockpiled from the trench and septic tank excavations or offsite soils with similar characteristics to the native soil.

III. DIMENSIONS

a. Leach lines are to be installed according to the qualified professional's specifications and a valid SCEHD construction permit for location, length, width, and depth.

b. Leach lines are to be spaced ten (10) feet apart, measured center to center, unless otherwise specified in a valid SCEHD construction permit

c. Leach lines are to be installed with a minimum width of eighteen (18) inches and a maximum width of thirty six (36) inches unless otherwise authorized in a valid SCEHD construction permit. A typical construction permit is expected to specify a 24-inch wide trench. One example of a wider system is a leach bed that may be allowed under certain conditions.

d. The minimum bottom infiltrative area for any new OWTS shall be 200 square feet (100 lineal feet of 24-inch wide trench) regardless of the projected wastewater flow.

IV. MATERIALS AND CONSTRUCTION CONSIDERATIONS

a. All piping and materials used in leach line systems, including gravel-less/chamber systems, must have IAPMO approval or otherwise be acceptable to the Director prior to installation.

b. Leach line trenches should not be excavated during periods of high soil moisture content, especially soils with high clay and silt content, as the excavation side walls and trench bottom may become smeared. If construction is done in wet soils all smeared or compacted surfaces shall be loosened by raking and the material removed from the trenches. Failure to remove this material would result in denial in the use of the leach line or dispersal system. Gravel-less systems installed in fine grained saturated clay and silt soils shall be back filled with washed drained rock, one to two inches above the top of the chambers, prior to backfilling with soil. SCEHD recommends that no construction occur in the rainy season when these conditions exist except for the need to repair a failing leach field.

c. Leach lines that utilize gravel shall be filled with clean, washed leach line rock to a point at least two (2) inches above the top of a three (3) or four (4) inch diameter perforated pipe or a pressure distribution pipe (size determined by a qualified professional) and shall have a minimum of twelve (12) inches of gravel below the pipe unless otherwise specified in a valid SCEHD construction permit. The rock shall be graded from three-fourths (3/4) inch to two and one-half (2 1/2) inches in size and shall be covered in straw, or preferably, a geotextile fabric, prior to backfilling to prevent the infiltration of soil into the rock. Geotextile fabrics prevent soil intrusion much longer than straw.

d. No leach line trench is to exceed one-hundred (100) feet in length. When multiple trenches are used, all trenches shall be constructed of equal length unless otherwise allowed in a serial distribution system in a valid SCEHD construction permit.

e. Where two (2) or more leach lines are used, an approved distribution box of sufficient size shall be installed at the head of the dispersal field (parallel distribution method). The inverts of all outlets shall be level, and the invert of the inlet shall be at least one (1) inch above the outlets. Suitable baffles or other devices shall be provided to ensure equal flow to each outlet. On sloping ground, a serial dam and siphon may be used to connect the lines (serial distribution method) with prior approval by SCEHD. Pressure distribution systems will not have a distribution box but will use valves at a manifold entrance to a trench to equalize flows to each line. All valves in systems are to be accessible through access or inspection risers with lids.

f. Leach lines may not be placed under impermeable surfaces. Leach lines that are covered by impermeable surfaces may not be considered as viable for purposes of determining primary and reserve area sizing requirements.
g. Leach line trenches shall be excavated with the trench bottom and filter materials/piping or chambers level or up to four (4) inches of continuous fall in 100 feet from the distribution point to the end of the trench. With pressure distribution systems, the maximum fall is two (2) inches.
h. Listed or approved plastic leaching chambers may be used in lieu of pipe and filter material. Chamber sizing requirements shall be the same as for leach rock/pipe systems (one lineal foot of chamber equals one lineal foot of rock and pipe leach line) and shall conform to manufacture's installation instructions.
i. A one hundred (100) percent reserve area shall be required to be maintained at the site for all leach line systems, whether a new installation, for leach capacity increase required for approved additions to structures, or other needed leaching additions. The only exception is a repair where all of the available space has been used for the repair. This area must meet all applicable setback requirements and must not be used for driveways, access roads, structures, stockpiles, or any other use that would cover/compact the soil or otherwise make the area unusable for sewage disposal purposes.
j. A switching or alternating valve is to be used when more than one leach field, including repair and replacement, is constructed at a site.

V. LEACH LINE SIZING

This section is for leach line sizing only. Guidance on sizing alternate dispersal systems is discussed elsewhere in the Technical Standards Manual.

Residential leach systems, including chambers, shall be sized based on the stabilized percolation rate, soil depth at the site (including depth to groundwater), and the expected daily flow for the structure(s) or project. A table (TABLE 2. A.) has been prepared which shows the amount of leach line required as a function of the site percolation rate and the number of bedrooms proposed for a single-family dwelling. A second table (TABLE 2. B.) is provided showing maximum soil loading rates based on soil percolation test results. Gravity flow and pressure distribution systems are sized the same.

Wastewater flows, in gallons per day, shall be based on the following:

Residential use is based on the number of bedrooms in a structure

One-bedroom = 150 gallons
Two-bedrooms = 300 gallons
Three-bedrooms = 450 gallons
With an additional 150 gallons per bedroom.

For other, non-residential, projects, wastewater flows are determined using the flow estimates in the latest version of the California Plumbing Code adopted by Shasta County or other method acceptable to the Director.

For residential projects, the following will apply:

The stabilized percolation rate (in MPI) is determined by completing percolation tests at the site as discussed in Section B of the TSM... TABLE 1 is for twelve (12) inches of rock beneath the bottom of the pipe.

It is expected that maintaining the necessary three (3) to five (5) feet minimum separation between ground water and the bottom of a leach trench may result in trenches of as little as six (6) inches of rock beneath distribution pipes in the trench with twelve (12) inches of rock beneath distribution pipes being more common with greater separation. Sizing in the length of leach lines, is given for twelve (12) inches of rock in trenches and is reflected in the leach field lengths given in TABLE 1 for trenches with a rock depth other than 12 inches, add the two sidewalls and bottom area of the proposed trench to obtain a square footage of absorption area per lineal foot. Divide four square feet (from TABLE 1) by the proposed absorption area square footage to obtain a multiplier. Use the multiplier and TABLE 1 to obtain the corrected lineal feet of leach line required for the propose trench dimensions. Examples are:

1. In deep soil that will allow twelve (12) inches of rock under the leach pipe, a three (3) bedroom residence proposed at a site with soils that percolate at a rate of thirty (30) MPI (from TABLE 1) requires two hundred and fifteen (215) feet of two (2) foot wide leach line.

2. The same project at a site that has a slightly shallower soil depth will allow only a trench with six (6) inches of rock is calculated by first determining the square feet of absorption area for a trench two feet wide with six inches of sidewall, or two feet plus one foot of sidewall equals three square feet of absorption area. Divide the four square feet of absorption area provided for in TABLE 1 by three square feet to obtain a multiplier of 1.33. Two hundred and fifteen (215) feet X 1.33 = two hundred and eighty seven (287) lineal feet of leach line with a two (2) foot wide trench and six inches of gravel.

The following formula is used to size a leach field using TABLE 2 in Shasta County:

Expected Daily Flow divided by the Application Rate divided by four (4) = amount of leach field required for a 2-foot wide leach line with twelve (12) inches of rock beneath the pipe. The calculation for a trench with six (6) inches of rock beneath the pipe is Expected Daily Flow divided by the Application Rate divided by three (3). Non-residential leach line systems are to be calculated by the qualified professional using expected peak wastewater flows with a safety/surge factor of at least 1.5 unless a reduction is allowed by the Director. A table of effluent application rates (in gallons per square foot per day), as determined from percolation tests, is given at the end of this section in TABLE 2 For example:

> A project is proposed that will generate 400 gallons per day. The percolation rate has been found to be 30 MPI (application rate of 0.533 gallons per square foot per day ($g/ft^2/d$)), and trench widths are generally two (2) feet wide and soils are deep enough to allow twelve (12) inches of rock beneath the pipe so the calculation would be 400 divided by 0.533 divided by four (4) = one hundred eighty eight (188) feet of leach line. This is for a trench with twelve (12) inches of gravel beneath the leach pipe. To convert to a trench with only six (6) inches of gravel filter material beneath a pipe, divide by three (3 feet of sidewall per linear foot) rather than four (4 feet of sidewall per linear foot) to reach a total of two hundred and fifty (250) lineal feet of leach line.

All residential and non-residential leach lines are to be calculated by a qualified professional using the sizing formulae above (or under an alternate system acceptable to the Director) for submittal with the OWTS permit application.

VI. USE OF CHAMBERED SYSTEMS (OWTS Policy 9.4.5)

Leaching chambers in use in Shasta County are gravel-less, open bottomed, arched plastic structures (chambers) used in place of rock and pipe leach lines. The sides have openings to allow effluent to seep into the surrounding soil sidewall. Leaching chambers may be dosed by gravity flow. Leaching chambers can easily be carried and installed with a minimum amount of compaction of soil at a site, are easier to install than rock and pipe, and do not shadow or obstruct the trench bottom as gravel does. However, they are more expensive to purchase where low cost gravel is readily available and effluent may not be treated to the level that a rock/pipe trench treats effluent (effluent receives treatment as it trickles over and down rock material). Leaching chambers must be installed per the manufacturer's instructions and care must be taken to follow manufacture guidelines for proper backfill.

Typically, Shasta County will allow the use of chambered systems in permitted systems on an equal foot-per-foot basis as compared to rock and pipe. Chambers are made by a number of manufacturers and come in sizes equivalent to 24-inch to 36-inch wide rock and pipe systems. Be aware that chambers are also manufactured to store and disperse storm water and these chambers typically have different dimensions and installation requirements than those manufactured specifically for leach field use.

Per the State OWTS Policy, a multiplier of less than 0.70 is prohibited.

VII. DUAL LEACH FIELDS

Two leach fields, each one hundred percent of the total size required for the design flow, shall be installed and interconnected with an approved device intended to allow alternate use of the fields, when average site percolation rates are slower than 90 MPI (up to 120 MPI), on parcels less than one acre in size, where it is determined by SCEHD staff where installation of the primary and secondary systems are necessary prior to full site development, or when otherwise specified in a valid sewage disposal system construction permit for specific OWTS supplemental treatment or alternate dispersal systems.

VIII. LEACH LINES ON STEEP SLOPES (OWTS Policy 9.4.4)

This section covers the requirements that must be met for the installation of leach lines on slopes that exceed thirty (30) percent.

Pursuant to the State OWTS Policy, a slope stability report must be prepared by a registered professional qualified to prepare such a report. The design of dispersal systems on steep slopes requires the experience and expertise to address conditions relative to soil, slope, stability, and subsurface conditions which require professional judgement and technical knowledge. Designs for steep slope systems will only be approved when submitted with a slope stability report prepared by a qualified professional. Additionally, soils at the site must meet all applicable setbacks and the requirements for percolation, soil depth, and depth to groundwater.

- **a.** Testing must provide data representative of the entire sloping dispersal area and demonstrate that conditions are uniform below the entire dispersal area. The minimum testing required is:
    - **1.** A minimum or three (3) percolation tests at a depth equal to the proposed trench depth.

2. A minimum of two (2) percolation tests, five (5) feet below the proposed trench depth or other depth specified by the Director may be requested to verify suitable soil depth.
3. Percolation tests must show rates of 1 to 120 minutes per inch.
4. At least two soil borings or profile pits demonstrating uniform conditions throughout the dispersal area to a depth of five (5) feet below the proposed trench depth or other depth specified by the Director.

b. A design report for leach lines on slopes greater than 30 percent, prepared by a qualified consultant, must include the following:

1. Cross-section(s) of the hillside soil profiles.
2. Detailed boring or soil pit logs.
3. Scaled layouts and profiled designs based on accurate topography.
4. Any grading proposed on the site of the dispersal area. (It is not uncommon for access roads and benches/pads to be constructed to provide for stable testing and installation/access – such grading must be taken into consideration by the qualified professional.) A valid grading permit issued by the Shasta County Department of Resource Management or appropriate city agency is required.
5. A slope stability report from a qualified professional.

Leach lines on steep slopes are sized as are leach line trenches on slopes of less than thirty (30) percent as shown above. All residential and non-residential leach lines are to be calculated by a qualified professional using the sizing formulae above or under an alternate system acceptable to the Director.

TSM SECTION F. SUPPLEMENTAL TREATMENT SYSTEMS (OWTS Policy 9.5)

A supplemental treatment system is one which treats effluent from a septic tank to a much higher standard. Supplemental treatment is generally needed to treat specific problems with the soil at a site. They are intended to provide treatment that is not received in shallow soils, soils in close proximity to surface or ground water, or rapidly permeable soils. This document is intended to provide technical design, installation, and monitoring guidance for intermittent and recirculating sand filters, and proprietary treatment units. Under the State OWTS Policy, every supplemental treatment unit must have periodic monitoring or inspections to maintain the system in good working order. Operating permits for all supplemental treatment systems detail inspections, maintenance, monitoring, possible sampling, and reporting to SCEHD on frequencies also to be specified in the permits. These "management requirements" are listed at the end of each section describing the various supplemental treatment systems in the Technical Standards Manual. (OWTS Policy 9.4.6)

I. SITING

a. Setbacks for supplemental treatment systems and any associated tanks and pumping units shall be the same as for septic systems as noted otherwise in the LAMP.
b. Dispersal systems receiving sand filter and proprietary treatment unit effluent are subject to all siting criteria for conventional septic systems (septic tank-dispersal trench), except as modified in accordance with the requirements for the specific type of alternate dispersal system proposed. Allowances for an OWTS utilizing supplemental treatment may include reduced vertical separation distances or may include consideration of increased wastewater application rates.

II. SITE EVALUATION, DESIGN, AND CONSTRUCTION REQUIREMENTS

Site evaluation, construction plans, operation and maintenance guidelines, and other permitting requirements for alternate treatment systems shall conform to all requirements for conventional OWTS, as well as any additional requirements specified in this LAMP and Technical Standards Manual for the type of treatment system proposed. Design and construction of alternate treatment systems shall be in conformance with requirements of this LAMP and Technical Standards Manual.

III. CONSTRAINTS ADDRESSED BY SUPPLEMENTAL TREATMENT UNITS

a. Used in combination with the appropriate alternate dispersal system, supplemental treatment systems can be used to address the following constraints:

1. High groundwater;
2. Shallow soil over fractured rock or coarse alluvium (rapidly permeable soil);
3. Shallow soil over impermeable soil or bedrock;
4. Slow percolation at usual leach and alternate dispersal trench depths;
5. Steep slopes;
6. Limited dispersal area (especially important after one or more failing repairs); and
7. Nitrogen limits (recirculating sand filters).

IV. SAND FILTERS

Intermittent sand filters and recirculating sand filters may be purchased as complete units or constructed in place on site. Whether purchased or constructed, they all share much of the following design criteria.

a. INTERMITTENT SAND FILTERS

The use of sand as a filter media has been used in waste water, drinking water, and swimming pools for more than 100 years. An intermittent sand filter, for purposes of this LAMP, is a relatively simple system using a biofilm on a bed of sand media to clarify septic tank effluent and reduce fecal coliform numbers as liquid passes through the media a single time. Effluent from an intermittent sand filter may discharge to a conventional leach field or to an alternate dispersal system as discussed in Section G of this Technical Standards Manual. Effluent from an intermittent sand filter designed, constructed, and operated per these guidelines is deemed to meet the criteria for supplemental treatment. Shasta County may consider alternate design and construction methods for intermittent sand filters.

1. DESIGN CRITERIA FOR INTERMITTENT SAND FILTERS

(a). Septic Tank Pretreatment. Intermittent sand filter treatment units shall be preceded by a septic tank, sized for the projected flow/project, as determined by guidance in Section D of this Technical Standards Manual.

(b). Dosing. Intermittent Sand filters may be pressure dosed with a pump/sump or may be dosed by an automatic dosing siphon to provide an equal amount of effluent at each dosing cycle. Any pump used as part of a dosing system shall be outfitted with an audio and visual alarm located in the structure serving the system. An intermittent sand filter would usually be dosed three to five times per day. Dosing systems provide:

(c). Uniform dosing of effluent over the surface application area of the filter distribution bed;

(d). Adequate flow rate, screening of effluent, and suitable piping network to preclude solids accumulation in the pipes or clogging of the discharge orifices;

(e). Suitable access provisions for inspection, testing, and adjustment of the pressure distribution system;

(f). Intermittent sand filters **–** Dosing volume to achieve a minimum of three to five doses of the filter per day at design flow conditions;

(g). At least one distribution lateral for every 36 inches of bed width.

(h). Wastewater Application Rate. The wastewater application rate for intermittent sand filters is as follows:

- **(1).** 1.0 gpd/ft^2 for individual residential OWTS or less;
- **(2).** 0.8 gpd/ft^2 for all commercial, industrial, institutional, and multi residential OWTS (domestic strength wastewater only) or less.
- **(3).** Wastewater, for example from restaurants, with expected strength higher than domestic flows would have reduced loading rates.

(i). Containment Liner. The intermittent sand filter shall be provide with an impermeable containment liner to prevent effluent leakage out of or groundwater intrusion into the filter. The liner shall be either: **(1).** a minimum 30 mil plastic; **(2).** reinforced, poured-in-place concrete; or **(3).** an equivalent impermeable structure or barrier.

(j). Finished Grade. The finished grade of an intermittent sand filter shall be at or above the surrounding ground elevation. Above-ground installations shall be structurally supported with retaining walls, as required by applicable building codes.

(k). Shape. The intermittent sand filter shall not be restricted to shape in plan view.

(l). Multiple Units. The intermittent sand filter may be divided into multiple units.

(m). Intermittent Sand Filter Media.

(1). Sand Specification. The sand media shall be a medium sand that meets the specifications as follows:

Sieve size	Percent Passing
3/8 inch	100
#4	90-100
#10	62-100
#16	45-62
#30	25-55
#50	5-20
#60	0-10
#100	0-4
#200	0-2

Documentation of laboratory sieve analysis results for the proposed sand fill material may be requested by Shasta County Environmental Health Division to verify conformance with the above specifications.

(2). **Sand Depth.** The minimum sand depth below the gravel distribution bed of an intermittent sand filter shall be twenty-four (24) inches.

(n). Gravel Distribution Bed.

(1). Material. The distribution bed above the sand shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.

(2). Depth. Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping. If the distribution piping is installed within leaching chambers, the pea gravel depth below the distribution pipe may be reduced from six (6) inches to four (4) inches, and the two (2) inch pea gravel cover may be eliminated.

(o). Silt Barrier. The gravel distribution bed (and leaching chambers if used) shall be covered in its entirety with a geotextile ("filter fabric") silt barrier. Filter fabric shall be either polyester, nylon, or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent, and shall be permeable.

(p). Cover.

(1). Material. A soil cover shall be placed over the distribution bed, consisting of a medium, loamy-textured soil.

(2). Depth. Soil cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the distribution bed. Soil cover shall be crowned or sloped to promote rainfall runoff.

(q). Underdrain.

(1). Material. The underdrain beneath the sand media shall consist of 3/8 inch washed pea gravel with a four (4) inch perforated drain pipe, installed with perforations oriented down.

(2). Depth. The pea gravel underdrain shall have a minimum depth of nine (9) inches.

(3). **Grade.** The underdrain shall be constructed and the drain pipe set with a minimum grade of one (1) percent toward the outlet point.

(4). **Watertight Outlet "Boot".** The sand filter underdrain shall be equipped with a watertight outlet "boot" for connection to piping for gravity flow to a pump/vault system or a dispersal field when allowed. Most likely, the intermittent sand filter will be equipped with an internal pump/vault system for direct pressure dosing of a shallow dispersal field.

(5). **Clean-out Riser.** For clean-out and inspection purposes, the upslope end of the perforated drain pipe in the underdrain shall be equipped with a vertical riser constructed of non-perforated pipe of equal diameter. The riser shall extend to finish grade of the sand filter and shall be capped to exclude insects.

(6). **Air Manifold.** An air manifold shall be installed within the pea gravel underdrain for the purpose of introducing forced air into the sand media, as needed, for maintenance or drainage rehabilitation. The air manifold shall consist of small diameter PVC piping, with drilled perforations (pointed down), and positioned above the perforated underdrain pipe. The manifold shall be connected to a vertical leader pipe that extends to the surface of the sand filter, fitted with a threaded pipe cap or plug at the top where a portable pressured airline can be connected.

(r). Inspection Wells. An inspection well shall be installed in the gravel distribution bed of each sand filter or individual compartment. The inspection well shall extend from finished grade through the pea gravel-sand interface of the distribution bed and shall be perforated in the pea gravel zone only. Inspection wells shall be two (2) inches to four (4) inches diameter plastic pipe and fitted with a wrench-tight cap or pipe plug. Perforations shall consist of hack-saw slots cut at nominal one (1) inch spacing; alternatively, commercially slotted pipe may be used. Wells shall be sealed against surface infiltration with a bentonite or concrete annual seal through the soil backfill zone.

(s). Internal Pump System. In lieu of gravity flow from the sand filter to the dispersal field (or dispersal field dosing system), an internal pump system may be installed within the intermittent sand filter for dosing directly to the dispersal field. In such applications:

(1). The pump chamber shall be seated at or below the bottom of the underdrain.

(2). The pump operating depth shall be entirely within the depth of the underdrain; and,

(3). Storage volume equal to at least 50 percent of the dispersal field dose volume shall be provided in the network of perforated drain pipe within the underdrain.

b. RECIRCULATING SAND FILTERS

Effluent from a septic tank is allowed to flow to a dosing/pump tank where it is mixed with recirculated filter effluent. Recirculating sand filters differ from an intermittent sand filter in that effluent is pumped to recirculate within the filter unit as much as five times prior to dosing the dispersal system. A recirculating sand filter, in general, is less effective in bacteria reduction but is typically more effective in nitrogen removal than is an intermittent sand filter (on the order of 50 percent reduction when compared with conventional septic tank effluent).

1. DESIGN CRITERIA FOR RECIRCULATING SAND FILTERS

(a). Septic tank pretreatment. As with an intermittent sand filter, a recirculating sand filter (RSF) requires the use of a properly sized septic tank for pretreatment.

(b). **Pressure Dosing.** Septic tank effluent shall be applied to the RSF by pressure dosing with a pump. The septic tank effluent is mixed in the sump with recirculated effluent drained from the RSF. In the event of a pump failure, an audio and visual alarm shall be located at the structure being served by the system. The pressure dosing system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:

- **(1).** Uniform dosing of effluent over the surface of the RSF distribution bed;
- **(2).** Adequate flow rate, screening of effluent, and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
- **(3).** Suitable access provisions for inspection, testing, and adjustment of the pressure distribution system;
- **(4)**. Dosing volume – an RSF shall be timed dosed to achieve a recirculation rate of approximately 5:1 at design flow conditions.
- **(5)**. At least one distribution lateral for every 36 inches of bed width.

(c). Wastewater Application Rate. The wastewater application rate used for sizing the surface area of the RSF shall be as follows:

- **(1).** Maximum of 5.0 gpd/ft^2 for individual residential OWTS;
- **(2).** Maximum of 4.0 gpd/ft^2 for all commercial, industrial, institutional, and multi-residential OWTS (similar to residential strength wastewater only). A reduction of the loading rate is made when a restaurant or other similar use with expected higher strength effluent is proposed.

(**d)**. **Containment Liner.** The sand filter shall be provided with an impermeable containment liner to prevent effluent leakage out of or groundwater intrusion into the filter. The liner shall consist of either: (a) 30 mil plastic; (b) reinforced poured–in–place concrete; or (c) an equivalent structure or barrier.

(e). Finished Grade. The finished grade of the sand filter shall be at or above the surrounding ground elevation. Above-ground installations shall be structurally supported with retaining walls as required by applicable building codes.

(f). Shape. The sand filter shall not be restricted as to its shape in plan view.

(g). **Multiple Units.** The sand filter may be divided into multiple compartments or multiple units.

(h). Sand Filter Media. The sand used in a recirculating sand filter differs from that used in an intermittent sand filter as follows:

Sieve size (inches)	percent passing
3/8	100
#4	70 – 90
#10	5 – 78
#16	0 – 4
#30	0 – 2
#50	0 – 1
#60	0 – 1
#100	0 – 1
#200	0 – 1

Documentation of laboratory sieve analysis results for the proposed sand fill material may be requested by SCEHD to verify compliance with the above specifications.

(i). Gravel Distribution Bed.

- **(1).** **Material.** The distribution bed shall consist of 3/8 – inch double-washed pea gravel, substantially free of fines;

(2). **Depth.** Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping. If the distribution piping is installed within leaching chambers, the pea gravel depth below the distribution pipe may be reduced from six (6) inches to four (4) inches, and the two (2) inch pea gravel cover may be eliminated.

(j). **Silt Barrier.** In contrast to an intermittent sand filter, a recirculating sand filter does not require a silt barrier.

(k). Cover. Cover over a recirculating sand filter varies from that over an intermittent filter as there is no soil cover over the distribution bed.

(l). Material. A granular media cover shall be placed over the distribution bed, consisting of clean gravel that may range in size from 3/8-inch pea gravel to 2 1/2-inch rounded rock.

(m). Depth. Cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the distribution bed.

With no soil cover, a recirculating sand filter would be expected to release more sewage odors than an intermittent sand filter or a septic tank and should not be located close to structures.

(n). Underdrain.

(1). Material. The underdrain beneath the sand media shall consist of 3/8-inch washed pea gravel with four (4) inch diameter perforated drain pipe, installed with perforations oriented down.

(2). Depth. The pea gravel underdrain shall have a minimum depth of nine (9) inches.

(3). Grade. The underdrain shall be constructed and the drain pipe set with a minimum grade of one (1) percent toward the outlet point.

(4). Watertight Outlet Boot. The recirculating sand filter underdrain shall be equipped with a watertight boot for connection of piping to the dosing tank.

(5). Clean-out Riser. For clean-out and inspection purposes, the upslope end of the perforated drain pipe in the underdrain shall be equipped with a vertical riser constructed of non-perforated pipe of equal diameter. The riser shall be extended to finish grade of the recirculating sand filter.

(o). Air Manifold. An air manifold shall be installed within the pea gravel underdrain for the purpose of introducing forced air into sand filter media, as needed, for maintenance or drainage rehabilitation. The air manifold shall consist of small diameter PVC piping, with drilled perforations (pointed down), and positioned above the perforated underdrain pipe. The manifold shall be connected to a vertical header pipe that extends to the surface of the sand filter, fitted with a threaded pipe cap or plug at the top where a portable airline can be connected.

(p). Inspection Wells. An inspection well shall be installed in the gravel distribution bed of each sand filter compartment. The inspection well shall extend from finished grade to the pea gravel. Sand interface of the distribution bed and shall be perforated in the pea gravel zone only. Inspection wells shall be two (2) inch to four (4) inch diameter plastic pipe and fitted with a wrench-tight cap or plug. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing; alternately, commercially slotted pipe may be used where available.

c. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTIONS FOR SAND FILTERS

1. Reference Guidelines. In addition to the requirements set forth in this document, design and construction of sand filter systems shall utilize applicable guidelines contained in the following references:

(a). "Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 1980 and as amended.

(b). "Design Manual – Onsite Wastewater Treatment and Disposal Systems", U.S. Environmental Protection Agency, October, 2002.

2. Construction Plans. Construction plans for sand filter systems shall include:

(a). All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines and notes for use by the installer;

(c). Recommended make and model of all components;

(d). Recommended pump system components, with cut-sheet depicting float settings;

(e). Control panel programming; and

(f). An inspection schedule listing all critical control points and required maintenance.

3. Construction Inspections. At a minimum, the inspection of the sand filter system installation should include the items listed below. Joint inspection by the property owner, system designer, installation contractor, and SCEHD may be required and is encouraged.

(a). Pre-construction inspection where the construction staking or marking of the sand filter is provided and construction procedures discussed;

(b). Water tightness of the septic tank and dosing (pump) tank;

(c). Sand filter dimensions, structure, and liner;

(d). Underdrain piping and filter rock;

(e). Sand quality, size, and placement;

(f). Piping installation and hydraulic ("squirt") test of the distribution system;

(g). Functioning and setting of all control devices; and

(h). Final inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, and erosion control has been completed.

4. O & M Manual. The system designer shall prepare an Operations and Maintenance (O & M) Manual for use by the property owner which shall describe the proper use of the system and allow the owners, or other persons, to conduct the minimum maintenance and monitoring/inspections needed for the system.

d. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for intermittent and recirculating sand filter systems are outlined herein. The State OWTS Policy requires OWTS utilizing supplemental treatment to have periodic monitoring and inspections and these will be identified as Operating Permit conditions.

1. Inspection – to be completed per operating permit conditions, typically every six (6) to twelve (12) months, depending on system size, usage, and history.

(a). Observe surface conditions on and around filter for effluent leakage, drainage/infiltration, erosion, or other problems.

(b). Check/measure liquid level in inspection well (s) in filter bed.

(c). Perform any inspection work as recommended by the system designer or equipment manufacturer.

(d). Record observations for permanent record kept by owner.

2. Maintenance. To be completed per operating permit conditions, typically every six 6) months to twelve (12) months, depending on system size, usage, or history. Also to be completed in response to complaints.

(a). Purge laterals.
(b). Perform all maintenance work as recommended by designer or equipment manufacturer.
(c). Record all work performed for permanent record kept by owner.

3. Water monitoring and reporting. Performed per Operating Permit conditions, if any.

(a). Report observation findings and maintenance actions, including notation of problems and corrective actions.
(b). Record dose counter and elapsed time meter readings from control panel.

4. Reporting. To be done immediately upon request of SCEHD or according to Operating permit conditions, typically every one (1) to two (2) years depending on system size, usage, history, and location.

(a). Report findings to SCEHD per Operating permit conditions.
(b). Standard report is to include a description of findings, analyze performance, and detail actions taken.
(c). Report emergency or failure conditions to SCEHD immediately.

V. GUIDELINES FOR PROPRIETARY UNITS

a. DESCRIPTION

Proprietary treatment units cover a category of manufactured or package treatment systems specifically developed for residential, commercial, and industrial uses/applications. Most proprietary unit designs currently available fall into two categories: (1) aerobic treatment units (ATUs), and (2) media filters.

1. Aerobic Treatment Units (ATUs). ATUs utilize forced air to oxidize the wastewater, promoting aerobic decomposition of wastewater solids. These systems provide supplemental treatment of wastewater for improvement in dispersal system performance; they also provide varying degrees of nitrogen removal. In general, ATUs can be relied on to produce secondary quality effluent, better than 30 mg/L BOD and 30 mg/l TSS. ATUs are generally not as effective in reducing pathogen levels as are systems that incorporate media filtration. However, some ATUs provide in nitrogen levels equal to or greater than that provided by sand filters and other media filters.

2. Media Filters. This includes proprietary designs that function similar to sand filters. In these systems, the sand is replaced with an alternate media such as peat, gravel, or textile. Textile and other media filters have been found to produce effluent quality, at a minimum, similar or better than recirculating sand filters, and provide similar capabilities in overcoming various soil and site constraints.

Effluent from proprietary treatment units may be discharged to conventional dispersal trenches and to any type of alternate dispersal system identified in this LAMP. At least one type of system is placed on top of a dispersal bed and discharges directly into the bed. Effluent from proprietary treatment units designed and operated in accordance with these guidelines will be considered to meet criteria for supplemental treatment.

b. CONSTRAINTS ADDRESSED

Used in combination with the appropriate type of dispersal system, proprietary treatment units can be applied to address the following onsite wastewater constraints:

1. High groundwater;

2. Shallow soil over fractured rock or coarse alluvium;
3. Shallow soil over impermeable soil or bedrock;
4. Slow percolation at standard trench depths;
5. Steep slopes;
6. Limited dispersal area; and
7. Nitrogen limitations.

c. SITING CRITERIA

1. Treatment Unit. All siting criteria for septic tanks shall also apply to proprietary treatment units and associated tanks and pumping units.

2. Dispersal Systems. Dispersal systems receiving effluent from a proprietary treatment unit are subject to all siting criteria for conventional septic tank-dispersal trench systems, except as modified in accordance with the requirements for the specific type of alternate dispersal system proposed. These may include reduced vertical separation distances, increased wastewater application rates, or modified slope restrictions.

d. DESIGN AND CONSTRUCTION REQUIREMENTS

1. NSF Standard 40. The proprietary treatment unit shall be listed by the National Sanitation Foundation (NSF) as meeting NSF Standard 40, class 1 performance evaluation, or have certification by a third-party listing agency as complying with NSF Standard 40 performance requirements. The treatment unit shall be manufactured and installed in accordance with the design specifications used to determine compliance to NSF Standard 40. This specification is applicable to treatment units for wastewater flows up to 1,500 gpd and is based on compliance with US EPA standards for secondary treatment of municipal wastewater, including 30-day average effluent limits of 25 mg/L for $CBOD_5$ and 30-day mg/L for TSS. Treatment units for flows in excess of 1,500 gpd will require certification by a third party listing agency of equivalent performance.

2. Design Sewage Flow. Sizing and design of proprietary treatment units shall be based on the projected sewage flow for the structure or facility served/proposed, determined in accordance with sewage flow estimation guidelines in this LAMP.

3. Tanks. All tanks housing a proprietary treatment unit shall be structurally sound, watertight, and capable of withstanding 1,000 pounds of weight.

4. Controls. Control panels shall be designed and configured in such a manner that, in the event of a treatment unit malfunction, an alarm system will be triggered and discharge from the treatment system to the dispersal field interrupted until the treatment unit malfunction is corrected. At a minimum, the alarm system shall include an audible and visual alarm located at the building served by the system.

5. Emergency Storage Provisions. Where a proprietary treatment unit is used in conjunction with a gravity feed dispersal system, the system shall provide emergency storage capacity equal to at least 1.5 times the daily wastewater flow, consistent with requirements for pump systems provided in Section D of this Technical Standards Manual.

6. Compliance with Manufacturer Requirements. The designer and installer shall follow the proprietary manufacturer's design, installation, construction, and operations procedures.

7. Construction Plans. Submittals for proprietary treatment units shall provide documentation of compliance with manufacturer's requirements and sufficient design analysis to verify the appropriateness of the treatment unit for the proposed application. Construction plans shall contain specific step-by-step construction guidelines and notes for use by the installer including any manufacturer instructions.

8. Installer Requirements. Anyone installing a proprietary unit shall be trained and certified by the system manufacturer. Documentation verifying conformance to this requirement shall be provided to SCEHD prior to system installation.

9. Maintenance Contract. The applicant must demonstrate that a written maintenance agreement with a qualified service provider has been obtained for the proposed proprietary unit to ensure satisfactory post-construction operation and maintenance. A maintenance agreement must be maintained valid for the life of the treatment unit.

10. Construction Inspection. The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the OWTS designer, system installer, property owner and SCEHD staff may be required.

- **(a).** Pre-construction inspection where the construction staking or marking of the treatment unit is to be placed and installation procedures are to be discussed;
- **(b).** Testing of the treatment unit:
  - **(1).** Function and setting of all control devices and alarms.
  - **(2).** Water-tightness of septic tank, treatment tanks, and dosing tanks, as applicable.
- **(c).** Final Inspection:
  - **(1).** A letter from the OWTS designer that the treatment unit has been installed and is operating in conformance with design specifications shall be provided to SCEHD.
  - **(2).** A signed maintenance agreement between the applicant/property owner and qualified service provider shall be provided to SCEHD.
- **(d).** An electrical permit will be required from the appropriate building inspection agency for work to provide a circuit and to provide electrical power to the treatment unit.
- **(e).** The system designer shall prepare an Operations and Maintenance (O & M) Manual for use by the property owner which shall describe the proper use of the system and allow owners, and other persons, to conduct the minimum maintenance and monitoring/ inspections needed for the system.

e. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for proprietary units are outlined herein. The State OWTS Policy requires OWTS utilizing supplemental treatment to have periodic monitoring and inspections and these will be identified as Operating Permit conditions.

1. Inspections. To be conducted according to operating permit conditions, typically every six (6) to twelve (12) months, depending on system size, usage, and history. Inspections are to be in accordance with manufacturer specifications.

2. Maintenance. To be completed according to operating permit conditions, typically every six (6) to twelve (12) months, depending on system size, usage, and history. Perform all maintenance as required and in accordance with equipment manufacturer specifications.

3. Water Monitoring and Sampling. If required, according to operating permit conditions, typically every six (6) to twelve (12) months, depending on system size, usage, and history. Monitoring is to be in accordance with manufacturer specifications.

4. Reporting. To be done according to operating permit conditions, typically every one (1) to two (2) years, depending on system size, usage, history, and location.

- **(a).** Report findings to SCEHD per operating permit requirements

(b). Standard report to describe findings, analyze performance, and detail actions taken.
(c). Report crisis or failure conditions to SCEHD immediately.

d. NITROGEN REMOVAL

In areas of high OWTS density, and after receipt of any ground or surface water sample results showing OWTS related nitrogen contamination, SCEHD would require the use of a nitrogen removal component as a part of the OWTS design. This might include specifying the use of a recirculating sand filter or the addition of some other nitrogen reduction system to the OWTS, as specified by the property owners qualified professional and concurred by SCEHD.

1. When nitrogen is identified in the RWQCB basin plan as a water quality concern, the following nitrogen effluent concentration must be achieved:

   (a). 30-day average BOD concentration will not exceed 30 milligrams per liter (mg/l), or alternately, a carbonaceous BOD (CBOD) in excess of 25 mg/l.
   (b). 30-day average TSS concentration will not exceed 30 mg/l.
   (c). 30-day average Total Nitrogen (TN) concentration will not exceed 10 mg/l as nitrogen.
   (d). Total Coliform, if required by an applicable Operation and Management Plan (O&M Plan), must be less than 10,000 Most Probable Number (MPN) per 100 milliliters.
2. Testing to comply with these performance standards must be conducted based on effluent analysis with the following minimum detection limits:

Parameter	Detection Limit
BOD	2 mg/l
TSS	5 mg/l
Total Nitrogen	1 mg/l

e. DISINFECTION

1. Components performing disinfection must be designed to achieve a total coliform bacteria effluent concentration at the 95th percentile, not to exceed the following:
   (a). 10 MPN per 100 ml prior to discharge into the dispersal system, where the soils exhibit percolation rates of 1-10 minutes per inch or where the soil texture is sand, or;
   (b). 1,000 MPN per 100 ml prior to discharge into the dispersal field, where the soils exhibit percolation rates greater than 10 minutes per inch or consists of a soil texture more restrictive than sand.
2. Effluent from supplemental treatment must be tested at least quarterly using an analytical method capable of achieving a minimum detection limit of 2.2 MPN total coliform. Such systems must be maintained to comply with the applicable performance requirements during operation/lifetime of the system.

f. OTHER TREATMENT SYSTEMS

Other supplemental treatment systems may be approved for use by the Director.

TSM SECTION G. ALTERNATE DISPERSAL SYSTEMS (OWTS Policy 9.5)

An alternate dispersal system means a type of OWTS that utilizes a method of wastewater dispersal other than a conventional rock leach line trench for the purpose of improved performance of and siting options for effluent dispersal.

This Section of the Technical Standards Manual provides guidelines for the design and application of various alternative dispersal systems suited to the conditions and constraints in Shasta County. These guidelines are intended to be followed for both new development and repair situations. Shasta County may allow (and may require) the use of alternative dispersal systems for the creation of new parcels (land divisions). However, soils at such sites shall meet the minimum standards for land divisions.

Guidelines are provided for the following types of alternative dispersal systems:

- Shallow Pressure Distribution
- Pressure-Dosed Sand Trench
- At-Grade
- Mound
- Drip Dispersal
- Engineered Fill
- Other alternative dispersal systems, combinations of supplemental treatment and dispersal systems, and/or other alternatives combined with monitoring/inspections that may be determined by the Director to meet the purpose of the State OWTS Policy of protecting water quality and public health.

I. SITING CRITERIA

All requirements for conventional OWTS utilizing leach line dispersal systems also apply to these alternative systems with the following clarifications and exceptions:

Horizontal setbacks. Horizontal setback requirements for alternative dispersal systems may be reduced with prior written authorization of the Director. Supplemental treatment may also be required for approval of such reduction.

Areas of flooding. Alternate dispersal systems shall not be located in areas subject to flooding. Areas subject to flooding are determined by calculating the ten (10) year frequency flood elevation for the parcel.

Ground Slope. The maximum ground slope for alternate dispersal systems is as follows:

Type of system	Percent slope
Mound	20%
Engineered Fill	20%
At-Grade	30%
Shallow Pressure Distribution	40%
Pressure dosed sand trench	40%
Subsurface Drip Dispersal	50%

(Note that any dispersal system planned for slopes in excess of 30 percent shall require the completion and approval of a geotechnical slope stability report.)

Vertical Separation from Groundwater. The minimum vertical separation to groundwater, measured from the bottom of the dispersal system to the seasonal high water table, may be reduced from the requirements that apply to conventional systems as specified in the following: (OWTS Policy 9.4.8)

Type of Dispersal System	Perc. Rate (MPI)	Depth
1. Gravity Trench/Supplemental Treatment	1 – 5	5ft
	5 – 120	2ft
2. Shallow Pressure Distribution (PD)	1 – 5	NP[1]
	5^+ – 120	2ft
3. At-Grade	1 – 5	NP[1]
	5^+ – 120	2ft
4. Shallow PD/Supplemental Treatment	1 – 5	3ft
	5^+ – 120	2ft
5. At-Grade/Supplemental Treatment	1 – 5	3ft
	5^+ – 120	2ft
6. Drip Dispersal/Supplemental Treatment	1 – 120	2ft
7. Mound	1 – 5	3ft
	5^+ – 120	2ft
8. Pressure Dosed Sand Trench	1 – 5	3ft
	5^+ – 120	2ft

1 Not Permitted (NP) without additional mitigation measures such as supplemental treatment or a sand lined trench

Soil Depth. The minimum depth of permeable soil beneath the bottom of the dispersal system shall be as specified below for different types of systems. Permeable soil is defined as having a percolation rate between 1 and 120 minutes per inch (MPI) or having a clay content of less than 60 percent and shall not include solid rock formations, hardpan (or similar formations), or those that contain continuous channels, cracks, or fractures. Additional depth may be required on steep slopes, for large systems (to compensate for linear loading and hydraulic mounding), or for particular site conditions or geographic locations as specified by the Director.

Type of Dispersal System	Minimum Soil Depth*
- Conventional Trench/Supplemental Treatment	2ft
-Shallow Pressure Distribution Trench	2ft
-At-Grade	2ft
- Shallow PD/Supplemental Treatment	2ft
- At-Grade/Supplemental Treatment	2ft
- Mound	2ft
- Subsurface Drip/Supplemental Treatment	2ft

*NOTE - As measured from the bottom of the dispersal trench, bed, or drip tubing.

II. SITE EVALUATION, DESIGN, AND CONSTRUCTION REQUIREMENTS

Site evaluation, construction plans, operation and maintenance guidelines, and other permitting requirements for alternative dispersal systems shall conform to all requirements of conventional OWTS as well as any additional requirements specified in this Technical Standards Manual for the type of alternate system proposed.

Design and construction of alternative dispersal systems shall be in conformance with requirements in this Technical Standards Manual.

III. HYDRAULIC MOUNDING AND LINEAR LOADING

Care must be taken with large dispersal systems to study hydraulic mounding and linear loading to assure that all wastewater applied to the dispersal system can be processed and dispersed by the soil. Loading soil too heavily with wastewater can result in saturation within the 2-foot minimum separation between the bottom of the dispersal system and a water table. Systems must be designed by qualified professionals so that an elevated water table or saturated soils resulting from wastewater discharge to a dispersal system do not rise up into the minimum 2 feet of required separation.

- **Groundwater Mounding** on flat or nearly flat ground may occur when the amount of wastewater applied to the dispersal system is more than can percolate down into the soil or flow laterally away from the area where it is applied. In less permeable soil, wastewater may not flow away from the dispersal area and rise up towards the bottom of the dispersal system. In more permeable soil this mounding <u>may</u> result in a higher hydraulic gradient that may ultimately assist in the flow of wastewater away from the dispersal system.

- **Lateral or Linear Loading** on sloping ground occurs when applied wastewater from a system, percolating down into the soil, is forced to move laterally down slope by a restrictive or less permeable layer. Each successive dispersal system/trench adds to this wastewater load potentially resulting in a rise of effluent and groundwater table into the dispersal system. Some simple means of limiting lateral loading are to design dispersal systems with long narrow dispersal systems units constructed along the site contour, oversize the dispersal system and pressure dose each square foot equally, operate the dispersal system (and a second or more dispersal systems) intermittently, or subdivide the dispersal system into multiple widely separated and smaller systems.

- **Lateral or Linear Loading Rate** is defined as the volume of wastewater flow divided by the effective length of the dispersal system measured along the slope contour. In general, deeper/faster perking soils would allow higher loading rates to be used when compared to shallow/slow perking soils.

IV. STANDARDS FOR SHALLOW PRESSURE DISTRIBUTION SYSTEMS

a. DESCRIPTION

Shallow pressure distribution (PD) systems are a variation of a conventional leach field. A sump/pump is used to pressurize a small diameter perforated pipe to achieve broad, uniform distribution of wastewater in the shallow soil zones for improved soil absorption and better treatment of percolating effluent. This type of system, especially in conjunction with a supplemental treatment system, is well suited for steeper terrain and shallow soil conditions. In general, clay particles in soil tend to migrate deeper into the soil profile over time, resulting in slightly faster perking soils closer to the ground surface. For purposes of this system, shallow is broadly assumed to mean 12 inches in depth but may vary by plus or minus six inches depending site conditions.

b. CONSTRAINTS ADDRESSED

1. High groundwater;
2. Shallow soil over impermeable soil or bedrock;
3. Shallow soil over fractured rock or course alluvium;
4. Slow percolation at standard dispersal trench depths; and
5. Steep terrain.

c. SITING CRITERIA

1. Setbacks. Horizontal setback requirements for shallow PD systems shall be the same as those applicable to conventional dispersal fields, unless otherwise authorized by the Director.

2. Vertical Separation requirements.

(a). Depth to Groundwater. Minimum depth to seasonal high groundwater for shallow PD systems, as measured from the trench bottom, shall vary according to soil percolation rate as shown in the table below.

(b). Soil Depth. Minimum soil depth, as measured from trench bottom to impermeable soil or rock, for shallow PD systems shall vary according to soil percolation rate and the level of treatment provided as shown as following:

Minimum Vertical Separation Requirements for Shallow PD Systems (feet below trench)

	Depth to Groundwater		**Soil Depth**	
Perc. Rate In (MPI)	**Primary Treatment**	**Supplemental Treatment**	**Primary Treatment**	**Supplemental Treatment**
1 – 5	NP[1]	2ft	NP[1]	2ft
5+ - 120	2ft	2ft	2ft	2ft

[1] Shallow PD systems not permitted without supplemental treatment prior to PD dispersal or a sand lined trench per guidelines for a sand lined pressure dose trench, where the average percolation rate is less than or equal to 5 MPI

3. **Percolation Rate.** Average percolation rate for shallow PD systems shall be within the range of 5 to 120 minutes per inch (MPI), as determined by a qualified professional in accordance with percolation test procedures in the Technical Standards Manual.

4. Ground Slope. Maximum ground slope for areas where a shallow PD system is proposed shall be 40 percent. Any PD system proposed on slopes greater than 30 percent shall require the completion of a geotechnical slope stability report, prepared by a qualified professional, and reviewed and accepted by SCEHD.

5. Dual System. Two shallow PD dispersal fields, each one hundred percent of the total size required for the design sewage flow, may be required to be installed and interconnected with an approved flow diversion device (pressure rated), intended to allow alternate use of the two fields, when average site percolation rates exceed 90 MPI.

d. DESIGN CRITERIA

1. Treatment. The following treatment requirements shall apply in connection with the use of shallow PD systems:

(a). Primary (septic tank) treatment shall be the minimum level of treatment.

(b). Supplemental treatment, using an approved alternate treatment system, may be used to allow reduced vertical separation distances as noted above.

2. Design Sewage Flow. Shallow PD systems shall be designed on the basis of the projected sewage flow for the structure or facility served, determined in accordance with sewage flow estimation guidelines presented in TSM Section E, Subsection V., “Leach Line Sizing”.

3 .Pressure Dosing. Septic tank or supplemental treatment system effluent shall be applied to the shallow PD system by pressure dosing utilizing a pump/sump system. Pressure distribution shall be designed in accordance with accepted engineering practices to achieve, at a minimum:

(a). Uniform dosing of effluent throughout the system of shallow trenches;

(b). Adequate flow rate, screening of effluent (an effluent filter), and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;

(c). Suitable access provisions for inspection, testing, and adjustment of the pressure distribution system; and

(d). Dosing volume to achieve minimum of five (5) doses per day at design flow conditions.

4. Dispersal Trenches. Shallow PD trenches shall conform to the same design and construction requirements as conventional leach line trenches, Section E of this Technical Standards Manual, with the exception that the piping shall consist of pressure piping rather gravity piping.

5. Pressure Distribution Piping.

(a). Pressure-Rated Pipe Material. All pipe, fitting, and valves shall be pressure rated PVC pipe rated at a minimum of 150 PSI.

(b). Solvent Welded. All joints in the pressure piping system shall be solvent welded.

(c). Pipe Sizing. All pressure distribution pipes, valves, and fittings must be adequately sized for the design flow, and shall be designed to minimize friction losses to the maximum extent practicable.

(d). Thrust blocks. Concrete thrust blocks, or equivalent restraint, shall be provided at sharp changes in piping direction.

(e). Shut-off Valve. The distribution lateral for each trench shall be fitted with a shut-off valve to adjust or terminate the flow of individual trenches. This valve may either be a ball or gate valve, and shall be located in a utility/valve box.

(f). Lateral End Riser and Clean Out. The end of each lateral shall be fitted with a sweep 90 degree fitting to facilitate line cleaning and hydraulic testing. The end riser pipe shall also be fitted with a ball valve and/or threaded end cap or plug, housed in a valve box extended to grade and capped.

6. Pump System. The pump shall be:

(a). appropriate for sewage applications;

(b). of the size and type to meet hydraulic design requirements; and

(c). designed and constructed in accordance with pump system requirements in this Technical Standards Manual.

7. Wastewater Application Rates. The wastewater application rates used for sizing Shallow PD systems shall be the same as used for leach line systems.

8. Trench Sizing. The required square footage of trench infiltrative surface shall be calculated based on the design flow and the wastewater application rate (from the average percolation rate of soils at the site). The required length of trench shall be calculated on a combined bottom area and trench sidewall up to a maximum of five (5) square feet of effective infiltrative surface per lineal foot of trench.

9. Inspection Wells. Inspection wells shall be installed in all shallow PD dispersal systems as follows**:**

(a). Pressure Dose Trenches: Inspection wells shall be located at the end of each lateral of the shallow PD system, extending from the bottom of a dispersal trench to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(b). Pressure Dose Beds on Flat Ground: Inspection wells shall be located in the middle of the bed at 1/6, ½, and 5/6 positions along length of the bed. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(c). Pressure Dose Beds on Sloped Ground: Inspection wells shall be located at the toe of the aggregate bed. Wells shall be positioned along the length of the bed at 1/6, ½, and 5/6 of the length. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTION

1. Reference Guidelines. In addition to the requirements set forth herein, design and construction of shallow PD systems shall utilize applicable guidelines contained in the following references:

(a). "Onsite Wastewater treatment Systems Manual", U.S. EPA, February 2002, and as amended.

(b). "Design Manual – Onsite Wastewater Treatment and Disposal Systems" U.S. EPA October 1980.

2. Construction Plans. Construction plans for shallow PD systems shall include:

(a). All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines for use by the installer;

(c). An erosion control plan for the area of disturbance for the system;

(d). Recommended make and model of all applicable components;

(e). Recommended pump system components, with cut sheets depicting float settings;

(f). Control panel programming; and

(g). An inspection schedule listing critical control points.

3. Construction Inspection. At a minimum, inspection of the shallow PD system installation shall include the items below. These are in addition to inspection work required for any supplemental treatment system. Joint inspections between the designer, contractor, property owner, and SCEHD may be required.

(a). Pre-construction inspection where the location of various system components is marked and construction procedures discussed;

(b). Water tightness of all tanks;

(c). Layout and excavation of dispersal trenches and piping;

(d). Drain rock material and placement method;

(e). Piping installation and hydraulic squirt test;
(f). Function and setting of all control devices; and
(g). Final inspection to verify all elements are in conformance with the approved permit, all wells are installed, and erosion control has been completed.

4. The system designer shall prepare an Operations and Maintenance (O & M) Manual for use by the property owner which shall describe the proper use of the system and allow the owner, or other persons to conduct the minimum maintenance and monitoring/inspections needed for the system.

f. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for shallow PD systems are outlined as follows:

1. Inspections. Every six (6) to twelve (12) months - Conduct routine visual observations of dispersal field, downslope area, and surrounding areas for wet areas, pipe leaks, or damage, soil erosion, drainage issues, abnormal vegetation, or other problems. Also, perform inspection of pump system. Record all inspection results.

2. Maintenance. Annually – Purge laterals, squirt, and balance lines, exercise valves, perform work recommended by equipment manufacturer. Repair erosion, drainage, and distribution system as needed and record all work done.

3. Water Monitoring and Sampling. Measure trench liquid levels in any monitoring wells annually and obtain and analyze water samples from monitoring wells, as applicable.

4. Reporting. Report findings to SCEHD when requested or immediately if public health or water quality emergency exists (standard report should include dates, observation/monitoring well readings, other data collected, and performance summary).

VIII. STANDARDS FOR MOUND SYSTEMS

a. DESCRIPTION

A mound system consists of an elevated sand bed, built over native soil, with a pressure dosed gravel distribution bed built into the top of the sand fill, and the entire system is then covered by soil fill. Mound systems are intended to raise the soil absorption system above grade and provide further treatment of effluent before it reaches native soils. The construction and function of a mound system share some similarities with a sand filter. A mound utilizes the shallow surface soils for broad distribution of effluent, and is used to mitigate high water table and shallow soil depth conditions on flat or gently sloping sites. Mound systems can be used on slopes of up to 20% depending on percolation rates. Mound systems are typically used without a supplemental treatment system.

b. CONSTRAINTS ADDRESSED.

1. High groundwater;
2. Shallow soil over fractured rock over course alluvium;
3. Shallow soil over impermeable soil or bedrock;
4. Slow percolation at standard dispersal trench depths; and
5. Limited dispersal area.

c. SITING CRITERIA.

1. **Setbacks.** Horizontal setback requirements for mound systems shall be those applicable to conventional leach line dispersal systems.

2. **Vertical Separation Requirements.**

(a). **Depth to Groundwater.** Minimum depth to high groundwater, as measured from the bottom of the gravel bed, shall vary according to soil percolation rates as follows:

Percolation Rate (MPI)	Depth to Groundwater
1 – 5	3 feet
5+ - 120	2 feet

(b). **Soil Depth.** Minimum depth of soil, as measured from the ground surface to impermeable soil or rock, for mound systems shall be two (2) feet. This soil depth shall apply within the mound fill area and in the adjacent area extending a distance of twenty-five (25) feet down-slope of the mound.

3. **Percolation Rate.** Average percolation rate for mound systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined at depths of one (1) to two (2) feet below the ground surface. These percolation requirements shall apply within the mound fill area and in the adjacent area extending a distance of 25 feet down-slope of the mound system.

4. **Ground slope.** Maximum ground slope for mound systems shall be 20% where the percolation rate is in the range of 1 to 60 MPI and 15% for soils with a percolation rate from 60+ to 120 MPI.

5. **Reserve Area/Dual System.** A reserve area having suitable soil/site conditions and sufficient area for full 100% replacement of the primary mound shall be provided or a complete dual primary and secondary mound system shall be installed initially. (See D.10 for circumstances requiring the installation of a dual system). In determining the necessary space for the primary and secondary mounds, the required basal area of the primary and secondary mounds shall not overlap. The surplus sand run-out and soil fill may also not overlap unless the primary and secondary mounds are installed together as a dual system.

d. DESIGN CRITERIA

1. Treatment. The mound system shall be preceded by a septic tank sized for the design sewage flow.

2. Design Sewage Flow. The mound shall be designed on the basis of the projected sewage flow for the structure/project as determined in accordance with guidelines elsewhere in this LAMP.

3. Pressure Dosing. Septic tank effluent shall be applied to the mound system by pressure dosing with a pump system to achieve, at a minimum:

(a). Uniform dosing of effluent over the surface application area of the mound distribution bed;

(b). Adequate flow rate, screening of effluent, and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;

(c). Suitable access provisions for inspection, testing, and adjustment of the pressure distribution system;

(d). Dosing volume to achieve a minimum of five (5) doses per day at design flow conditions;

(e). Dosing shall be completed using a time-dose pump control module where no connection exists between the pump on and high level alarm circuits; and

(f). At least one distribution lateral for every 36 inches of bed width.

Additional requirements for design and construction of pressure distribution piping systems contained in "Guidelines for Shallow Pressure Distribution Systems" shall also apply.

4. Pump Systems. The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements of this LAMP.

5. Sand Fill.

(a). Sand Specifications. The sand media shall be a medium coarse sand which meets the following gradation specifications:

Sieve Size	Percent Passing
3/8	100
#4	90 – 100
#10	80 – 100
#16	45 – 82
#30	25 – 55
#50	5 – 20
#60	0 – 10
#100	0 – 4
#200	0 – 2

Documentation of laboratory sieve analysis results for the proposed sand fill material may be requested by SCEHD to verify conformance with the above specifications.

(b). **Sand Depth.** The minimum depth of sand fill, below the gravel distribution bed, shall be twelve (12) inches. The minimum depth of sand fill shall be increased to 24 inches for sites where the average percolation rate is between 1 and 5 MPI; such sites also require greater separation to groundwater below the ground surface (3 feet rather than 2 feet).

(c). Lateral Dimensions. The sand shall be placed as a continuous fill extending in lateral dimensions as necessary to meet the following minimum requirements:

(1). Top of the sand fill shall extend horizontally beyond the gravel distribution bed:

-one (1) foot in the upslope direction.

-two (2) feet in the upslope direction.

-two (2) feet in the longitudinal (side) direction.

(2). Maximum slope from the top of the sand shall be three horizontal to one vertical beyond the dimensions given in 1 above.

(3). Bottom of the sand fill shall be large enough to meet minimum mound requirements based on basal area and linear loading rate criteria (below).

6. Gravel Distribution Bed.

(a). Material. The gravel distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.

(b). **Depth.** Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping.

(c). **Width.** Maximum trench width of the distribution bed shall be ten (10) feet.

(d). **Level.** The bottom of the distribution bed shall be level; and the downslope side shall be parallel to the slope contour.

7. Silt Barrier. The gravel distribution bed shall be covered in its entirety with a geotextile (filter fabric) silt barrier. Filter fabric shall either be polyester, nylon, or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent, and shall be permeable.

8. Soil Cover.

(a). **Material.** A continuous soil cover shall be placed over the entire distribution bed and sand fill. The soil cover shall consist of a medium, loamy textured soil.

(b). **Depth.** Soil cover depth shall be a minimum of six (6) inches and a maximum of eighteen (18) inches over the top of the distribution bed, and twelve (12) inches over the sand fill portion of the mound. Soil cover over the distribution bed shall be crowned to promote runoff, and compacted by track rolling, minimum of two (2) passes or other method giving similar results.

(c). **Lateral Extension.** The soil cover shall extend a minimum of three (3) feet beyond the perimeter edge of the sand fill in all directions.

9. Wastewater Application Rate. The maximum wastewater application rates used for sizing the surface area of the distribution bed and sand basal area shall be as follows:

(a). Distribution Bed

(1). 1.0 gpd/ft^2 for individual residential OWTS; and

(2). 0.8 gpd/ft^2 for commercial, industrial, institutional, and multi-residential OWTS.

A reduction in the above wastewater loading rates or other provisions, to insure the long-term integrity and performance of the mound distribution bed, may be required for high strength waste flows, such as from restaurants

(b). Sand Basal Area. The basal area of the sand fill shall be sized to meet minimum basal wastewater application rates and linear loading requirements as follows:

(1). Basal Wastewater Application Rates.

Effective Application Area.

-For level sites (0 – 2%) slope the effective basal wastewater application area includes the entire sand fill area.

-For sloping sites (>2% slope) the effective basal wastewater application area includes the sand basal area immediately below and directly down-slope (at right angles to the natural slope contours) of the distribution bed.

- The sand basal area shall also be large enough to contain the required gravel distribution bed (with the horizontal lateral extensions required of the basal area and the 3 to 1 slope down to the native surface).

Wastewater Flow. The wastewater flow used for sizing the basal area shall be the design flow for the system.

Application Rates. The maximum sand basal area application rate shall not exceed the septic tank effluent application rate based on the demonstrated average percolation rate of the upper 12 to 24 inches of soil depth at the site.

(2). Linear Loading Requirements.

-Linear Loading Rate Definition. Linear loading rate is defined as the volume of wastewater flow (in gpd) divided by the effective length of the disposal system measured along the slope contour.

-Effective Length. The effective length (L) of the mound system for determining the linear loading rate shall be the length of gravel distribution bed along the down-slope edge. Separate linear loading rate calculations shall be made for the primary and secondary (reserve) systems. The effective length of each mound may overlap for purposes of determining compliance with linear loading rate criteria since only one system would be in use at a given time.

-Wastewater Flow. The wastewater flow used for determining the linear loading rate shall be as follows:

-150 gpd/bedroom for residential systems;

-Design flow rate for commercial, institutional, industrial, and multi-residential systems.

-Loading Rate Criteria. Maximum linear loading rates for mound systems vary according to ground slope and percolation rate as shown below. If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soils and utilizing site specific hydraulic conductivity (permeability) data.

Maximum Linear Loading Rates

Soil Depth	**Ground Slope**	**Percolation Rate (MPI)**		
(ft)	**(%)**	**1 – 30**	**30+ - 60**	**60+ - 120**
2 to 2.5	0 – 10	5	4	3
	10+ – 20	6	5	4
2.5+ - 3.0	0 – 10	7	6	5
	10+ - 20	8	7	6
3.0+ - 4.0	0 – 10	9	8	7
	10+ - 20	10	9	8
>4.0	0 – 10	11	10	9
	10+ - 20	12	11	10

10. Dual Mound Systems.

(a). Dual System Requirement. Dual mound systems shall be required for any system where the average site percolation rate exceeds 90 MPI or, due to space constraints, the sand fill run-out of the primary mound overlaps the sand fill run-out of the secondary mound.

(b). **Distribution Bed Placement.** Dual mound systems shall have at least two (2) distinctly separate distribution beds. The beds may be placed within one continuous mound or in separate mounds. The distribution beds may be placed end-to-end or up-slope/down-slope of one another subject to meeting minimum sizing requirements for basal and linear loading rates above.

(c). Distribution Bed Separation. The minimum lateral (i.e., end-to-end) separation between distribution beds in a dual mound system shall be six (6) feet.

(d). Effective Basal Area. For dual mound systems, the effective basal area for sizing the two systems shall not overlap.

(e). Alternate Dosing. The distribution beds for dual mound systems shall be designed and operated to provide alternate dosing and resting of the beds.

11. Inspection Wells. Inspection wells shall be installed in all mound dispersal systems as follows**:**

(a). Pressure Dose Mounds on Flat Ground: Inspection wells shall be located in the middle of the bed at 1/6, ½, and 5/6 positions along length of the bed. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(b). Pressure Dose Mounds on Sloped Ground: Inspection wells shall be located at the toe of the aggregate bed. Wells shall be positioned along the length of the bed at 1/6, ½, and 5/6 of the length. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTIONS

1. Reference guidelines. Construction of mound systems shall be in accordance with guidelines contained in the following references:

(a). "Design and Construction Manual for Wisconsin Mounds", Small Scale Waste Management Project, University of Wisconsin, Madison, January 2000, including any amendments.

(b). "Onsite Wastewater Treatment Systems Manual", U.S. EPA February 2002.

2. Construction Plans. Construction plans for mound systems shall include:

(a). All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines and notes for use by the installer;

(c). Erosion control plan;

(d). Recommended make and model of components;

(e). Recommended pump system components, with cut sheet depicting float settings;

(f). Control panel programming; and

(g). An inspection schedule listing critical control points.

3. Construction Inspection. At a minimum, inspection of the mound system installation should include the following. Joint inspections by the system designer, installation contractor, property owner, and SCEHD may be required.

(a). Pre-construction inspection where the construction staking or marking of the mound system is provided and construction procedures discussed;
(b). Water tightness of all tanks;
(c). Clearing and ripping/plowing of the mound basal area soils;
(d). Sand material and placement;
(e). Pea gravel distribution bed and piping installation;
(f). Hydraulic squirt test of the distribution system;
(g). Functioning and setting of all control devices;
(h). Placement of filter fabric silt barrier and soil cover.

Final inspection to verify that all construction elements are in conformance with the approved plan/permit and specifications, all inspection wells are installed, and erosion control has been completed.

The system designer shall prepare an Operations and Maintenance (O & M) Manual for use by the owner which shall describe the proper use of the system and allow owners, or other persons, to conduct the minimum maintenance and monitoring/inspections needed for the system.

f. MANAGEMENT REQUIREMENTS.

The recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for mound systems are outlined as follows:

1. Inspections. To be conducted according to permit conditions and/or based on the O & M manual prepared by the designing consultant, typically every six (6) to twelve (12) months.
(a). Conduct routine visual observations of mound and downslope areas and surroundings for wet areas, pipe leaks, or damage, soil erosion, drainage issues, abnormal vegetation, burrowing animals, or other problems.
(b). Perform all inspections of pump and appurtenances per the O & M Manual.
(c). Record observations.

2. Maintenance. To be completed according to O & M Manual recommendations, typically annually unless otherwise specified.
(a). Purge laterals, squirt, and balance.
(b). Exercise valves.
(c). Perform all maintenance work as recommended by equipment manufacturer for any special components.
(d). Maintain mound area landscape vegetation as needed.
(e). Investigate and repair erosion, drainage, or other field problems as needed.
(f). Investigate and perform distribution system corrective work, as needed.
(g). Record all work done.

3. Water Monitoring and Sampling.
(a). Measure and record water levels in observation/monitoring wells in distribution bed, sand fill, and around mound perimeter at least annually.
(b). Obtain and analyze water samples from monitoring wells, when system failure is suspected.

4. Reporting. To be done when requested.
(**a).** Report findings to SCEHD.

(b). Standard report to include dates, observation well and monitoring well readings, and other data collected work performed, and performance summary.
(c). Report public health/water quality emergency to SCEHD immediately.

IX. STANDARDS FOR AT-GRADE SYSTEMS

a. DESCRIPTION

At-grade systems are similar to mound systems, except that they do not include the sand bed. The gravel distribution bed is placed directly on the scarified (i.e., plowed) soil surface. They are often used in conjunction with a supplemental treatment system. They can be used in the same types of situations as mound systems to overcome shallow soil depths and high groundwater.

b. CONSTRAINTS ADDRESSED

1. High groundwater;
2. Shallow soil over impermeable soil or bedrock;
3. Shallow soil over fractured rock or course alluvium; and
4. Limited dispersal area.

c. SITING CRITERIA

1. Setbacks. Horizontal setback requirements for At-grade systems shall be those applicable to conventional dispersal fields.

2. Vertical Separation Requirements.

(a). Depth to Groundwater. Minimum depth to seasonal high groundwater for At-grade systems, as measured from the ground surface shall be no less than two feet.

Percolation Rate	Depth to Groundwater		Soil Depth	
(MPI)	Primary Treatment	Supplemental Treatment	Primary Treatment	Supplemental Treatment
1 - 5	NP[1]	3ft	NP[1]	3ft
5+ - 120	2ft	2ft	3ft	2ft

[1] At-grade dispersal systems not permitted (NP) without supplemental treatment where percolation rates are less than 5 MPI

(b). Minimum Soil Depth. Minimum soil depth, as measured from the ground surface to impermeable soil or rock, for At-grade systems shall vary according to soil percolation rate and the level of treatment provided as shown above. These minimum soil depth requirements shall apply within the dispersal field and in the adjacent area extending a distance of 25 feet down-slope of the At-grade system on sloping sites, and a distance of 15 feet on all sides on level sites.

3. Percolation Rate. Average percolation rate for At-grade systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined from testing at one (1) to two (2) feet below ground surface. These percolation requirements shall apply within the dispersal field and in adjacent area extending a distance of 25 feet down-slope of the At-grade system on sloping sites, and a distance of 15 feet on all sides on level sites.

4. Ground slope. Maximum ground slope for At-grade systems shall be 20%.

5. Reserve Area/Dual System. A reserve area having suitable site conditions and sufficient area for full, 100% replacement of the primary At-grade system shall be provided or a complete dual primary and secondary At-grade shall be installed initially. See D.8 for circumstances requiring the installation of a dual system (and applicable requirements). In determining the necessary space for a primary and secondary (reserve) field, the required gravel distribution bed area of the primary and secondary At-grade shall not overlap. The surplus soil fill run-out may also not overlap unless primary and secondary At-grades are both installed at the same time (as a dual system).

d. DESIGN CRITERIA

1. Treatment. The following treatment requirements shall apply in connection with the use of At-grade systems:

(a). Primary (septic tank) treatment shall be a minimum level of treatment, and shall be acceptable where the average percolation rate is in the range of 6 – 120 MPI and the applicable vertical separation distances are met.

(b). Supplemental treatment, using an approved alternative treatment system identified in this manual, shall be required where the average percolation rate is between 1 and 5 MPI, and/or to allow compliance with reduced vertical separation distances.

2. Design Sewage Flow. At-grade systems shall be designed on the basis of the projected sewage flow for the structure or facility being served or determined in accordance with sewage flow estimation provided in Section E.V. of this LAMP.

3. Pressure Dosing. Wastewater effluent, from the septic tank or supplemental treatment system, shall be applied to the At-grade system by pressure dosing, utilizing a pump system. The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:

(**a).** Uniform dosing of effluent over the surface of the At-grade distribution bed;

(b). Adequate flow rate, screening of effluent, and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;

(c). Suitable access provisions for inspection, testing, and adjustment of the pressure distribution system;

(d). Dosing volume to achieve a minimum of five (5) doses per day at design flow conditions; and

(e). Dosing shall be completed using a time-dose pump control module where no connection exists between the pump on and high level alarm circuits; and

(f). At least one lateral for every 36 inches of distribution bed width.

Additional requirements for design and construction of pressure distribution piping systems contained in guidelines for shallow pressure distribution systems shall also apply.

4. Pump System. The pump system shall be: (a) appropriate for the sewage applications; (b) of the size and type to meet hydraulic design requirements; and (c) designed and constructed in accordance with pump requirements provided in this LAMP.

5. Gravel Distribution Bed.

(a). Material. The distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.

(b). **Depth.** Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping.

(c). **Width.** Maximum width of the distribution bed shall be ten (10) feet. Long, narrow distribution bed configurations are preferred.

(d). **Wastewater Application Rate.** The wastewater application rate used for sizing the basal surface area of the distribution bed (i.e., soil infiltrative surface) shall be the same as for conventional leach lines. A reduction of these loading rates or other provisions to insure the long-term integrity and performance of the At-grade distribution bed may be required for high strength waste flows such as from restaurants.

(e). Minimum Basal area Sizing. At a minimum, sizing of the distribution bed basal area shall be determined by dividing the design wastewater flow (in gpd) by the applicable application rate for soils at the site.

(f). Linear Loading Rate Requirements. The length of the distribution bed shall be sized to meet maximum linear loading rate criteria as follows:

(1). Linear Loading Rate Definition. Linear loading rate is defined as the volume of wastewater flow (in gpd) divided by the effective length of the dispersal system measured along the slope contour.

(2). Effective length. The effective length (L0 of the At-grade system for determining the linear loading rate) shall be the length of the gravel distribution bed measured along the down-slope edge. Separate linear loading rate calculations shall be made for the primary and secondary (reserve) systems. However, the effective length of each field may overlap for purposes of determining compliance with linear loading rate criteria.

(3). Wastewater Flow. The wastewater flow used for determining the linear loading rate shall be as follows:

- 150 gpd/bedroom for residential systems; and
- Design sewage flow rate for commercial, institutional, industrial, and multi-residential systems.

(4). Loading Rate Criteria. Maximum linear loading rates for At-grade systems vary according to ground slope and percolation rates as shown below. If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soils and utilizing site specific hydraulic conductivity data.

Maximum Linear Loading Rates (gpd/lineal foot)

Soil Depth	**Ground slope**	**Percolation Rate (MPI)**		
(ft)	(%)	1 – 30	30+ - 60	60+ - 120
2.0 to 3.0	0 – 10	5	4	3
	10+ - 20	6	5	4
3.0 to 4.0	0 – 10	7	6	5
	10+ - 20	8	7	6
4.0 to 5.0	0 – 10	9	8	7
	10+ - 20	10	9	8
>5.0	0 – 10	11	10	9
	10+ - 20	12	11	10

6. Silt Barrier. The gravel distribution bed shall be covered in its entirety with a geotextile (filter fabric) silt barrier. Filter fabric shall either be polyester, nylon, or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent, and shall be permeable.

7. Soil Cover.

(a). Material. A continuous soil cover shall be placed over the entire distribution bed. The soil cover shall consist of a medium, loamy texture soil.

(b). **Depth.** Soil cover shall be a minimum of six (6) inches and a maximum of eighteen (18) inches over the top of the distribution bed. Soil cover over the distribution bed shall be crowned to promote rainfall runoff, and be compacted by track-rolling, minimum of two passes or other similar method.

(c). Lateral Extension. The soil cover shall extend a minimum of four (4) feet beyond the perimeter edge of the gravel bed in the upslope and side directions. In the down-slope direction, the soil cover extension beyond the downslope edge of the gravel bed shall vary according to slope as follows:

Ground Slope (%)	Soil Fill Extension (ft)
0 – 2	4
3 – 4	6
5 – 6	8
7 – 8	10
9 – 10	12
11 – 12	14
13 – 14	16
15 – 16	18
17 – 18	20
19 – 20	24

8. Dual At-grade Systems.

(a). **Dual System Requirement.** Dual At-grade systems shall be required for any system where the average site percolation rate exceeds 90 MPI or, due to space constraints, the soil cover run-out of the primary At-grade system overlaps the soil cover run-out area of the secondary At-grade system.

(b). **Distribution Bed Placement.** Dual At-grade systems shall have at least two (2) distinctly separate distribution beds. The beds may be placed with one continuous soil cover fill or with independent soil cover fill. The distribution beds may be placed end-to-end or upslope/downslope of one another, subject to meeting minimum sizing requirements determined from basal area and linear loading criteria above.

(c). Distribution bed separation. The minimum lateral (i.e., end-to-end) separation between distribution beds for a dual At-grade system shall be six (6) feet.

(d). Alternate Dosing. The distribution beds for dual or multiple At-grade systems shall be designed and operated to provide alternate dosing and resting of beds.

9. Inspection Wells. Inspection wells shall be installed in all mound dispersal systems as follows**:**

(a). Pressure Dose Mounds on Flat Ground: Inspection wells shall be located in the middle of the bed at 1/6, ½, and 5/6 positions along length of the bed. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(b). Pressure Dose Mounds on Sloped Ground: Inspection wells shall be located at the toe of the aggregate bed. Wells shall be positioned along the length of the bed at 1/6, ½, and 5/6 of the length. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTION

1. Reference Guidelines. Construction of At-grade systems shall be in accordance with guidelines contained in the following references:

(a). "Wisconsin At-grade Soil Absorption System Siting, Design, and Construction Manual", Small Scale Waste Management Project, University of Wisconsin – Madison, 1990.

(**b).** "Onsite Wastewater Treatment Systems Manual", U.S. EPA, February 2002.

(c). "At-grade Component Using Pressure Distribution Manual for Private Onsite Wastewater Treatment Systems", State of Wisconsin, Department of Commerce, 1999.

2. Construction Plans. Construction plans for At-grade systems shall include:

(**a).** All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines and notes for use by the installer;

(c). Erosion control plan;

(d). Recommended make and model of all components;

(e). Recommended pump system components, with cut sheet depicting float settings;

(f). Control panel programming; and

(g). An inspection schedule listing critical control points.

3. Construction Inspection. At a minimum, inspection of the At-grade system installation should include the following. This is in addition to inspection work required for a supplemental treatment system, if used. Joint inspection by the system designer, installation contractor, the owner and SCEHD may be required.

(a). Pre-construction inspection where the construction staking or marking of the At-grade system is provided and construction procedures discussed;

(b). Water tightness of all tanks;

(c). Clearing and ripping/plowing of the At-grade basal area soils;

(d). Pea gravel distribution bed and piping installations;

(e). Hydraulic (squirt) test of the distribution system;

(f). Functioning and setting of all control devices;

(g). Placement of filter fabric silt barrier and soil cover; and

(h). Final inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, and erosion control has been completed.

The system designer shall prepare an Operations and Maintenance (O & M) Manual for use by the owner which shall describe the proper use of the system, and allow the owner, or other persons, to conduct the minimum maintenance and monitoring/inspections needed for the system.

f. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for At-grade systems are as follows:

1. Inspections. To be conducted according to the O & M Manual.

(a). Conduct routine visual inspection of At-grade fill and downslope area and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, burrowing animals, or other problems.

(b). Perform all inspections of pump and appurtenances.

(c). Record all observations.

2. Maintenance. Perform distribution system maintenance annually and other maintenance as specified in the O & M Manual.

(a). Purge laterals, squirt, and balance when possible;

(b). Exercise all valves where accessible;

(c). Perform all maintenance work as recommended by equipment manufacturer for any special valves or other components;

(d). Maintain fill area landscape vegetation, as applicable, and as needed;

(e). Investigate and repair erosion, drainage, or other dispersal field problems, as needed;

(f). Investigate and perform distribution system corrective work, as needed; and

(g). Record all work performed.

3. **Water Monitoring and Sampling.** Measure dispersal system water levels annually and conduct other monitoring according to the O & M Manual as applicable.

(a). Measure and record water levels in observation wells in distribution bed and around system perimeter;

(b). Obtain and analyze water samples from monitoring wells, as applicable, when system failure is suspected.

4. Reporting. To be done according to O & M Manual recommendations.

(a). Report findings to SCEHD when requested;

(b). Standard report should include dates, observations, and inspection well readings, and other data collected, work performed, corrective actions taken, and performance summary; and

(c). Report public health/water quality emergency to SCEHD immediately.

X. STANDARDS FOR PRESSURE-DOSED SAND TRENCH SYSTEMS

a. DESCRIPTION

Pressure-dosed sand trench systems (PDST) systems are a variation of a shallow pressure distribution system that utilizes a medium grade sand in place of a portion of the gravel fill in the dispersal trench to improve treatment of effluent and normalize flow of effluent before it reaches the trench bottom. Treatment occurring in the sand fill can enhance the acceptance rate of native soils beneath the trench. This type of design can also be used with supplemental treatment, and is well suited for conditions where underlying soils are highly permeable and/or groundwater beneath a system is especially vulnerable to wastewater contaminants.

b. CONSTRAINTS ADDRESSED

1. High groundwater; and
2. Rapid percolation.

c. SITING CRITERIA

1. Setbacks. Horizontal setback requirements for PDST systems shall be those applicable to conventional leach line dispersal fields.

2. Vertical Separation Requirements.

(a). Depth to Groundwater. Minimum depth to seasonal high groundwater for PDST systems, as measured from the trench bottom, shall vary according to soil percolation rate, level of treatment provided, and sand fill thickness as follows:

Percolation Rate	Depth to Groundwater (ft)	
(MPI)	Primary Treatment	Supplemental Treatment
1 – 5	3[1]	2[2]
5+ - 120	2[2]	2[3]

[1] 24-inch sand thickness beneath pipe
[2] 12-inch sand thickness beneath pipe
[3] 6-inch sand thickness beneath pipe

(b). Soil Depth. Minimum depth of soil, as measured from ground surface to impermeable soil or rock, for PDST systems shall be 2 feet.

3. Percolation Rate. Average percolation rate for PDST systems shall be within the range of 1 to 120 minutes per inch (MPI) as determined in accordance with standard percolation requirements for conventional dispersal trenches.

4. Ground Slope.

(a). Maximum ground slope in areas used for PDST systems shall be 40 percent.

(b). Any PDST located on slopes greater than 30 percent shall require the completion of a slope stability report approved by a registered professional.

5. Dual System. When the average site percolation rate exceeds 90 MPI, two PDST dispersal fields, each one hundred percent of the total size required for the design flow, shall be installed and interconnected with an approved flow diversion device (pressure rated), intended to allow alternate use of the two fields.

d. DESIGN CRITERIA

1. Treatment. The following requirements shall apply in connection with the use of PDST systems:

(a). Primary (septic tank) treatment shall be the minimum level of treatment, and shall be acceptable where the applicable vertical separation distances are met (see C. above).

(b). Supplemental treatment, using an approved alternative treatment system identified in this LAMP, may be used to allow compliance with reduced vertical separation distances in **C**. above.

2. Design Sewage Flow. PDST systems shall be designed on the basis of the projected sewage flow for the structure or facility being served, or determined in accordance with sewage flow estimation guidelines provided in Section E.V. of this manual. System size uses trench bottom and no sidewall.

3. Pressure Dosing. Septic tank or supplemental treatment system effluent shall be applied to the PDST system by pressure dosing, utilizing either an automatic dosing siphon or a pump system. The pressure distribution system is to be designed in accordance with accepted engineering practices to achieve, at a minimum:

(a). Uniform dosing of effluent throughout the system of PDST trenches;

(b). Adequate flow rate, screening of effluent, and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;

(c). Suitable access provisions for inspection, testing, and adjustment of pressure distribution piping system;

(d). Dosing shall be completed using a time-dose pump control module where no connection exists between the pump on and high level alarm circuits;

(**e**). Dosing volume to achieve a minimum of five (5) doses per day at design flow conditions; and

(f). Additional requirements for design and construction of pressure distribution piping systems, contained in "Guidelines for Pressure Distribution Systems" above, shall also apply.

4. Pump System. The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements of this Technical Standards Manual.

5. Drain field Trenches. PDST drain field trenches shall conform to the same design and construction requirements as shallow PD trenches, per this Technical Standards Manual, with the exception that the filter trench material (below the distribution pipe) shall consist of a minimum of six (6) inches of double-washed pea gravel underlain by six (6) to twenty-four (24) inches of medium sand fill per c.2.a. above and d.8. below. Additionally, system dosing shall not exceed those numbers given in section 8.a and 8.b below.

Trench Width. Trench widths for PDST systems shall be as follows:

(a). For septic tank effluent: 18 to 36 inches

(b). With supplemental treatment: 12 to 36 inches

6. Sand Fill.

(a). Sand Specifications. The sand media shall be a medium to coarse sand that meets the following gradation specifications:

Sieve Size	Percent Passing
3/8	100
#4	90 – 100
#10	80 – 100
#16	45 – 82
#30	25 – 55
#50	5 – 20
#60	0 – 10
#100	0 – 4
#200	0 – 2

Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to SCEHD to verify conformance with the above specifications.

(b). Depth of Sand. The minimum depth of sand below the drain rock shall be as follows:

(1). For septic tank effluent:

- 1 – 5 MPI percolation: 24”
- 5+ - 120 MPI percolation: 12”

(2). With supplemental treatment:

- 1 – 5 MPI percolation: 12”
- 5+ - 120 MPI Percolation 6”

8. Wastewater Application Rates. Wastewater application rates used for system sizing shall include consideration for both the: (a) pea gravel – sand interface; and sand-soil interface, bottom area only. The more restrictive criterion shall govern system sizing.

(a). Pea Gravel - Sand Interface. The wastewater application rate used for sizing the pea gravel – sand interface shall be:

(1). 1.0 gpd/ft^2 for individual residential OWTS.

(2). 0.8 gpd/ft^2 for commercial, industrial, institutional, and multi-residential OWTS.

(b). Sand – Soil Interface. The wastewater application rate for sizing the sand – soil interface (considering bottom area only) shall be based upon representative percolation test results for the soil zone corresponding with trench bottom depth as shown below:

Percolation Rate (MPI)	Wastewater Loading Rate (gpd/ft^2)
1 -5	1.0
10	0.8
24	0.6
30	0.533
45	0.367
60	0.2
90 - 120	0.1

Reduction in the above wastewater loading rates or other provisions to insure the long term integrity and performance of the PDST trenches may be required for high strength waste flows, such as from restaurants.

9. Trench Sizing. The required square footage of trench infiltrative surface shall be calculated based on design flow and the applicable wastewater application rate above. The required length of trench shall be calculated based on the bottom area only up to a maximum of three (3) square feet of effective infiltrative surface per lineal foot of trench.

10. Inspection Wells. Inspection wells shall be installed in all PDST dispersal systems as follows**:**

(a). Pressure Dose Trenches: Inspection wells shall be located at the end of each lateral of the PDST system, extending from the bottom of a dispersal trench to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(b). Pressure Dose Sand Beds on Flat Ground: Inspection wells shall be located in the middle of the bed at 1/6, ½, and 5/6 positions along length of the bed. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

(c). Pressure Dose Sand Beds on Sloped Ground: Inspection wells shall be located at the toe of the aggregate bed. Wells shall be positioned along the length of the bed at 1/6, ½, and 5/6 of the length. Inspection wells shall extend from the bottom of a dispersal bed to the ground surface with perforations for the entire interval of aggregate. No annular space seal is required.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTION

1. Reference Guidelines. In addition to the requirements set forth herein, design and construction of PDST systems shall generally follow guidelines contained in the following references:

(a). "Onsite Wastewater Treatment Systems Manual", U.S. EPA, February 2002 and as amended.

(b). "Design Manual – Onsite Wastewater Treatment and Disposal Systems" U.S. EPA, October 1980.

2. Construction Plans. Construction plans for PDST systems shall include:

(a). All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines and notes for use by the installer;

(c). Erosion control plan for any site over 20% slope, utilizing cover fill, or design flow greater than 1,000 gpd;

(d). Recommended make and model of any components;

(e). Recommended pump system components with cut sheets depicting float settings;

(f). Control panel programming; and

(g). An inspection schedule listing critical control points.

3. Construction Inspection. At a minimum, inspection of the PDST system installation should include the following. This is in addition to inspection work required for a supplemental treatment system, if used. Joint inspection by the system designer, installation contractor, property owner and SCEHD may be required.

(a). Pre-construction inspection where the construction staking or marking of the various system components is provided and construction procedures is discussed;

(b). Water tightness of all tanks;

(c). Layout and excavation of dispersal trenches and piping;

(d). Sand and drain rock materials and placement;

(e). Piping installation and hydraulic “squirt” test of the distribution system;
(f). Functioning and setting of all control devices, and;
(g). Final inspection to verify that all construction elements are in conformance with the approved plans and specifications, all performance wells are installed, and erosion control has been completed.

The system designer shall prepare an Operation and Maintenance (O & M) Manual for use by the property owner which shall describe proper use of the system and allow the owner, or other person, to conduct the minimum maintenance and monitoring/inspections needed for the system.

f. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, monitoring, and reporting activities for pressure dosed sand trench systems are outlined as follows:

1. Inspections. To be conducted according to the O & M Manual recommendations.
(a). Conduct routine visual observations of dispersal field and downslope area and surrounding areas for wet areas, pipe leaks, or damage, soil erosion issues, abnormal vegetation or other problems.
(b). Perform other inspection recommended of the pump system.

2. Maintenance. Distribution system maintenance to be conducted per O & M Manual recommendations.
(a). Purge laterals, squirt, and balance;
(b). Exercise valves;
(c). Perform all maintenance work as recommended by equipment manufacturer for any special valves/equipment;
(d). Investigate and repair erosion, drainage, or other disposal field problems, as needed;
(e). Investigate and perform distribution system corrective work, as required; and
(f). Record all work done.

3. Water Monitoring and Sampling. To be performed per O & M manual requirements:
(**a).** Measure and record water levels in trench observation wells;
(**b**). Measure and record water levels in dispersal field monitoring wells;
(c). Immediately report any continuous ponding at sand interfaces that may indicate the formation of a restrictive biomat.
(d). Obtain and analyze water samples from the monitoring wells when evidence of system failure exists.

4. Reporting.
(a). Report findings to SCEHD when requested;
(b). Standard report should include dates, observation well and monitoring well readings, and other data collected, work performed corrective actions taken, and performance summary;
(c). Report public health/water quality emergency to SCEHD immediately.

XI. STANDARDS FOR SUBSURFACE DRIP DISPERSAL SYSTEMS

a. DESCRIPTION

Subsurface drip dispersal is a method for disposal of treated and filtered wastewater that uses special drip tubing designed for use with wastewater. The drip line is normally placed six (6) to twelve (12) inches below the ground surface and makes use of the most biologically active soil zone for distribution, nutrient uptake, and evapotranspiration of the wastewater. A drip dispersal system is comprised of small diameter (1/2" to 1") drip lines, usually spaced about 24 inches apart, with emitters located 12 to 24 inches on center along the drip line. Effluent is conveyed under pressure to the drip line laterals with timed doses. Prior to dispersal, the effluent requires supplemental treatment.

Drip dispersal has several advantages, including (a) it can be effective in very shallow soil conditions since it distributes the wastewater very uniformly to all of the available soil in the field; (b) it can be installed in multiple small discontinuous zones, allowing the hydraulic load to be spread widely rather than concentrated in main areas as with other dispersal systems; (c) installation on steeper slopes causes less soil disturbance and erosion or slope stability hazards; and (d) water movement away from drip emitters is substantially by unsaturated/capillary flow, which maximizes contact with and treatment by the soil.

b. CONSTRAINTS ADDRESSED

1. High Groundwater;
2. Shallow soil over impermeable soil or bedrock;
3. Shallow soil over fractured rock or course alluvium;
4. Slow percolation at standard dispersal trench depths;
5. Steep slopes;
6. Limited dispersal area; and
7. Large and/or dense tree cover.

c. SITING CRITERIA

1. Setbacks. Horizontal setback requirements for drip dispersal systems shall be the same as for conventional leach lines except that drip dispersal lines may be installed within two (2) feet of structures.

2. Vertical Separation Requirements.

(a). Depth to Groundwater. Minimum depth to seasonal high groundwater, as measured from the bottom of the drip line, shall vary according to soil percolation rate as follows:

Percolation (MPI)	Depth to Groundwater
1 – 5	3 feet
5+ - 120	2 feet

(b). Soil Depth. Minimum depth of soil, as measured from the bottom of the drip line to impermeable soil or rock, shall be two (2) feet.

3. Percolation Rate. Percolation rates for subsurface drip dispersal systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined by testing at a depth of 12".

4. Ground Slope.

(a). Maximum ground slope in areas used for drip dispersal systems shall be 50 percent.

(b). Any drip dispersal system located on slopes greater than 30 percent shall require the completion and submittal of a slope stability report prepared by a registered professional.

5. Dual System. Two drop dispersal fields, each one hundred percent of the total size required for the design sewage flow, shall be installed and interconnected with an approved flow diversion device (pressure rated), to allow alternate or combined use of the two fields.

d. DESIGN CRITERIA

1. Treatment: The following treatment requirements shall apply in connection with the use of subsurface drip dispersal systems:

(a). Wastewater effluent discharged to any drip dispersal system shall be treated to at least a secondary level through an approved supplemental treatment system, in accordance with applicable guidelines in this Technical Standards Manual.

(b). All drip dispersal systems shall include a filtering device capable of filtering particles larger than 100 microns. This device shall be located downstream of the supplemental treatment system.

2. Design Sewage Flows: Subsurface drip dispersal systems shall be designed on the basis of the projected sewage flow for the structure or facility being served determined in accordance with sewage flow estimation guidelines.

3. Wastewater Application Rates. Wastewater application rates used for drip dispersal fields shall be based on soil percolation rates and the corresponding loading rates given in TABLE 2.

4. Drip field Sizing.

(a). Minimum sizing of the drip dispersal field area shall be equal to the design wastewater flow divided by the applicable wastewater application rate (Table 2).

(b). For sizing purposes, effective ground surface area used for drip field calculations shall be limited to no more than 4.0 square feet per drip emitter (tubing at 2ft spacing with emitters at 24" on the tubing). For example, 200 lineal feet of drip line with emitters at 2 foot spacing would require a total of 100 emitters (200/2) and could be used for dispersal to an effective area of up to 400 square feet (100 emitters x 4 ft^2/emitter). Conversely, if wastewater flow and percolation design information indicate the need for an effective area of 1,000 ft^2, the drip line design and layout would have to be configured to provide a minimum of 250 emitters spaced over the required 1,000 ft^2 dispersal area.

(c). Drip fields may be divided into multiple zones which may be located in different areas of a site, as desired or needed to provide the required dispersal system size. A single, continuous drip field area is not required. However, any areas proposed for drip dispersal shall be supported by field observation/tests/measurements to verify conformance with soil suitability and other site requirements. Differences in soil conditions and percolation characteristics from one zone to another may require the use of correspondingly different wastewater application rates and drip field sizing for each zone.

5. Pressure Dosing. Secondary treated effluent shall be delivered to the drip field by pressure, employing a pump system and timed dosing. The pressure distribution system shall be designed in accordance with accepted engineering practices and manufacturer recommendations for drip dispersal systems to achieve, at a minimum:

(a). Uniform dosing of treated effluent;

(b). An adequate dosing volume and pressure per manufacturer's guidelines;

(c). Dosing shall be completed using a time-dose pump control module where no connection exists between the pump on and high level alarm circuits;

(d). Adequate flow rate, final filtering of effluent and suitable piping network to preclude solids accumulation in the pipes and drip lines or clogging of discharge emitters;

(e). A means of automatically flushing the filter noted in D.1.b. and drip lines at regular intervals; and

(f). Suitable access provisions for testing, inspection, and adjustment of the drip field and components and line flushing.

6. Pump System. The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet hydraulic design requirements; (c) designed and constructed in accordance with pump system requirements.

7. Drip line Material. Drip line shall be manufactured and intended for use with secondary quality wastewater, with minimum 45 mil tubing wall thickness, bacterial growth inhibitors, and means of protection against root intrusion.

8. Drip field Layout. Each drip line row shall be level and parallel to the slope contour.

9. Drip line Depth. The drip line depth shall be installed at a depth between six (6) and twelve (12) inches below native grade. Deeper placement of drip lines may be considered by SCEHD on a case-by-case basis.

10. Length of individual Drip lines. The maximum drip line length shall be designed in accordance with accepted engineering practices and in accordance with the manufacturer's criteria and recommendations.

11. Line and Emitter Spacing. Line and emitter spacing shall be designed as appropriate for soil conditions, slope, and contour. Emitters shall be located at no less than 12" from the supply and return manifolds.

12. Dual System Operation. Unless exempted by the Director, all drip dispersal systems shall be installed as dual (200%) capacity drip fields, and shall normally be operated with both fields in use. Doses may be alternated among different zones in both the primary and secondary fields, or all zones may be dosed simultaneously. Secondary drip fields should not be left dormant for long periods of time (more than a few weeks at a time) to preserve planted vegetation.

13. Inspection Wells. A minimum of three (3) inspection wells, minimum three (3) feet in depth, shall be installed for the purpose of monitoring groundwater levels or for water quality sampling within and around the drip dispersal field as follows:

(a). One well shall be located within the drip field area.

(b). One well shall be located 10 to 15 feet up-gradient of the drip field.

(c). One well shall be located 10 to 15 feet down-gradient of the drip field.

(d). Wells shall be constructed of 2" to 4" diameter pipe (or equivalent), equipped with a wrench tight cap or plug and a bottom cap. All wells shall be perforated beginning at a depth of 12 inches below grade and extending to the bottom of the pipe. Perforations shall consist of hacksaw slots at a nominal one (1) inch spacing, or equivalent commercially slotted pipe. Inspection wells should be sealed with a bentonite or concrete annual seal (or equivalent) to prevent surface infiltration.

14. Vegetation. Vegetation shall be planted to assist in transpiration of dispersed effluent. Vegetation shall be appropriate for the soil/loading rate.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTION

1. Reference Guidelines. Installation of subsurface drip dispersal systems shall be in accordance with applicable manufacturer's guidelines and recommendations.

2. Construction Plans. Construction plans for subsurface drip dispersal systems shall include:

(a). All relevant elevation data and hydraulic calculations;

(b). Specific step-by-step construction guidelines and notes for use by the installer;

(c). Erosion control plan for any site over 20% slope, utilizing cover fill, or with design flow greater than 1,000 gpd;

(d). Recommended make and model of components;

(e). Recommended pump system components, with cut sheets depicting float settings;

(f). Control panel programming; and

(g). An inspection schedule listing critical control points.

(h). Planting of vegetation to assist with effluent transpiration.

3. Construction Inspection. At a minimum, inspection of the drip dispersal system installation should include the following. This is in addition to inspection work required for the treatment system. Joint inspection by the system designer, installation contractor, property owner, and SCEHD may be required.

(a). Pre-construction inspection where the construction staking or marking of the drip lines, supply and return piping, pump system, and appurtenances is discussed;

(b). Water tightness of all tanks;

(c). Drip field layout, piping materials and installation, and all associated valves and connections;

(d). Hydraulic testing of the system;

(e). Functioning and setting of all control devices; and

(f). Final inspection to verify that all construction elements are in conformance with the approved plans, specifications, and manufacture recommendations, all inspection wells are installed, final vegetation planting, and erosion control has been completed.

The system designer shall prepare an Operation and Maintenance (O & M) Manual for use by the owner which shall describe the proper use of the system and allow owners, or other persons to conduct the minimum maintenance and monitoring/inspections needed for the system.

f. MANAGEMENT REQUIREMENTS

In addition to the requirements for a supplemental treatment system, the recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for subsurface drip dispersal systems are as follows:

1. Inspections. To be conducted according to O & M Manual recommendations:

(a). Conduct routine visual observations of drip field, downslope and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, borrowing animals, or other problems;

(b). Conduct routine physical inspections of system components, including valves, filters, and head works boxes;

(c). Perform special inspections of drip field at time of any landscaping work or other digging in drip field area;

(d). Perform inspection of dosing pump and appurtenances; and

(e). Record all observations.

2. Maintenance. To be completed according to O & M Manual recommendations:

(a). Manually remove and clean filter at least every six (6) months;

(b). Clean and check operation of pressure reducing valves; and

(c). Clean flush valves and vacuum release valves.

3. Water Monitoring and Sampling. To be performed per O & M Manual recommendations:

(a). Measure and record water levels in dispersal field monitoring wells, as applicable, per permit requirements;

(b). Obtain and analyze water samples from dispersal field monitoring wells, if system failure is suspected.

4. Reporting. To be done at the request of SCEHD:

(a). Report findings to SCEHD when requested;

(b). Standard report should include dates, monitoring well and other data collected, work performed, corrective actions taken, and performance summary;

(c). Report public health/water quality emergency to SCEHD immediately.

XII. STANDARDS FOR CURTAIN DRAINS

a. DESCRIPTION

A curtain drain, sometimes called a French Drain, is a simple system with no moving parts used to artificially lower a water table by intercepting subsurface water flowing down gradient through the area of a proposed dispersal system. A curtain drain may lower a seasonal groundwater table sufficiently to allow the installation of a leach line or alternate dispersal system. Typically, a restrictive or impermeable layer must be present for a curtain drain to be most effective in lowering water tables. When considering the use of a curtain drain near an onsite system, care must be taken to prevent any interaction between wastewater and groundwater (and the discharge of effluent/groundwater mix to the ground surface or surface waters). Typically, this is done with a barrier between the drain and a leach field and through maintaining a minimum setback distance between the two. A curtain drain must discharge intercepted water to the ground surface so a site typically requires a minimum 5% slope.

b. CONSTRAINTS ADDRESSED

1. High seasonal groundwater.

c. SITING CRITERIA

1. Setbacks. Horizontal separation requirements for curtain drains shall be those applicable to conventional leach fields. However, curtain drains do not need to meet the setback requirements from property lines, drainage ways, or bodies of water. The curtain drain barrier or combination curtain drain/barrier shall be setback ten (10) feet from a dispersal system. A curtain drain must not be installed within 100 feet, down slope, from a septic system or other OWTS.

2. Vertical Separation Requirements.

(a). Depth to Groundwater. While a curtain drain does not have a setback to water (and in fact must be constructed into water), any dispersal system proposed for installation has a specific separation requirement.

(b). Soil Depth. There is no minimum soil depth for a curtain drain. However, the curtain drain must be excavated deep enough into native soil to be effective in lowering the water table for the needs of the specific dispersal system proposed for use.

3. Percolation Rate. There or no minimum or maximum percolation rates for sites for the installation of a curtain drain. A curtain drain must be designed to be effective regardless of the permeability of the soil at a site.

4. Ground Slope. The minimum ground slope for the effective use of a curtain drain is five (5) %. The maximum slope allowed would be dependent on the type of dispersal system proposed (with a slope stability report for the curtain drain/dispersal system for slopes in excess of 30%). A curtain drain will not function as required on flat or nearly flat sites and a pump system cannot be used to assist in collection or to discharge groundwater.

d. DESIGN CRITERIA

1. Depth of Trench.

(a). The curtain drain must be constructed from just below the ground surface to such a depth as to allow and maintain the minimum separation of the entire dispersal system from the altered groundwater table as measured from the bottom of the dispersal system trench or drip line.

(b). The trench is to be excavated nominally six (6) inches into a limiting impermeable layer or to a depth that would provide the required separation between a dispersal system trench bottom and the altered groundwater table.

2. Width of Trench. The width of a curtain drain trench is typically 12 to 24 inches.

3. Pipe.

(a). A minimum four (4) inch perforated pipe, with perforations oriented down, is laid at the bottom of the trench. Several inches of gravel shall be placed under the pipe. The pipe shall have a minimum fall/slope of one (1) percent up to four (4) percent.

(b). A solid pipe, of the same size or larger than the perforated pipe, shall be used to convey water from the curtain drain to a surface discharge point. This outlet pipe shall have a slope of one (1) to four (4) percent to the discharge point but may be greater.

4. Gravel.

(a). The perforated pipe shall be covered with rock (clean, washed rock suitable for leach field use) and the rock shall extend to the ground surface.

(b). The rock shall be enveloped and covered in a filter fabric. Filter fabric must be of the type approved for use in covering dispersal systems as described elsewhere in this LAMP.

5. Barrier. A barrier must be placed between the dispersal system and the curtain drain as follows:

(a). A minimum thirty (30) mil plastic, rubber, or other impermeable barrier (as approved by the Director) is used to line the down slope side and bottom of a curtain drain trench prior to the placement of the rock. All seems shall be heat or chemically welded to provide an impermeable barrier. With this method, a barrier/drain trench could be placed a minimum of ten (10) feet from the dispersal system.

(b). A bentonite or soil/bentonite blend or impermeable barrier, as above, is placed dry into a narrow trench between the curtain drain and the dispersal system. This trench would be placed ten (10) feet from the dispersal system and a curtain drain closely above it.

(c). Barrier material in a separate trench should extent into the restrictive layer, or if one is not present, at minimum of one (1) foot deeper than the curtain drain.

6. Curtain Drain Layout/Siting. The purpose of a curtain drain is to intercept subsurface water before it flows to a dispersal system. The curtain drain must, therefore, be placed directly upstream from the dispersal system. Additionally, the curtain drain and barrier must extend far enough beyond the ends of the dispersal system to prevent groundwater from flowing back to the dispersal system. This is typically a minimum of 15 to 20 feet.

7. Discharge. Water collected in a curtain drain must flow and discharge to the ground surface by gravity flow out of one or more outlet pipes. The outlets shall be located on the property being developed.

(a). The end of the outlet pipe must be clearly visible and must be adequately protected from damage.

(b). The discharge from a curtain drain shall not negatively impact a downslope or neighboring property.

8. Demonstration of effectiveness. A demonstration of the effectiveness of a curtain drain may be required where there is no defined restrictive or impermeable layer directly beneath the site. A small scale or a full scale test of the entire curtain drain, with upslope and downslope monitoring wells, may be required to verify that a curtain drain would be effective in this situation throughout an entire rainy (minimum of 80% of normal rainfall) and/or irrigation season. In dry years, supplemental application of water may be accepted with prior approval of the Director.

e. CONSTRUCTION PLANS AND CONSTRUCTION INSPECTION

1. Construction Plans. Construction plans for curtain drains shall include:

- **(a).** All Relevant elevation data;
- **(b).** Document soil, geologic, and groundwater conditions at the site. Determine the feasibility and means of controlling groundwater levels with a curtain drain;
- **(c).** Determine the appropriate depth and location for the proposed curtain drain and outlet point(s), based on site conditions;
- **(d).** Specific step-by-step construction guidelines and notes for use by the installer;
- **(e).** Erosion control plan if not already prepared for a related dispersal system; and
- **(f)**. An inspection schedule listing all critical control points.

2. Construction Inspection. Construction inspections should be coordinated with the construction of treatment and dispersal systems whenever possible. When not possible, inspection of curtain drains should include the following. Joint inspections by the designer, contractor, and SCEHD may be required.

- **(a).** Pre-construction inspection where the construction staking or marking of the curtain drain, barrier, and discharge outlet is provided and construction procedures discussed;
- **(b).** Piping, barrier, and filter fabric installation and placement of gravel;
- **(c).** Final inspection to verify that all construction elements are in conformance with approved plans and specifications, the outlet is readily visible and protected, and erosion control has been completed.

The system designer shall prepare an Operation and Maintenance (O & M) Manual for use by the system owner which shall describe the proper use of the curtain drain and related dispersal system and allow the property owner or other persons to conduct the minimum maintenance needed for the system.

f. MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring, and reporting activities for curtain drain systems are to be recommended in the O & M Manual. It is expected that a curtain drain system will be installed in conjunction with a supplemental treatment system and/or an alternate dispersal system.

1. Inspections. To be conducted according to O & M Manual recommendations or Operating Permit conditions, typically every six (6) to twelve (12) months, depending on system size usage and history.

2. Maintenance. To be completed according to O & M Manual recommendations or Operating Permit conditions, typically every six (6) to twelve (12) months depending on system size, usage, and history.

3. Water Monitoring and Sampling. If required, according to O & M Manual recommendations or Operating Permit conditions, typically every six (6) to twelve (12) months, depending on system size, usage, and history.

4. Reporting. To be done according to O & M Manual recommendations or Operating Permit conditions, typically every one (1) to two (2) years, depending on size, usage, history and location:

(a). Report findings to SCEHD when requested;

(b). Standard report should describe findings, analyze performance, and detail actions;

(c). Report crisis or failure conditions to SCEHD immediately.

TSM SECTION H. SAMPLE SYSTEM SIZING CALCULATIONS

Here we include examples on sizing all types of treatment, dispersal, and pump systems for use within Shasta County. These examples include septic tank and pump tank sizing, supplemental treatment system sizing, leach field and alternate dispersal system sizing.

a. SEPTIC TANKS
Minimum septic tank sizes for residential use and expected flows are as follows:

One-bedroom	750 gallons for an expected flow of 150 gallons per day
Two-bedrooms	1,100 gallons for an expected flow of 300 gallons per day
Three-bedrooms	1,100 gallons for an expected flow of 450 gallons per day
Four-bedrooms	1,500 gallons for an expected flow of 600 gallons per day
Five-bedrooms	2,000 gallons for an expected flow of 750 gallons per day

An additional 400 gallons is added for each additional bedroom (an additional 150 gallons per day flow). After five bedrooms, the next larger tank size is to be used when a garbage disposal unit is used on the system. Tanks are sized for maximum settling and retention of solids.

In commercial and industrial projects, using the total flow provided by the site developer, the following apply:

1. Up to 1,500 gallons water use per day – Flow x 1.5 = septic tank size
2. Above 1,500 gallons water use per day – Flow x 0.75 + 1,125 = septic tank size

b. SAND FILTERS AND OTHER SUPPLEMENTAL TREATMENT SYSTEMS
1. The capacities of proprietary treatment units is determined by the unit manufacturer.
2. Intermittent sand filters are sized as follows:

(a). Residential use - choose the expected daily flow from the septic tank sizing section above and divide by 1.0 gallons per day per square foot (gpd/ft^2).

Example: A three-bedroom home, with an expected daily flow of 450 gal per day will require an intermittent sand filter of 375 square feet surface area. (450 gallons/day divided by 1.0 gpd/ft^2 =450 ft^2).

(b). Commercial, industrial, institutional, or multi-unit residential use – determine the expected daily flow and divide by 0.8 gpd/ft^2.

Example: A commercial, industrial, institutional, or multi-residential unit (with domestic strength wastewater), in this example, is expected to generate 450 gallons of wastewater per day and will require an intermittent sand filter of 450 square feet of surface area. (450 gallons/day divided by 0.8 gpd/ft^2 = 563 ft^2). Restaurants would be expected to have higher strength wastewater and would generally be designed with a reduced loading rate as noted in the Wastewater Application Rates for intermittent sand filters.

3. Recirculating sand filters are sized as follows:

(a). Residential use – choose the expected daily flow from the septic tank sizing section above and divide by 5.0 gpd/ft^2.

Example: A three-bedroom home, with an expected daily flow of 450 gallons per day will require a recirculating sand filter with 90 square feet of surface area. (450 gallons/day divided by 5.0 gpd/ft^2 = 90 ft^2).

(b). Commercial, industrial, institutional, and multi-residential use – determine the expected daily flow and divide by 4.0 gallons per day per square foot.

Example: A commercial, industrial, institutional, or multi-residential project (with residential strength wastewater) is expected to generate 450 gallons of wastewater per day and will require a recirculating sand filter of 113 square feet of surface area. (450 gallons per day divided by 4.0 gpd/ft^2 = 112.5 square feet rounded up to 113). Restaurants with higher strength waste may require a lower loading rate as determined by a Qualified Professional.

The dispersal system chosen for use after treatment in a sand filter is sized per the instructions for that particular dispersal system.

c. PUMP TANKS

Unless otherwise specified as part of a treatment or dispersal system design, a tank with an adequately-sized pump, used as a pump tank shall be a minimum of 500 gallons and equal to a minimum one day of expected daily wastewater flow or roughly one-third the size of the system septic tank.

d. ROCK AND CHAMBERED LEACH LINES

Leach fields are sized using TABLE 1 (based on the site soil percolation rate) in the appendices or calculated as a function of expected daily flow, soil loading rate (TABLE 2), and trench width/sidewall height for other uses.

1. Residential use - rock leach lines are sized using the applicable tables in the appendices.

Example: A three-bedroom house on a site with a percolation rate of 30 minutes per inch and a two foot wide trench with **12** inches of gravel under the pipe will require **211** lineal feet of leach line. However, if soils at the site will allow only a trench with **6** inches of rock under the pipe, multiply the 211 foot number by **1.25** to see that **264** lineal feet of leach line is required.

At the same site with a three (3) foot wide trench, and **12** inches of rock beneath the pipe, a total of **169** feet of leach line will be required. However, if soils at the site will only allow a trench with **6** inches of rock under the pipe, multiply the 169-foot number by **1.25** to see that **211** lineal feet of leach line is required.

2. Other uses – calculate the daily wastewater flow from the most recent version of the California Plumbing Code adopted by Shasta County or by some other means acceptable to the Director. Obtain a loading rate, based on percolation test results from TABLE 2 in the appendices.

Example: A motel with ten bed spaces (with kitchen) would generate an expected 60 gallons per bed space per day. The site has a percolation rate of 30 minutes per inch. The site would require a minimum of 281 lineal feet of leach line as follows:

At a site allowing **12** inches of leach rock under the pipe, the calculation is 60 gpd x 10 units divided by .533 g/ft^2/day divided by **4** ft^2/lineal foot =**281** lineal feet. (From TABLE 2 in the appendices, a percolation rate of 30 minutes per inch equals a loading rate of 0.533 gallons per square foot per day).

The same site where soil depth will only allow **6** inches of rock under the pipe, the calculation is 60 gallons per day per bed space x 10 bed spaces divided by .533 g/ft^2/day divided by **3** ft^2/lineal foot = **375** lineal feet of leach line.

The calculation can also be similarly adjusted for a three-foot wide trench.

3. Chambered leaching systems – chambers are molded in a specific height, equivalent to 12 inches of rock beneath a leach pipe, and are typically labelled as equivalent to a 24 or 36 inch wide leach rock trench. Chambers may be substituted for a leach rock and pipe system. The calculations are identical to those examples shown above with **211** feet and **264** feet required in the first example (when chambers are installed shallow, where soils allow only 6 inch installation depth (i.e., Low Profile Chambers), additional fill cover is required and sidewall credit is given for 6 inches only).

e. SHALLOW PRESSURE DISTRIBUTION SYSTEMS

Calculating leach line lengths is the same as those used to determine the amount of leach line required for a rock or chambered leach field as shown above. The depth of rock allowed beneath the pipe is the same for small diameter pressure lines as it is for 3 or 4 inch gravity flow lines. The calculation shall use a maximum of 4 feet of infiltrative area (bottom and sidewall) per lineal foot of trench.

f. PRESSURE-DOSED SAND TRENCH (PDST)

A PDST system is sized using trench bottom only. Based on site percolation rates, and using TABLE 2, a site proposed for a three-bedroom residence (450 gallons per day) with a percolation rate of 45 minutes per inch and either 12 or 24 inches of sand beneath the distribution rock leach piping in a 2 foot wide trench will require 726 lineal feet of PDST leach trench as follows:

450 gallons per day divided by a loading rate of **0.367** gallons per square foot per day (from TABLE 2) divided by 2 square feet per lineal foot (PDST systems are dosed based on **bottom area only** – sidewall is not included) = **613** lineal feet. A PDST system with a 3-foot wide trench would require **484** lineal feet of trench (450 divided by 0.367 divided by 3 = 409).

g. AT-GRADE SYSTEMS

At-grade systems are constructed **on the ground surface** and, are therefore, sized using the **bottom area** of the infiltrative bed only. The sizing calculations are identical to those used in calculating the size of a PDST above.

The size of the fill area around the At-grade system is dependent on the size of the infiltrative area and is to be adjusted as required.

Care must be taken to consider linear loading when designing an At-grade system as this may result in a narrower width infiltrative area.

Sizing of an At-grade system is by trench bottom only. The residential sizing TABLE 1 is for two (2) feet of sidewall per lineal feet leach trench. With no credit given for sidewall in an at-grade system, you would need to double the length of leach trench in a two (2) foot wide at-grade system. As an option, and at the discretion of the Director, a three (3) foot wide trench may be allowed. Multiply the length of two (2) foot wide At-Grade dispersal system (as determined above) by two (2 foot wide trench) and divide by three (3 foot wide trench) to calculate the amount of three (3) foot wide trench required. For example:

> **1**. A three-bedroom residence is proposed at a site with a percolation rate of 30 MPI. Using a two (2) foot wide trench, we find that from TABLE 1 that 215 feet of standard leach field is needed. However, no sidewall is used in the AT-grade system calculation so we multiply by two (2), arrive at two hundred and fifteen (215) feet X two (2) = four hundred and thirty (430) lineal feet of leach line needed.
>
> **2.** If allowed at the site, using a three (3) foot wide trench, this would be reduced to two hundred and eighty seven feet (287) feet as follows – four hundred and thirty feet (430) X 2 feet wide divided by 3 foot wide = two hundred eighty seven (287) lineal feet of leach line.

h. MOUND SYSTEMS

Mound system gravel distribution beds and sand basal areas are sized using bottom area only as follows:

Gravel distribution beds are constructed within the sand basal area and are sized using only the bottom of the gravel distribution bed – no credit is given for sidewall. Loading rates of 1.0 gallons per square foot per day for individual residential use and 0.8 gallon per square foot per day for commercial, industrial, institutional, and multi-residential uses. The gravel distribution bed can be square for flat ground but must be rectangular for sloping ground, with the longest dimension parallel to the slope with a width of no more than 10 feet.

Examples: At 450 gallons per day, a minimum distribution bed of 450 square feet (450 gallons per day divided by 1.0 gallons per square foot per day) is needed for residential use and a minimum 563 square feet (450 gallons per day divided by 0.8 gallon per square foot per day) is required for other uses.

The minimum size of a mound system sand basal area is based on the size of the infiltrative area required to infiltrate the expected wastewater flow into the native soil, using loading rates from TABLE 2.

The sand basal area includes: (1) the sum of the area directly beneath the gravel distribution bed, (2) the sand basal area extends 1 foot above and 2 feet below and adjacent to the distribution bed, and (3) that area needed, at a maximum 3 to 1 slope, to slope down to the native ground surface from the top of the sand.

A sand basal area for a three-bedroom residence at a site with a loading rate (based on site soil percolation rate of 30 minutes per inch) of 0.533 gallons per square foot per day would be a minimum of 844 square feet. The same residence at a site with a percolation rate of 60 MPI (0.2 gallons per square foot per day loading rate) would require a minimum basal area of 2250 square feet. The basal area calculation is the same for residential and other uses.

Reminder – the sand basal area includes:

> **1**. The area beneath the gravel distribution bed;
> **2.** One foot upslope and 2 feet side and downslope from the distribution bed; and
> **3**. The area required (at a maximum of 3 to 1 slope) to slope down from the top of the sand to the native ground surface. This last dimension will vary depending on sand depth and site slope. On sites greater than 2% slope, this area includes the sloping sand at the sides and downslope of the gravel distribution bed.
>
> **As a result of this, the required sand basal areas may be much larger than the dispersal bed area calculated above.**
>
> Care must be taken to consider linear loading when designing a mound system as this may result in a narrower and longer gravel distribution bed and sand basal area.
>
> Finally, a continuous soil cover shall be placed over the entire gravel distribution bed and sand basal area. The soil cover shall have similar slope as the sand basal area and extend a minimum of three feet in all directions beyond the sand basal area.

i. DRIP DISPERSAL SYSTEMS

Minimum size of the drip dispersal area shall be equal to the expected wastewater flow divided by the soil loading rate (determined by soil percolation tests).

Example: A planned four-bedroom (600 gallons per day) home at a site with a percolation rate of 60 minutes per inch (a loading rate of 0.2 gallons per square foot per day) will require a minimum dispersal area of 3,000 square feet – 600 gallons per day divided by 0.2 gallons per square foot per day = 3,000 square feet of drip dispersal area needed.

Example: Market with a wastewater flow of 450 gallons per day at a site with a percolation rate of 20 minutes per inch (0.657 gallons per square foot per day) will require a minimum dispersal area of 685 square feet – 450 gallons per day divided by 0.657 gallons per square foot per day = 685 square feet of drip dispersal area needed.

Within each drip dispersal area, a drip emitter may be placed every two feet along a drip line and lines are spaced two feet apart. This means that each drip emitter is dosing 4.0 square feet of the drip dispersal area. To determine the number of emitters, divide the drip dispersal area by 4.

Example: In the previous examples resulting in 3,000 and 685 square feet dispersal areas, the number of emitters required are 750 emitters (3,000 square feet divided by 1 emitter per 4 square feet = 750 emitters, and 171 emitters (685 square feet divided by 1 emitter per 4 square feet = 171 emitters).

With emitters spaced every 2 feet on a drip line, 750 emitters requires a minimum of 1,500 lineal feet of drip line (750 emitters x 2 lineal feet per emitter = 1,500 lineal feet) and 171 emitters requires a minimum of 342 lineal feet of drip line (171 emitters x 2 lineal feet per emitter = 342 lineal feet).

f. PUMP SYSTEM SIZING

The pump system shall be appropriate for sewage applications, shall be of the size and type to meet the hydraulic design requirements, and designed and constructed in accordance with this section.

1. The sump shall be a minimum one-third (1/3) the size of the septic tank.

2. The pump shall be sized for the design flow of the OWTS or OWTS component and provide the required GPM at the designed head.

3. Piping used with pump systems shall be of the appropriate strength and be sized for the pump output and flow requirements.

TSM SECTION I. INSPECTION FREQUENCY AND MAINTENANCE REQUIREMENT

This Section details the recommended frequency of inspections, the recommended minimum maintenance, the recommended system inspection requirements, and reporting to SCEHD and others for systems with supplemental treatment, alternate dispersal systems, and systems on steep slopes or systems with a curtain drain.

The majority of systems expected to be used in Shasta County will be standard Tier 1 systems or alternate Tier 2 systems that will not require supplemental treatment. The Environmental Health Division will have no formal requirement for inspections and/or maintenance for these systems.

I. TREATMENT

An onsite wastewater treatment system that includes supplemental treatment is required by the State OWTS Policy to have periodic monitoring and inspections. As a result, an Operating Permit will be issued by SCEHD after construction has been approved, for systems with supplemental treatment that includes specific minimum requirements for maintenance, inspections/monitoring, and reporting to SCEHD. The intent of this Operating Permit is to tailor the specific maintenance, inspection/monitoring, and reporting for that individual system. The frequency of maintenance, inspection/monitoring, and reporting by a person designated by the property owner will come from system component manufacturers, the owner's consultant/system designer, and/or sewage disposal system contractor as will the minimum requirements.

II. DISPERSAL

Most of the alternate dispersal systems expected to be used in Shasta County have no moving parts to fail making an operating permit unnecessary. However, some of them will employ the use of pressure distribution to evenly dose a dispersal system. A pressure distribution system relies on a piping system that requires occasional flushing to prevent clogging. Siltation/solids settling within the distribution pipes results in clogging of the system orifices/emitters resulting in uneven distribution leading which can lead to premature failure of the system and expensive restoration. A system that uses pressure distribution as an integral process in the dispersal system would have a construction permit recorded with a note indicating the maintenance/monitoring requirements/frequencies. There may be other systems proposed for use in Shasta County that are not specifically included in the LAMP or Technical Standards Manual that may need an Operating Permit. In evaluating these proposed systems, the Director may impose specific maintenance, inspection/monitoring, or reporting requirements for that specific system.

III. INSPECTION FREQUENCY

The recommended frequency of inspections and general maintenance of dispersal systems will be specified in the individual OWTS construction permit. The frequency of required inspections, maintenance, monitoring, and reporting to SCEHD shall be specified in OWTS Operating Permits for systems with supplemental treatment.

IV. MINIMUM INSPECTION REQUIREMENTS

a. Septic Tanks.

1. Verify scum and sludge depths and recommend pumping frequency based on results.

2. Observe integrity of tank, including observations for:

3. cracks or indications of structural deterioration;
4. condition of inlet and outlet "T"

(a). condition of lids;
(b). indication of leaks.
(c). Observe the condition of outlet filters, if present.

b. Pump and Dosing Chamber.

1. Verify scum and sludge depths and recommend pumping frequency, as needed.
2. Observe integrity of tank, including observations for:

(a). cracks or indications of structural deterioration.
(b). condition of inlet and outlet "T".
(c). condition of lids.
(d). indication of leaks.
(e). Observe condition of and correct operation of all floats.
(f). Verify all electrical cords are routed and harnessed per specifications.
(g). Observe condition of pump inlet screens.
(h). Verify pump cycle.
(i). Verify any siphoning devices are functioning.

3. Control Panel.

(a). Verify timer and digital counter readings.
(b). Verify cycles on digital counter.
(c). Verify audible and visual alarms are functioning.
(d). Verify that the run time is appropriate for the daily flow.
(e). Verify that the electrical box is free from moisture and all connections are secured.
(f). Inspect other system components as per manufacturer's maintenance specifications.

4. Dispersal Systems.

(a). Verify maintenance and accessibility of any observation ports.
(b). Measure effluent depth in any trench observation ports and wells.
(c). Ensure dispersal field is not obstructed by roads, structures, or vehicular traffic.
(d). Ensure surface water drainage and/or downspouts are diverted away from dispersal field.
(e). Inspect dispersal field and surrounding area for surfacing sewage. If observed, report to SCEHD within 48 hours of observation. Prevent effluent from running offsite or into bodies of water, submit repair permit application to SCEHD, and repair/correct as soon as possible.
(f). For pressure distribution systems – observe condition of visible orifices and verify equal distribution to all laterals, where possible.

5. Curtain Drain.

(a). Inspect curtain drain outlet for obstructions and vegetation removal.
(b). Inspect curtain drain area for excessive water and inspect associated dispersal field for surfacing sewage.

6. Sand Filters.

(a). Inspect sand filter for surfacing effluent.

(b). Ensure dispersal field is not obstructed by roads, structures, and vehicular traffic. Ensure surface water drainage and/or downspouts are diverted away from dispersal field.
(c). Verify maintenance and accessibility of any observation ports.
(d). Verify uniform distribution of effluent in sand filter where possible.
(e). Observe condition of visible orifices, if any. Verify integrity of lines as best as possible.
(f). Verify pump chamber/dosing tank components are correct/functioning.
(g). Inspect filter for damage/leakage at walls/liner where possible.

7. Other Aerobic treatment units.
(a). Refer to manufacturer's requirements.

8. Disinfection units.
(a). Refer to manufacturer's requirements.

TABLE 1 LINEAL FEET OF LEACH LINE FOR TRENCHES WITH 4 FT² OF ABSORPTION AREA[1]							
MPI	Number of Bedrooms						Additional bedrooms add
	1	2	3	4	5	6	
1	100	100	100	125	160	190	35
2	100	100	100	125	160	190	35
3	100	100	100	125	160	190	35
4	100	100	100	125	160	190	35
5	100	100	100	125	160	190	35
6	100	100	145	190	235	285	50
7	100	100	145	190	235	285	50
8	100	100	145	190	235	285	50
9	100	100	145	190	235	285	50
10	100	100	145	190	235	285	50
11	100	100	145	195	240	290	50
12	100	100	150	195	245	295	50
13	100	100	150	200	250	300	50
14	100	105	155	205	255	305	55
15	100	105	155	210	260	310	55
16	100	110	160	215	265	320	55
17	100	110	165	215	270	325	55
18	100	110	165	220	275	330	55
19	100	115	170	225	280	340	60
20	100	115	175	230	290	345	60
21	100	120	175	235	295	350	60
22	100	120	180	240	300	360	60
23	100	125	185	245	310	370	65
24	100	125	190	250	315	375	65
25	100	130	195	255	320	385	65
26	100	130	195	260	325	390	65
27	100	135	200	265	335	400	70
28	100	135	205	270	340	405	70
29	100	140	210	280	345	415	70
30	100	145	215	285	355	425	75
31	100	145	220	290	360	435	75
32	100	150	225	295	370	445	75
33	100	150	225	300	375	450	75
34	100	155	235	310	385	465	80
35	100	160	240	315	395	475	80
36	100	165	245	325	405	485	85
37	100	165	250	330	415	495	85
38	100	170	255	340	425	510	85
39	100	175	260	350	435	520	90
40	100	180	270	360	445	535	90
41	100	185	275	365	460	550	95

TABLE 1 LINEAL FEET OF LEACH LINE FOR TRENCHES WITH 4 FT² OF ABSORPTION AREA[1]							
MPI	Number of Bedrooms						Additional bedrooms add
	1	2	3	4	5	6	
42	100	190	285	375	470	565	95
43	100	195	290	390	485	580	100
44	100	200	300	400	500	600	100
45	105	205	310	410	515	615	105
46	110	215	320	425	530	635	110
47	110	220	330	435	545	655	110
48	115	225	340	450	565	675	115
49	120	235	350	465	585	700	120
50	125	245	365	485	605	725	125
51	125	250	375	500	625	750	125
52	130	260	390	520	650	780	130
53	135	270	405	540	675	810	135
54	145	285	425	565	705	845	145
55	150	295	440	590	735	880	150
56	155	310	460	615	770	920	155
57	165	325	485	645	805	965	165
58	170	340	505	675	845	1010	170
59	180	355	535	710	885	1065	180
60	190	375	565	750	940	1125	190
61	195	385	575	765	955	1145	195
62	195	390	580	775	970	1160	195
63	200	395	595	790	990	1185	200
64	205	405	605	805	1005	1205	205
65	205	410	615	820	1020	1225	205
66	210	420	625	835	1045	1250	210
67	215	425	640	850	1060	1275	215
68	220	435	650	865	1080	1295	220
69	225	445	665	885	1105	1325	225
70	225	450	675	900	1125	1350	225
71	230	460	690	915	1145	1375	230
72	235	470	705	940	1175	1410	235
73	240	480	720	960	1195	1435	240
74	245	490	735	975	1220	1465	245
75	250	500	750	1000	1250	1500	250
76	260	515	770	1025	1280	1535	260
77	265	525	785	1045	1305	1565	265
78	270	540	805	1075	1340	1610	270
79	275	550	825	1095	1370	1645	275
80	285	565	850	1130	1410	1695	285
81	290	580	870	1155	1445	1735	290
82	300	595	890	1185	1480	1775	300
83	305	610	915	1220	1525	1830	305

TABLE 1 LINEAL FEET OF LEACH LINE FOR TRENCHES WITH 4 FT² OF ABSORPTION AREA[1]							
MPI	Number of Bedrooms						Additional bedrooms add
	1	2	3	4	5	6	
84	315	625	940	1250	1565	1875	315
85	325	645	965	1285	1605	1925	325
86	335	665	1000	1330	1660	1995	335
87	345	685	1025	1365	1705	2050	345
88	355	705	1055	1405	1755	2105	355
89	365	730	1095	1460	1825	2185	365
90 - 120	375	750	1125	1500	1875	2250	375

[1] Lineal footage of leach line for trenches that provide four square feet (4 FT²) of absorption area per lineal foot (i.e. trenches two feet wide with one foot gravel, trenches three feet wide with one half of one foot of gravel, etc.).

TABLE 2 APPLICATION RATES AS DETERMINED FROM STABILIZED PERCOLATION RATE							
Percolation Rate (MPI)	**Application Rate (gpd/ft^2)**		**Percolation Rate (MPI)**	**Application Rate (gpd/ft^2)**		**Percolation Rate (MPI)**	**Application Rate (gpd/ft^2)**
1	1.2		31	0.522		61	0.197
2	1.2		32	0.511		62	0.194
3	1.2		33	0.5		63	0.19
4	1.2		34	0.489		64	0.187
5	1.2		35	0.478		65	0.184
6	0.8		36	0.467		66	0.18
7	0.8		37	0.456		67	0.177
8	0.8		38	0.445		68	0.174
9	0.8		39	0.434		69	0.17
10	0.8		40	0.422		70	0.167
11	0.786		41	0.411		71	0.164
12	0.771		42	0.4		72	0.16
13	0.757		43	0.389		73	0.157
14	0.743		44	0.378		74	0.154
15	0.729		45	0.367		75	0.15
16	0.714		46	0.356		76	0.147
17	0.7		47	0.345		77	0.144
18	0.686		48	0.334		78	0.14
19	0.671		49	0.323		79	0.137
20	0.657		50	0.311		80	0.133
21	0.643		51	0.3		81	0.13
22	0.629		52	0.289		82	0.127
23	0.614		53	0.278		83	0.123
24	0.6		54	0.267		84	0.12
25	0.589		55	0.256		85	0.117
26	0.578		56	0.245		86	0.113
27	0.567		57	0.234		87	0.11
28	0.556		58	0.223		88	0.107
29	0.545		59	0.212		89	0.103
30	0.533		60	0.2		90 - 120	0.1

SEPTIC TANK AND DISPERSAL SYSTEM SETBACKS. This table is to be used to determine appropriate setbacks for septic tanks and dispersal systems. The term septic tank, as used here, also includes sumps and supplemental treatment systems.

TABLE 3 REQUIRED HORIZONTAL SETBACK DISTANCES				
Minimum Horizontal Distance (in feet) Required Between:	**Building Sewer**	**Septic Tank**	**Dispersal Field**	**Well**
Building or Structures[1]	2	5	8	None
Property Lines	None	5	10	5
Private/ Public Wells	50[2]	50	100/150[3]	None
Domestic Water Line	5[4]	5	5	None
Springs[5]	50	50	200	Above Flood Plain
Ephemeral Drainage[6]	50	50	50	Above Flood Plain
Intermittent and Perennial Streams[7]	50	50	100	Above Flood Plain
Lakes[8]	50	50	200	Above Flood Plain
Cuts or Excavations		Four times height of cut with a maximum of 50 feet		None
Dispersal Field		5	10	100
Distribution Box		5		100

FOOTNOTES:

1. Includes mobile homes, porches and steps, whether covered or uncovered, breezeways, roofed porte-cocheres, roofed patios, carports, covered walks, covered driveways and other structures or appurtenances.

2. All non-metallic drainage piping shall clear domestic water supply wells at least 50 feet. This distance may be reduced to not less than 25 feet when approved piping is installed. Where special hazards are involved, the distance required shall be increased as necessary pursuant to the Director of Environmental Health.

3. Wastewater effluent dispersal systems shall be at least 100 feet from private domestic wells and 150 feet from public water supply wells.

4. Water pipes and sewer pipes shall not be located in the same trench. The minimum separation shall be ten feet.

5. These distances apply to sewage disposal systems on the same level as or lower than any spring. Sewage disposal systems shall not be closer than 200 feet at any point in relationship to a spring located on the same hillside or in the same watershed or 100 feet if downhill from the spring.

6. Ephemeral drainage also includes roadside ditches.

7. Includes irrigation ditches, roadside ditches, and natural and artificial drainage ways with either intermittent or continuous flows. This distance is to be measured from the 10-year flood line or top of bank or other evident high-water line or the expected 10-year flood line.

8. Includes lakes, ponds, reservoirs, and other bodies of standing water, as measured from the high-water line or spillway elevation. For lakes that are uphill from the disposal field, the setback may be reduced to 100 feet.

The Director may accept horizontal setbacks that vary from the required distances above. Examples would include drainage ways that were constructed as part of road construction but carry little or no water or reduced setbacks from systems that utilize supplemental treatment and/or disinfection.

CHAPTER 6

FIRE SAFETY STANDARDS

Adopted:	September 22, 1981
Revised:	August 7, 1986
	September 29, 1988
	April 1, 1992
	September 4, 1992
	May 15, 2001
	June 1, 2003
	September 15, 2004
	December 1, 2015
	June 27, 2017

6.0 GENERAL POLICIES

6.01 AUTHORITY

These standards are Shasta County Fire Safety Standards and are adopted by the Board of Supervisors. These standards are inclusive of “State Responsibility Area (SRA) Fire Safe Regulations”. These standards shall be administered and implemented by the County Fire Warden, his or her designees, and as otherwise authorized by the Board of Supervisors by adoption of these standards.

6.02 SCOPE

These standards are a component of the Shasta County Development Standards and enhance public and firefighter safety by establishing criteria for development. Addressed within this document are public and emergency responder access requirements, fire protection water standards, building construction standards, and fuel modification standards.

These standards shall apply to subdivisions, parcel maps, use permits, administrative permits, building permits, mobile home installation permits, and any other developments which require the issuance of a permit by the County of Shasta.

6.03 CONSISTENCY WITH OTHER STANDARDS AND REGULATIONS

a. Portions of these standards are required by the California Code of Regulations (CCR) Title 14, Division 1.5, Chapter 7, Subchapter 2, Articles 1-5. Such sections are noted with the CCR section in parenthesis after the section. As minimum State of California regulations, these sections would supersede other Shasta County regulations and standards.

b. Sections not noted with the CCR in parenthesis are locally adopted standards which exceed or differ from the requirements of the regulations of the State of California. These standards are adopted by resolution and may be superseded by other Shasta County ordinances.

c. These standards are intended to be minimum standards. If other County standards require a higher standard of development then the other standard prevails. Where these standards require a higher standard of development, these standards prevail.

6.04 DEFINITIONS (CCR T.14, Section 1271.00)

Accessory building: Any building used as an accessory to residential, commercial, recreational, industrial, or educational purposes as defined in the California Building Code, 1989 Amendments, Chapter 11, Group M, Division 1 Occupancy that requires a building permit.

Agriculture: Land used for agricultural purposes as defined in a local jurisdiction's zoning ordinances.

All Weather Access Road: Road surface with suitable aggregate material over compacted subgrade soil.

Building: Any structure used or intended for supporting or sheltering any use of occupancy that is defined in the California Building Code, 1989 Amendments, Chapter 11, except Group M, Division 1, Occupancy. For the purposes of this subchapter, building includes mobile homes and manufactured homes, churches, and day care facilities.

CDF: California Department of Forestry and Fire Protection.

Dead-end road: A road that has only one point of vehicular ingress/egress, including cul-de-sacs and looped roads.

Defensible space: The area within the perimeter of a parcel, development, neighborhood or community where basic wildland fire protection practices and measures are implemented, providing the key point of defense from an approaching wildfire or defense against encroaching wildfires or escaping structure fires. The perimeter as used in this regulation is the area encompassing the parcel or parcels proposed for construction and/or development, excluding the physical structure itself. The area is characterized by the establishment and maintenance of emergency vehicle access, emergency water reserves, street names and building identification, and fuel modification measures.

Development: "Development" means the uses to which the land shall be put, the buildings to be constructed on it, and all alterations of the land and construction incident thereto.

Director: Director of the Department of Forestry and Fire Protection or his/her designee.

Distance Measurements: All specified or referenced distances are measured along the ground, unless otherwise stated.

Driveway: A vehicular access that serves no more than two parcels, with no more than three dwelling units on a single parcel, and any number of accessory buildings.

Dwelling unit: Any building or portion thereof which contains living facilities, including provisions for sleeping, eating, cooking and/or sanitation for not more than one family.

Exception: An alternative to the specified standard requested by the applicant that may be necessary due to health, safety, environmental conditions, physical site limitations or other limiting conditions (such as recorded historical sites) that provide mitigation of the problem.

Fire valve: See hydrant.

Fuel modification area: An area where the volume of flammable vegetation has been reduced, providing reduced fire intensity and duration.

Greenbelts: A facility or land-use, designed for a use other than fire protection, which will slow or resist the spread of a wildfire. Includes parking lots, irrigated or landscaped areas, golf courses, parks, playgrounds, maintained vineyards, orchards or annual crops that do not cure in the field.

Hammerhead/T: A roadway that provides a "T" shaped, three-point turnaround space for emergency equipment, being no narrower that the road that serves it.

Hydrant: A valved connection on a water supply/storage system, having at least one 2 1/2-inch outlet, with male American National Fire Hose Screw Threads (NH) used to supply fire apparatus and hoses with water.

Local Jurisdiction: Any county, city/county agency or department, or any locally authorized district that issues or approves building permits, use permits, tentative maps or tentative parcel maps, or has authority to regulate development and construction activity.

Maintenance of Defensible Space Measures: To ensure continued maintenance of properties in conformance with these standards and measures and to assure continued availability, access, and utilization of the defensible space provided for these standards during a wildfire, provisions for annual maintenance shall be included in the development plans and/or shall be provided as a condition of the permit, parcel or map approval.

Occupancy: The purpose for which a building, or part thereof, is used or intended to be used.

One-way road: A minimum of one traffic lane width designed for traffic flow in one direction only.

Roads, streets, private lanes: Vehicular access to more than one parcel; access to any industrial or commercial occupancy; or vehicular access to a single parcel with more than two buildings or four or more dwelling units.

Roadway: Any surface designed, improved, or ordinarily used for vehicle travel.

Roadway structures: Bridges, culverts, and other appurtenant structures which supplement the roadway bed or shoulders.

Same Practical Effect: As used in this subchapter means an exception or alternative with the capability of applying accepted wildland fire suppression strategies and tactics, and provisions for firefighter safety, including:

(a) access for emergency wildland fire equipment,
(b) safe civilian evacuation,
(c) signing that avoids delays in emergency equipment response,
(d) available and accessible water to effectively attack wildfire or defend a structure from wildfire, and
(e) fuel modification sufficient for civilian and firefighter safety.

State Board of Forestry (SBOF): A nine-member board, appointed by the Governor, which is responsible for developing the general forest policy of the state, for determining the guidance policies of the Department of Forestry and Fire Protection, and for representing the state's interest in federal land in California.

State Responsibility Area (SRA): As defined in the Public Resources Code section 4126-4127; and the California Code of Regulations, Title 14, Division 1.5, Chapter 7, Article 1, Sections 1220-1220.5.

Structure: That which is built or constructed, an edifice or building of any kind, or any piece of work artificially built up or composed of parts joined together in some definite manner.

Subdivision: As defined in Section 66424 of the Government Code.

Traffic lane: The portion of a roadway that provides a single line of vehicle travel.

Turnaround: A roadway, unobstructed by parking, which allows for a safe opposite change of direction for emergency equipment. Design of such area may be a hammerhead/T or terminus bulb.

Turnouts: A widening in a roadway to allow vehicles to pass.

Vertical clearance: The minimum specified height of a bridge or overhead projection above the roadway.

Wildfire: As defined in Public Resources Code Sections 4103 and 4104.

6.1 ACCESS

a. The following standards shall establish minimum access requirements for public safety. The road and driveway networks shall provide safe access for emergency wildland fire equipment and civilian evacuation concurrently and shall provide unobstructed traffic circulation during a wildfire emergency. The road and driveway network shall also provide all-weather, safe access for emergency personnel responding to medical aids, traffic accidents, and structure fires. The standards shall apply to subdivisions, parcel maps, use permits, administrative permits, building permits, mobile home installation permits, and any other developments which require the issuance of a permit by the County of Shasta. (CCR T. 14, Section 1273.00)

b. In accordance with Sections 6.91 thru 6.94 of these standards, the County Fire Warden or the approving authority may approve or recommend the approval of exceptions to the access standards where the same practical effect can be achieved and where reasonable access can be provided to assure adequate evacuation routes for the public and adequate access routes for emergency personnel and equipment. In determining whether the same practical effect can be achieved, the approving authority shall apply and make findings concerning the performance criteria set forth in Section 6.92.

c. For single family residential building permits and residential mobile home installation permits on existing lawful parcels, off-site improvements will not be required if adequate physical access is existing as determined by the County Fire Warden. Private bridges on access roads must be certified by a licensed engineer when required by the County Fire Warden. If modifications are necessary in order to provide adequate physical access for fire apparatus, then a building or grading permit maybe required and the necessary modifications shall be made.

d. For administrative and use permits, off-site improvements will not be required on public roads and streets constructed prior to January 1, 1992, if adequate physical access exists and the County Fire Warden finds that any increase in personal density created by the project will not adversely affect public safety.

6.11 GENERAL ROAD DESIGN REQUIREMENTS

Scope:

It shall be the intent of the Fire Safety Standards to provide for safe access for emergency fire equipment, civilian evacuation, and unobstructed traffic circulation by requiring the construction of continuous or through roadways and limiting the length and use of dead-end roads.

6.11.1 Dead-end Road Length:

The maximum length of a dead-end road, including all dead-end roads accessed from the dead-end road, shall not exceed the following cumulative lengths, regardless of the numbers of parcels served: (CCR T.14, Section 1273.09)

Parcels zoned for less than one acre – 800 feet
Parcels zoned for 1 acre to 4.99 acres – 1320 feet
Parcels zoned for 5 acres to 19.99 acres – 2640 feet
Parcels zoned for 20 acres or larger – 5280 feet

All lengths shall be measured from the edge of the roadway surface at the intersection that begins the road to the end of the road surface at the intersection that begins the road to the end of the road surface at its farthest point. Where a dead-end road crosses areas of differing zoned parcel sizes, requiring different length limits, the shortest allowable length shall apply.

Where parcels are zoned 5 acres or larger, turnarounds shall be provided at a maximum of 1320 foot intervals.

Each dead-end road shall have a turnaround constructed at its terminus.

6.11.1.1 Exception:

Deleted

6.11.2 Construction Standard:

Continuous or through roads constructed in areas designated by the General Plan as Urban (UR), Suburban (SR), Commercial (C) and Industrial (I) shall be constructed in accordance with Chapter 2 of the Development Standards. Continuous or through roads constructed in all other areas, may be constructed as emergency fire escape roads as determined by the County Fire Warden and the Director of the Department of Public Works. Emergency fire escape roads shall be constructed in accordance with the minimum road standards as specified in Section 6.14 of the Fire Safety Standards.

6.11.3 Density:

Deleted

6.11.4 Open Space and Greenbelts:

Projects creating open space and greenbelt areas shall provide adequate fire department access to such areas as determined by the County Fire Warden or approving authority.

6.12 PRIVATE ROAD, PUBLIC ROAD, AND NON-RESIDENTIAL DRIVEWAY STANDARDS

a. The following standards are minimum standards and may be superseded by the requirements of Chapter 2 of the Development Standards when said requirements are more stringent than these minimum standards.

b. Non-residential driveways shall provide fire department access from the nearest Shasta County recognized private or public roadway to within 150 feet of any portion of the exterior wall of each building on the premises. An exception to subsection (b) may be approved by the County Fire Warden when building(s) are completely protected with an approved automatic fire sprinkler system.

c. Following are minimum roadway and non-residential driveway construction standards:

1. Road Width – All roads shall be constructed to provide a minimum of two, ten (10) foot traffic lanes, not including shoulder and striping. These traffic lanes shall provide for two-way traffic flow to support emergency vehicle and civilian egress, (CCR T.14, Section 1273.01)

2. Shoulders – one (1) foot wide on each side of the driving surface in accordance with Chapter 2 of the Development Standards.

3. Vertical Clearance – Fifteen (15) feet, unobstructed. (CCR T.14, Section 1273.10)

4. Roadway Surface -

   a. Roadways shall be designed and maintained to support the imposed load of fire apparatus weighing at least 75,000 pounds and provide an all-weather aggregate road base. Applicant shall provide engineering specifications to support design if requested by the County Fire Warden. (CCR T.14, Section 1273.02)

5. Roadway Radius - (CCR T.14, Section 1273.04)

   a. Not less than 50 feet inside radius

   b. Curves having an inside radius of 50-100 feet shall have a minimum surfacing width of 24 feet.

   c. Curves having an inside radius of 100-200 feet shall have a minimum surfacing width of 22 feet.

d. The length of vertical curves in roadways, exclusive of gutters, ditches, and drainage structures designed to hold or divert water, shall be not less than 100 feet.
(CCR T.14, Section 1273.04)

6. Roadway Turnarounds

a. Dead-end roads shall be provided with a turnaround.
(CCR T.14, Section 1273.05 / 1273.09 / Figure 2-40)

b. Dead-end non-residential driveways over 150 feet in length shall be provided with an approved area for turning around fire apparatus.
(California Fire Code, Section 503.2.5)

c. Turnarounds are required on driveways and dead-end roads. The turning radius on a turnaround shall be forty (40) feet from the center line of the road, not including parking.
(CCR T.14, Section 1273.05 / Figure 2-40)

d. Hammerhead or “T” turnarounds may be approved for parcel maps by the approving authority upon considering recommendations by the Department of Public Works and the County Fire Warden. Alternative turnarounds shall be constructed in accordance with Figure 2-40.

e. Hammerhead or “T” turnarounds may be approved on non-residential driveways by the County Fire Warden. Alternative turnarounds shall be constructed in accordance with Figure 2-40.

7. Hydrant Turnouts

a. The hydrant serving any building shall be located at a turnout or turnaround, along the driveway to that building or along the road that intersects with that driveway. (CCR T.14, Section 1275.15)

b. Turnouts shall be a minimum of 12 feet wide and 30 feet long with a minimum 25-foot taper at each end. (CCR T.14, Section 1273.06 / 1275.15 / Figure FS-4)

c. An exception to the turnout requirement may be granted by the County Fire Warden when fire hydrants are required at intersections.

8. Roadway Structures (Bridges, Culverts, etc.) (CCR T.14, Section 1273.07)

a. All non-residential driveway, road, street, and private lane roadway structures shall be constructed to carry at least the maximum load and provide the minimum vertical clearance as required by Vehicle Code Sections 35250, 35550, and 35750.

b. Appropriate signing, including but not limited to weight or vertical clearance limitations, one-way road or single lane conditions, shall reflect the capability of each bridge.

c. One-lane bridges shall provide unobstructed visibility from one end to the other and shall be provided with turnouts at both ends per Figure FS-4.

d. Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with the American Association of State and Highway Transportation Officials Standard Specifications for Highway Bridges, (known as AASHTO HL-93).

e. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges when required.

f. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, barriers, or signs, or both, as approved by the County Fire Warden, shall be installed and maintained.

9. Grades – shall not exceed 16%. (CCR T.14, Section 1273.03)

10. All one-way roads shall be constructed to provide a minimum, not including shoulders, of one 12-foot traffic lane. The County Fire Warden may approve one-way roads. All one-way roads shall connect to a two-lane roadway at both ends, and shall provide access to an area currently zoned for no more than ten (10) dwelling units. In no case shall it exceed 2,640 feet in length. A turnout shall be placed and constructed at approximately the midpoint of each one-way road. (CCR T.14, Section 1273.08)

11. Obstructions – minimum widths and vertical clearance shall be maintained.

12. Gate Entrances (CCR T.14, Section 1273.11)

a. Gate entrances shall be at least two (2) feet wider than the width of the traffic lane(s) serving that gate and a minimum width of fourteen (14) feet unobstructed horizontal clearance and unobstructed vertical clearance of fifteen (15) feet.

b. all gates providing access from a road to a driveway shall be located at least thirty (30) feet from the roadway and shall open to allow a vehicle to stop without obstructing traffic on that road.

c. Security gates shall not be installed without approval and where security gates are installed, they shall have an approved means of emergency operation. Approval shall be by the County Fire Warden. The security gates and the emergency operation shall be maintained operational at all times.

d. Where a one-way road with a single traffic lane provides access to a gated entrance, a forty (40) foot turning radius shall be used. (Figure 2-40)

13. Speed Control Bumps on private roads and driveways shall not exceed four (4) inches in height.

14. Turnouts shall be a minimum of twelve (12) feet wide and thirty (30) feet long with a minimum twenty-five (25) foot taper on each end. (CCR T.14, Section 1273.06 / Figure FS-4)

6.13 RESIDENTIAL DRIVEWAY STANDARDS

a. The following standards are minimum driveway standards to be applied to residential driveways serving no more than three (3) residences located on a single parcel. Residential driveways servicing four (4) or more residences shall meet the requirements of Section 6.12. (CCR T.14, Section 1271.00 / 1273.10)

b. Following are minimum residential driveway standards:

1. Driveway Road Width (CCR T. 14, Section 1273.10)

   a. Fourteen (14) feet, unobstructed horizontal clearance.

   b. The County Fire Warden may approve widths of twelve (12) feet for short distances. The lesser widths may be utilized at bridges, culverts, gates, and cattle guards, and in areas where unique topographic conditions exist.

2. Driveways exceeding 150 feet in length, but less than 800 feet in length, shall provide a turnout near the midpoint of the driveway. Where the driveway exceeds 800 feet, turnouts shall be provided no more than 400 feet apart. (CCR T.14, Section 1273.10)

3. Shoulders – One (1) foot wide on each side of driveway.

4. Vertical clearance, fifteen (15) feet, unobstructed. (CCR T.14, Section 1273.10)

5. Driveway Roadway Surface

   a. Capable of supporting a 40,000-pound load. Applicant shall provide engineering specifications to support design, if requested by the County Fire Warden.

   b. All-weather surface width of not less than ten (10) feet of the driveway. Minimum surface thickness of 4” of compacted class 3 aggregate base rock.

6. Driveway Roadway Radius (CCR T.14, Section 1273.04)

   a. Horizontal curves shall have an inside radius of not less than 50 feet.

   c. The length of vertical curves in roadways, exclusive of gutters, ditches, and drainage structures designed to hold or divert water, shall be not less than 100 feet.
   (CCR T.14, Section 1273.04)

7. Driveway Roadway Turnarounds

   a. A turnaround shall be provided to all building sites on driveways over 300 feet in length and shall be within 50 feet of the building. (CCR T.14, Section 1273.10)

   b. Turnarounds shall be constructed in accordance with the Shasta County Development Standards. (CCR T.14, Section 1273.05 / Figure 2-42)

8. Hydrant Turnouts – If a fire hydrant is located along a residential driveway, then a turnout shall be provided per Attachment FS-4. (CCR T.14, Sections 1273.06 / 1275.15 / Figure FS-4)

9. Driveway Roadway Structures (Bridges and Culverts): (CCR T.14, Section 1273.07)

   a. Bridges having limitations shall be posted with signs designating the limitations including vertical clearance and weight limitations. (CCR T.14, Section 1273.07)

   b. Signage, including but not limited to weight or vertical clearance limitations, one-way road or single lane conditions, shall reflect the capability of each bridge.

   c. Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with the American Association of State and Highway Transportation Officials Standard Specifications for Highway Bridges, (known as AASHTO HL-93).

   d. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges when required.

   e. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, barriers, or signs, or both, as approved by the County Fire Warden, shall be installed and maintained.

10. Grades shall not exceed 16%. (CCR T.14, Section 1273.03)

11. Driveway Gate Entrances (CCR T.14, Section 1273.11)

   a. Gate entrances shall be at least (2) two feet wider than the traffic lanes serving that gate and a minimum width of fourteen (14) feet unobstructed horizontal clearance and unobstructed vertical clearance of fifteen (15) feet.

b. All gates providing access from a road to a driveway shall be located at least thirty (30) feet from the roadway and shall open to allow a vehicle to stop without obstructing traffic on that road.

c. Gates shall not be installed without prior approval and shall have an approved means of emergency operation. Any gate and emergency operation of that gate shall be maintained at all times.

6.14 EMERGENCY FIRE ESCAPE ROAD (EFER) STANDARDS

Scope:

The following construction standards shall apply to the creation of an emergency fire escape road. The construction standards shall apply only to the emergency fire escape road and not an existing road unless a portion of an existing road becomes part of an emergency fire escape road.

The following standards are minimum standards and may be superseded by the requirements of Chapter 2 of the Development Standards.

6.14.1 Definition:

Emergency Fire Escape Road: A road designed and constructed primarily to provide an alternate route of civilian vehicular egress, in the event of a wildfire, from an area accessed by only one ingress/egress road, and that the area served by the one ingress/egress road exceeds the minimum dead-end road length as indicated in Section 6.11.

6.14.2 Delineation:

Applicant shall submit improvement plans indicating the proposed location and placement of the emergency fire escape road to the Shasta County Fire Department and the Department of Public Works.

6.14.3 Location and Placement:

The County Fire Warden and the Director of the Department of Public Works shall determine the final location and placement of emergency fire escape roads. Emergency fire escape roads shall be located in relationship to topography, fuel types and fuel density in the project area, and serviceability of existing ingress road.

Emergency fire escape roads shall provide a second means of vehicular egress and shall be sufficiently separated from the primary vehicular ingress road to prevent both roadways from being simultaneously obstructed during a wildland fire.

6.14.4 Right of Ways:

Right-of-ways or easements shall be a minimum of 30-feet in width and shall be sufficient to permit construction and maintenance of the required road improvements. Applicant shall acquire and offer rights-of-ways or easements for dedication to the County of Shasta.

6.14.5 Construction Standards:

Emergency fire escape roads shall be either:

a. Constructed to the standards of a permanent road division emergency fire escape road pursuant to Section 6.14.6 and be maintained by the permanent road division or,

b. Constructed to the standards of a paved emergency fire escape road pursuant to Section 6.14.7.

6.14.6 Permanent Road Division EFER Construction Standards:

Emergency fire escape roads constructed as a permanent road division emergency fire escape road shall be constructed to the following standards and as shown in Figure FS-8.

6.14.6.1 Road Width:

a. Minimum driving surface of two ten (10) foot traffic lanes, not including shoulder. These traffic lanes shall provide for two-way traffic flow to support emergency vehicle and civilian egress, (CCR T.14, Section 1273.01)

b. A vegetative clear zone shall be created on each side of the road by removing vegetation smaller than 6 inches in diameter a minimum of 4 feet beyond the edge of the road.

c. Shoulders – One (1) foot wide on each side of roadway in accordance with Chapter 2 of the Development Standards.

6.14.6.2 Roadway Surface:

Roadways shall be designed and maintained to support the imposed load of fire apparatus weighing at least 75,000 pounds and provide an aggregate base. Project proponent shall provide engineering specifications to support design, if requested by the local authority having jurisdiction. (CCR T.14, Section 1273.02)

6.14.6.3 Vertical Clearance:

Vertical clearance shall not be less than 15 feet unobstructed.
(CCR T.14, Section 1273.10)

6.14.6.4 Grades:

Grades shall not exceed 16%. (CCR T.14, Section 1273.03)

6.14.6.5 Roadway Radius: (CCR T.14, Section 1273.04)

a. Horizontal curves shall have an inside radius of not less than 50 feet.

b. Curves having an inside radius of 50-100 feet shall have a minimum surfacing width of 24 feet.

c. Curves having an inside radius of 100-200 feet shall have a minimum surfacing width of 22 feet.

6.14.6.6 Vertical Curvature:

The length of vertical curves in roadways, exclusive of gutters, ditches, and drainage structures designed to hold or divert water, shall be not less than 100 feet.
(CCR T.14, Section 1273.04)

6.14.6.7 Roadway Structures (Bridges and Culverts): (CCR T.14, Section 1273.07)

a. Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with the American Association of State and Highway Transportation Officials Standard Specifications for Highway Bridges, (known as AASHTO HL-93).

b. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges when required.

c. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, barriers, or signs, or both, as approved by the County Fire Warden, shall be installed and maintained.

6.14.6.8 Gate Entrances:

Gates may be installed in areas so that an emergency fire escape road does not provide through access on a continual basis.

a. Gate entrances shall be at least two (2) feet wider than the width of the traffic lane(s) serving that gate. (CCR T.14, Section 1273.11)

b. Gates shall be designed to open without the use of a key, tools, or any special knowledge or effort. Gates shall not be locked together rendering the "break away" gate post inoperable.

c. Gates shall not be locked or rendered unusable by using chains, bolts, and latches or barricaded unless approved and installed per Figure FS-4.

d. EFER gate location/placement shall be approved by the County Fire Warden.

6.14.6.9 Identification:

a. Signs shall be constructed and installed adjacent to the beginning of the emergency fire escape road as shown in Figure FS-9.

b. Road reflectors shall be utilized as deemed appropriate by the County Fire Warden and the Director of Public Works.

6.14.7 Paved EFER Construction Standards:

Emergency fire escape roads constructed as paved emergency fire escape roads shall be constructed to the same standards in accordance with Section 6.14.6 as a permanent road division emergency fire escape road, except that the aggregate base shall be surfaced with 0.17' X 20' of asphalt concrete as shown in Figure FS-8.

6.14.8 Roadway Structures (Bridges and Culverts): (CCR T.14, Section 1273.07)

a. All road, street, and private lane roadway structures shall be constructed to carry at least the maximum load and provide the minimum vertical clearance as required by Vehicle Code Sections 35250, 35550, and 35750.

b. Appropriate signing, including but not limited to weight or vertical clearance limitations, shall reflect the capability of each bridge.

c. Where a bridge or an elevated surface is part of a fire apparatus access road, the bridge shall be constructed and maintained in accordance with the American Association of State and Highway Transportation Officials Standard Specifications for Highway Bridges, (known as AASHTO HL-93).

d. Bridges and elevated surfaces shall be designed for a live load sufficient to carry the imposed loads of fire apparatus. Vehicle load limits shall be posted at both entrances to bridges when required.

e. Where elevated surfaces designed for emergency vehicle use are adjacent to surfaces which are not designed for such use, barriers, or signs, or both, as approved by the County Fire Warden, shall be installed and maintained.

6.2 STREET SIGNS AND BUILDING NUMBERING

6.21 ADDRESS FOR BUILDINGS

a. Every building or structure, except accessory buildings shall be permanently posted with a street address marker located with respect to the nearest public highway, street or road servicing such building or structure so as to be clearly visible and legible at all times from the roadway. Each dwelling unit shall be separately identified. (CCR T.14, Section 1274.08 / Section 1274.10)

b. These numbers shall contrast with their background and addresses shall be Arabic numbers or alphabetic numbers. Numbers shall be a minimum of four (4) inches high, with a minimum stroke width of 0.5-inch reflectorized, contrasting with the background color of the sign. (CCR T.14, Section 1274.09)

c. Each building, except accessory buildings, shall have a permanently posted address which shall be posted at the intersection of the driveway and the road. Addresses shall be visible from both directions of travel. Where multiple addresses are required at a single driveway, they shall be mounted on single post. (CCR T.14, Section 1274.10)

d. Address signs along one-way roads shall be visible from both the direction of travel, and the opposite direction. Where access is by means of a private road and the address cannot be viewed from the public way, a monument, pole or other sign or means shall be used to identify the address.
(CCR T.14, Section 1274.09 / 1274.10)

e. Address posting shall be maintained. (CCR T.14, Section 1274.10)

f. Addresses shall be posted at the beginning of construction and shall be maintained thereafter and the address shall be visible and legible from the road on which the address is located. (CCR T.14, Section 1274.10)

g. Where a roadway provides access solely to a single commercial or industrial business, the address sign shall be placed at the nearest road intersection providing access to that site. (CCR T.14, Section 1274.10)

6.22 STREET IDENTIFICATION SIGNING

a. Newly constructed or approved public and private roads shall be identified by a name or number that is non-duplicating and consistent with the Shasta County road naming system. (CCR T.14, Section 1274.04)

b. Signs identifying roads, streets, and private lanes shall be placed at the intersection of those roads, streets and/or private lanes and shall be clearly visible from both directions of travel for a distance of at least 100 feet. (CCR T.14, Sections 1274.02 / 1274.05)

c. Letters and numbers for street and road signs shall be a minimum of 4-inch letter height, 0.5-inch stroke reflectorized, and contrasting with the background color of the sign. (CCR T.14, Section 1274.01)

d. Road, street, and private lane signs required by this article shall be installed prior to final acceptance by the local jurisdiction of road improvements. (CCR T.14, Section 1274.07)

e. Height of street and road signs shall be uniform county wide and meet the visibility and legibility standards of this article. (CCR T.14, Section 1274.03)

6.23 STREET LIMITATION SIGNING

a. Newly constructed and approved public and private roads shall be provided with signs identifying any access limitations such as weight limitation, vertical clearance, dead-end road, one-way road, single-lane condition, and other similar limitations. (CCR T.14, Section 1274.06)

b. Limitations shall be clearly posted at two locations:

    1. the intersection preceding the traffic limitation.

    2. at a location not more than 100 feet before the actual area of traffic limitation (CCR T.14, Section 1274.06)

c. Letters and numbers for street and road signs shall be a minimum of 4-inch letter height, 0.5-inch stroke reflectorized, and contrasting with the background color of the sign. (CCR T.14, Section 1274.01)

d. Road, street, and private lane signs required by this article shall be installed prior to final acceptance by the local jurisdiction of road improvements. (CCR T.14, Section 1274.07)

6.3 FIRE PROTECTION WATER STANDARDS

With A Central Water System

a. The standards in this section apply to new developments within the boundaries of a public or private water service jurisdiction having a pressurized water system that contains water mains that are six inches in diameter or larger in size. The standards in the California Fire Code, Appendix B will not be applied by Shasta County to permit applications for single-family residences on parcels that were created prior to January 1, 1989.

b. For land divisions, the required water system, including hydrants, must be installed and in service or bonded prior to recording the map.
(CCR T.14, Section 1275.01)

c. For use permits, building permits and other developments, the required water system must be installed and in service prior to the foundation inspection by the Shasta County Building Division.

d. For single family residential construction, mobile home installation permits or for a building permit for substantial improvements to any such structures (as defined by Section 5.01.080 of the Shasta County Ordinance Code) an approved fire hydrant shall be installed at an approved location on water mains four inches or larger in size within 500 feet of the parcel or, the applicant shall contribute to the fire hydrant fund.

6.31 FIRE FLOW AND HYDRANT SPACING

a. New water facilities shall meet fire flow requirements listed in the California Fire Code, Appendix B, in addition to the average daily demand.

b. Proof of the ability to comply with the fire flow requirements shall be submitted with the application for development. Proof may consist of a letter of certification from the responsible water supply entity.

c. In order to qualify for the sprinkler fire flow reduction, a building must be completely protected by an automatic sprinkler system installed in accordance with NFPA 13 and the latest edition of the California Building Code Standards. Approved backflow prevention device(s) may be required by the responsible water supply entity.

d. If the fire flows listed in the California Fire Code, Appendix B are greater than those required by the Insurance Services Office (ISO) Guide for Determination of Needed Fire Flow, the lesser fire flow shall be allowed for the development. However, system design may be required to meet higher fire flow requirements for future development or expansion.

e. On residential and commercial projects where minimum fire flow or hydrant size or spacing cannot be achieved, the Fire Warden may, where reasonable fire protection can otherwise be supplied, approve reduced fire flows, hydrant size or increase spacing if alternate facilities or construction methods can be provided to assure reasonable fire protection. (CFC, Sections B103.1 and B103.2)

6.32 DURATION

Deleted- Refer to current edition of the California Fire Code.

6.33 PRESSURE

Deleted- Refer to current edition of the California Fire Code.

6.34 WATER LINE SIZE AND DESIGN

The distribution system shall be of adequate size and so designed, in conjunction with related facilities, to maintain the minimum fire flow and pressure required. Minimum pipe size for new water lines that supply or may be anticipated to supply fire hydrants shall be not less than six inches in diameter. Water line materials shall be approved by the responsible water supply entity.

6.35 LOCATION

a. Fire hydrants shall be attached to the distribution system at locations approved by the responsible fire protection agency and water supply entity providing service.

b. Fire hydrants should be located not closer than 50' to the building being protected unless a second hydrant is available as approved by the responsible fire department. (CCR T.14, Section 1275.15)

c. Fire hydrants installed after January 1, 1992, shall be located at a turnout or turnaround along the road or driveway so that fire apparatus using the hydrant will not block the roadway. (CCR T.14, Section 1275.15)

d. Turnouts shall be constructed in accordance with Figure FS-4. An exception to the turnout may be granted by the County Fire Warden when fire hydrants are located at intersections. (CCR T.14, Section 1273.06 / 1275.15)

6.36 MATERIALS AND HYDRANTS

a. Six-inch fire hydrants shall conform to A.W.W.A. standards with one 4 ½" and two 2 ½" NST connections. All fire hydrants shall be a dry barrel type. Each hydrant shall be fitted with a 5 ¼" main valve opening and installed per Figure FS-2.

b. Fire hydrants shall be:

   1. Mueller Centurion A-423
   2. Kennedy Guardian K-81A
   3. Waterous Pacer WB-67 (with oil reservoir, bronze seat ring, weather shield, one piece bronze nut and mechanical attached nozzles)

   4. or equivalent, as approved by the respective water service and fire protection agency.

c. Each hydrant gate valve shall be supplied with an 8" valve box with metal cover, set to finish grade and installed to allow operation of gate valve per Figure FS-2.

d. All hydrants, valves, fittings, pipe, and installation shall be approved by the responsible fire protection agency and water supply entity providing service.

e. Protective barriers shall be provided when required by the respective fire department or water supply entity and shall be installed per Figure FS-3. (CCR T. 14, Section 1275.15)

6.37 HYDRANT INSTALLATION

a. Fire hydrants shall be installed in accordance with Figure FS-2 and items 1 through 6 of Figure FS-1.

b. Hydrant installations are to be inspected in a timely manner by the responsible water supply entity or fire agency prior to burial.

6.38 HYDRANT MAINTENANCE AND MARKING

a. It is essential that hydrants be in operable condition when they are needed; therefore, hydrant maintenance is an important part of these standards.

It is recommended that water and fire districts enter into an agreement to specify which maintenance tasks will be the responsibility of each respective district.

b. A written record of hydrant inspections and maintenance should be maintained.

c. The following hydrant maintenance schedule is recommended:

2-year intervals

- Paint hydrant - taking care that paint does not interfere with valve stem operation or cap removal

1-year interval

- Flush and flow-test hydrant

6-month interval

- Check for leaks in valves and repair
- Operate and check street valve
- Lubricate valve stem
- Lubricate threads on outlets and caps

d. Marking – Public hydrant barrels should be painted chrome yellow in color; private hydrant barrels should be painted red in color.

e. Hydrants installed after January 1, 1992, shall be identified by reflectorized blue markers. (CCR T.14, Section 1275.20)

   1. On paved roadways located below 2,000-foot elevation, reflectorized blue markers shall be installed in accordance with the State Fire Marshal's Guidelines for Fire Hydrant Markings along State Highways and Freeways. (May 1988) See Figure FS-7;

      or

      Hydrants shall be identified by a reflectorized blue dot (minimum (3) three-inch diameter) mounted on a metal post located within three (3) feet of the hydrant. The blue dot shall be three (3) feet to five (5) feet above ground level and clearly visible from the road/driveway. (CCR T.14, Section 1275.20)

   2. Along paved roads located at or above the 2,000-foot elevation, and along unpaved roads or driveways, hydrants shall be identified by a reflectorized blue marker on a metal post as specified above. (CCR T.14, Section 1275.20)

f. Flammable vegetation shall be cleared within eight (8) feet of fire hydrants. (CCR T.14, Section 1275.15)

g. Fences, structures, obstructions, and hydrant protection posts shall not be permitted within three (3) feet of fire hydrants. (California Fire Code, Section 507.5.5)

6.4 FIRE PROTECTION WATER STANDARDS

No Central Water System

The following standards shall apply for new developments within areas without a central water distribution facility (either public or private) as described in Section 6.3a.

6.41 DEVELOPMENT WITHIN A WATER AGENCY SPHERE OF INFLUENCE

Developments within the sphere of influence of a public water agency or adjacent to a private water system (as described in Section 6.3) may be required to connect to the water system and to meet the requirements of Section 6.3 and the California Fire Code. The County Fire Warden and water supply entity shall make recommendations to the Planning Commission or other appropriate board as to whether or not connection to the water system should be required.

6.42 RESIDENTIAL REQUIREMENTS

a. Each project shall be analyzed for individual requirements by the responsible fire department. Single-family residences outside the boundaries of a public or private water system will normally have water supplied by a fire department water tender. (CCR T.14, Section 1275.10).

b. Land divisions that create parcels less than two acres in size shall construct a central water system meeting the requirements listed in Section 6.3 and the California Fire Code.

c. Land divisions that create parcels less than five acres in size shall be located within five road miles of a fire station. Said fire station shall be recognized by the County Fire Warden as being capable of providing fire protection services to the lots being created.

d. If usable and reliable water supplies exist on site, the responsible fire department may require access to such supplies. Access may be either an all-weather road for direct drafting or a gravity flow minimum 3” feeder line with 2 ½” NST gated valve outlet. Examples of water supplies are swimming pools, ponds, lakes, creeks, streams, irrigation ditches, etc.

e. Fire sprinklers shall be installed in all new residential construction, including but not limited to, one-, two-, multi-family dwellings, and townhouses. Residential fire sprinklers shall comply with the National Fire Protection Agency 13D. (California Fire Code, Section 903.2.8)

6.43 FIRE FLOW - COMMERCIAL

a. Commercial, industrial, multiple residential (4 units or more) and public assemblies shall develop a private water system that meets the ISO Schedule for Needed Fire Flow, most current edition;

or

Shall participate in a public entity that has plans for developing a water system to provide the needed fire flows. Said plans shall be approved by the County Fire Warden or his representative.

b. On projects where minimum fire flow, hydrant size or spacing cannot be achieved, the Fire Warden may, where reasonable fire protection can otherwise be supplied, approve reduced fire flows, hydrant size or increase spacing if alternate facilities or construction methods can be provided to assure reasonable fire protection.

6.5 BUILDING CONSTRUCTION STANDARDS

6.51 BUILDING SETBACKS

All parcels 1 acre and larger shall provide a minimum 30-foot setback for buildings and accessory buildings from all property lines and/or the center of the road, whichever is greater. (CCR. T.14, Section 1276.01)

For parcels less than 1 acre, the local jurisdiction shall provide for the same practical effect. Refer to Shasta County Zoning Plan, Ordinance 17.84.020.

6.52 ROOFING

Deleted- Refer to current edition of the California Building Code.

6.53 CHIMNEY

Deleted- Refer to current edition of the California Building Code.

6.54 RAFTERS

Deleted- Refer to current edition of the California Building Code.

6.6 FUEL MODIFICATION

6.61 DISPOSAL OF VEGETATION

Disposal, including chipping, burning or removal to a landfill site approved by the local jurisdiction, of flammable vegetation and fuels removed during or caused by site development and/or construction, road and driveway construction, or fuel modification, shall be completed prior to recording the map for land divisions or final inspection for building permits. Disposal of vegetation by on-site burial is not permitted. (CCR T.14, Section 1276.02)

6.62 GREENBELTS

Subdivisions and other developments, which propose greenbelts such as parks, golf courses, irrigated landscaped areas, playgrounds, parking lots, orchards, etc. as a part of the development plan, shall locate said greenbelts strategically to provide a separation between wildland fuels and structures. The location of greenbelts shall be approved by the County Fire Warden and may be consistent with the CAL FIRE Shasta-Trinity Unit Fire Management Plan. (CCR T.14, Section 1276.03)

6.63 VEGETATION CLEARANCES AROUND STRUCTURES

Combustible vegetation shall be cleared around all structures for a distance of not less than 100 feet on each side; or to the property line, or in compliance with PRC 4291. This does not apply to specimen trees or irrigated landscaping that will not transmit fire from the native vegetation to the structure. (Public Resources Code Section 4291)

6.7 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Deleted- Refer to current edition of the California Fire Code.

6.71 ABOVEGROUND STORAGE TANKS FOR MOTOR VEHICLE FUEL – DISPENSING STATIONS

Deleted- Refer to current edition of the California Fire Code.

6.72 VAULTED TANKS OF CONCRETE OR EQUIVALENT

Deleted- Refer to current edition of the California Fire Code.

6.73 ABOVEGROUND STORAGE TANKS WITHOUT VAULTS

Deleted- Refer to current edition of the California Fire Code.

6.8 (Reserved for future additions to Standards.)

6.9 POLICIES AND STANDARDS; EXCEPTIONS; APPEALS

6.91 POLICIES AND STANDARDS NOT A LIMITATION

The policies and standards established by this chapter are not a limitation upon the powers of an approving authority to protect public health and safety and to ensure consistency between the projects and all elements of the General Plan, all other applicable laws, policies and standards of Shasta County, and all applicable state and federal laws and standards. The approving authority by 4/5 vote or greater may, with appropriate findings, grant an exception to the design and construction standards for an individual project in order to avoid physical obstructions which are extremely difficult or impossible to remove; to avoid irreparable damage to natural features; and to handle similar situations which are unforeseen by these standards. Exceptions from the generally applicable Standards shall result in the same practical effect of the general standards by meeting the performance criteria listed in Section 6.92.
(CCR T.14, Section 1270.07)

6.92 CRITERIA FOR EXCEPTIONS AND APPEALS

a. The approving authority shall apply the following criteria when granting exceptions or appeals:

    1. Exceptions shall provide defensible space consistent with the "SRA Fire Safe Regulations." (CCR T.14, Section 1270.09)

    2. Exceptions shall provide safe emergency access for fire equipment.

    3. Exceptions shall provide for unobstructed traffic circulation during an emergency.

    4. Exceptions shall provide for safe civilian evacuation during an emergency.

    5. Exceptions shall not cause delays in emergency response or interfere with the ability of emergency personnel to locate an incident.

    6. Exceptions shall provide a sufficient quantity of water for both wildfire and structural firefighting at a location where it is immediately available to emergency personnel.

    7. Exceptions shall not result in fuel modification that would adversely affect access or defensible space thereby jeopardizing civilian and firefighter safety.

b. The approving authority shall consider recommendations from the County Fire Warden in the exception or appeals process. The County Fire Warden shall provide documentation outlining the effects of the requested exception on fire protection services.

c. The approving authority shall make a written statement of findings as to the reason for the decision. A copy shall be provided to the applicant and the County Fire Warden.

6.93 EXCEPTIONS

a. Requests for exceptions shall be made in writing to the County Fire Warden by the applicant or the applicant's authorized representative. Requests shall state the specific section(s) for which an exception is requested, material facts supporting or justifying the exception, and proposed alternative mitigation measures. (CCR T.14, Section 1270.08)

b. For projects or permits under the jurisdiction of the Planning Division, the County Fire Warden will forward requests for exceptions to the Planning Commission or Board of Administrative Review along with his or her recommendations. The Planning Commission or Board of Administrative Review may grant or deny an exception in accordance with Section 6.92. A request for exception on a project subject to an administrative permit may, at the discretion of the Director of Resource Management, be referred to the County Fire Warden for approval or denial of the exception in accordance with Section 6.92.

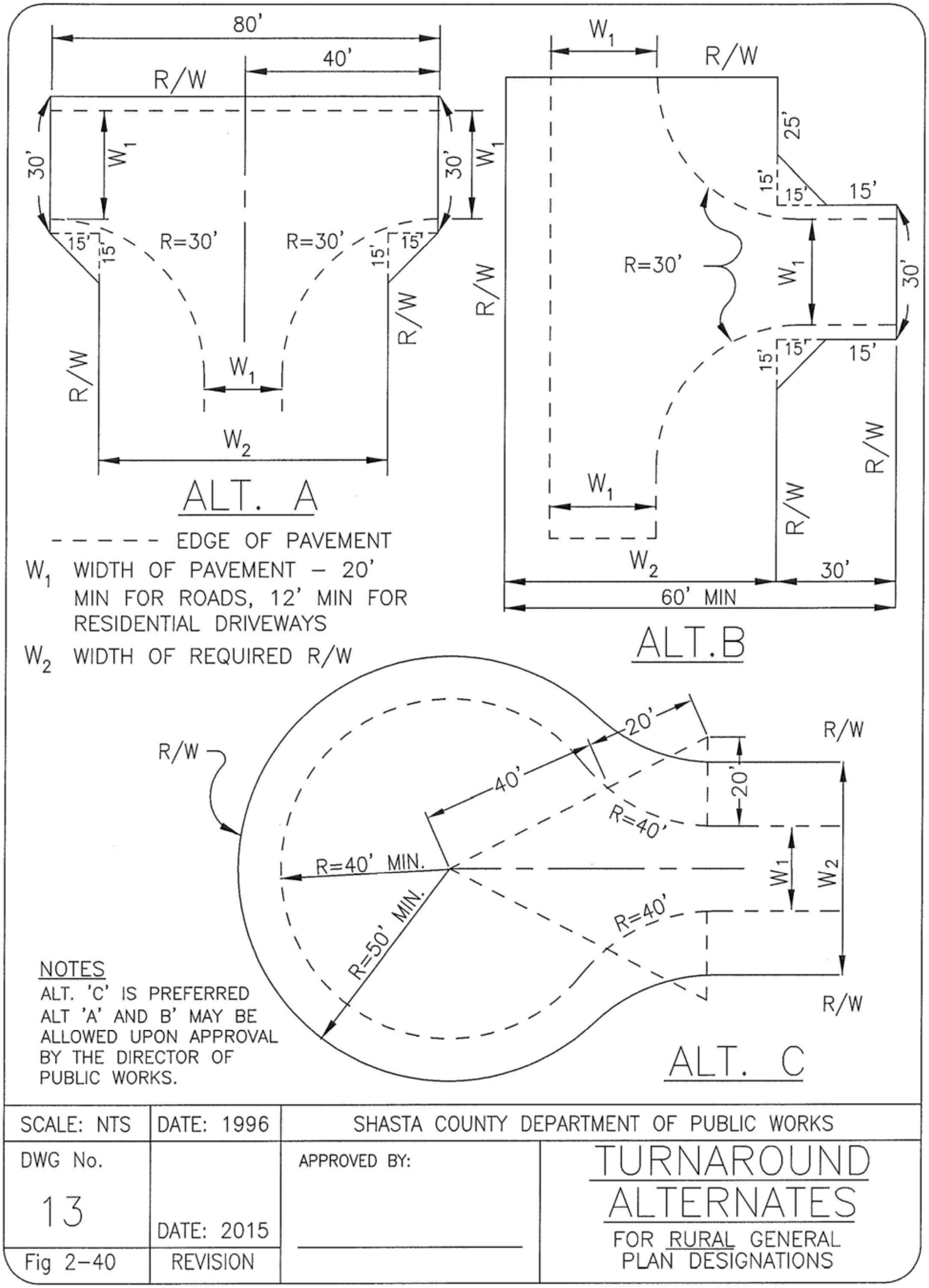
c. For permits under the jurisdiction of the Building Division, the County Fire Warden may grant or deny the exception in accordance with Section 6.92.

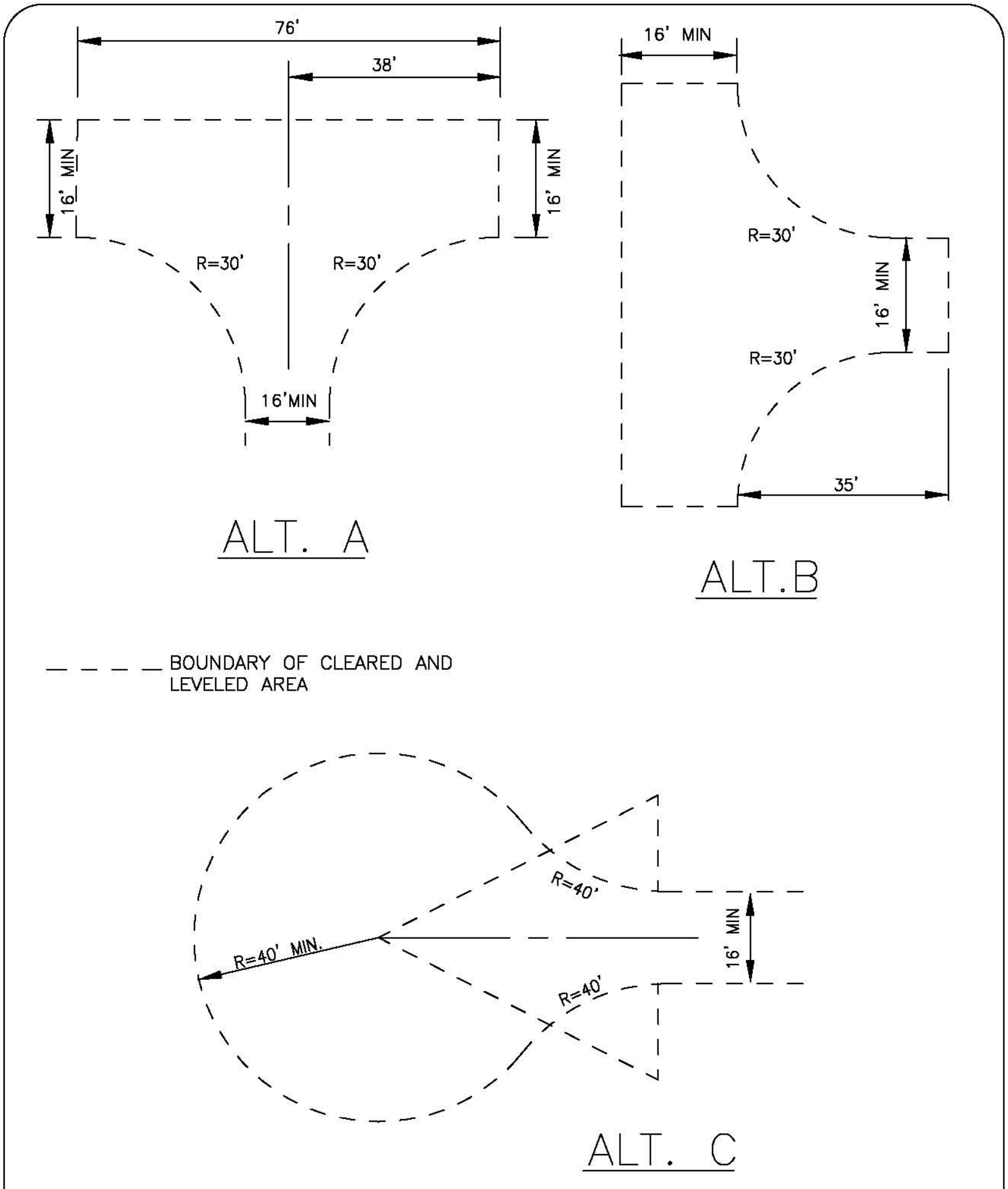
6.94 APPEALS (CCR T.14, Section 1270.09)

a. Where an exception is not granted by the approving authority, appeals shall be processed in the manner provided for in the Shasta County Code. Planning Commission or Board of Administrative Review appeals shall be processed in accordance with Section 15.08.140. Building permit appeals shall be processed in accordance with Section 16.04.080.

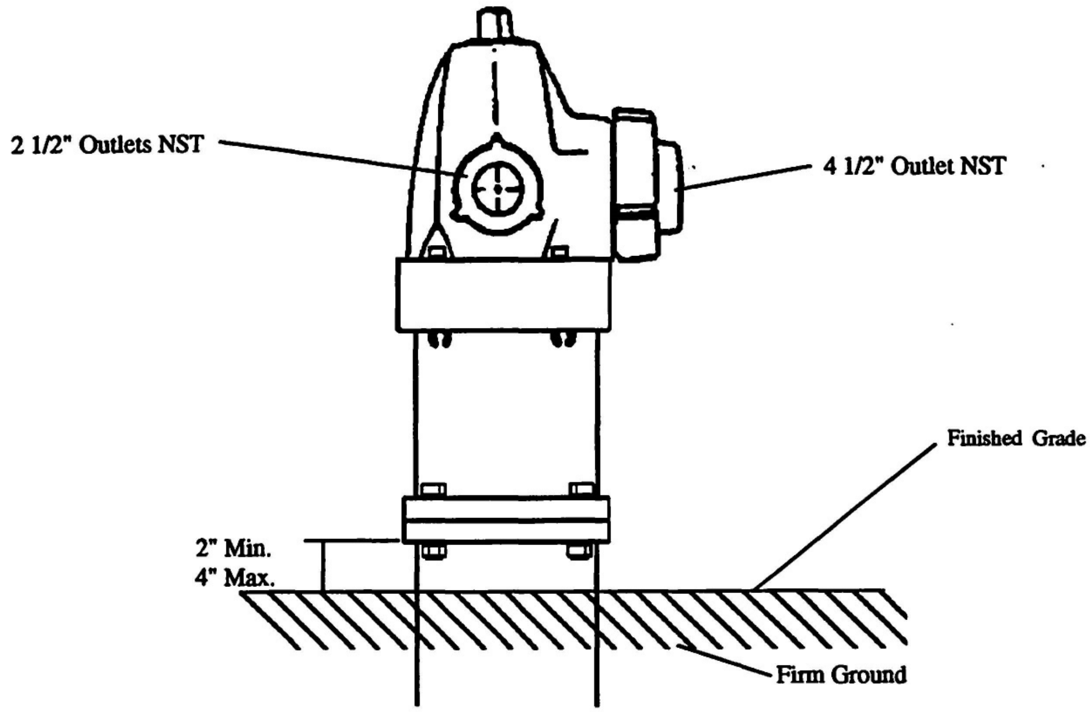
b. Upon appeal, the Board of Building Appeals may grant or deny an exception in accordance with Section 6.92.

c. Upon appeal, the Board of Supervisors may grant or deny an exception in accordance with Section 6.92.


80'
40'
R/W
30'
W_1
R=30'
R=30'
15'
15'
15'
15'
R/W
R/W
W_1
W_2
ALT. A
- - - - - - EDGE OF PAVEMENT
W_1 WIDTH OF PAVEMENT – 20' MIN FOR ROADS, 12' MIN FOR RESIDENTIAL DRIVEWAYS
W_2 WIDTH OF REQUIRED R/W
W_1
R/W
25'
15'
15'
15'
R=30'
R/W
W_1
30'
15'
15'
15'
R/W
W_1
R/W
W_2
30'
60' MIN
ALT.B
R/W
20'
40'
20'
R=40'
R/W
R=40' MIN.
W_1
W_2
R=50' MIN.
R=40'
R/W
NOTES
ALT. 'C' IS PREFERRED
ALT 'A' AND B' MAY BE ALLOWED UPON APPROVAL BY THE DIRECTOR OF PUBLIC WORKS.
ALT. C
SCALE: NTS
DATE: 1996
SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS
DWG No.
13
APPROVED BY:
TURNAROUND ALTERNATES
FOR RURAL GENERAL PLAN DESIGNATIONS
DATE: 2015
Fig 2–40
REVISION



SCALE: NTS	DATE: 1996	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS	
	DATE: 2015	APPROVED BY:	MINIMUM FIRE STANDARD TURNAROUND ALTERNATES (FOR RESIDENTIAL DRIVEWAYS OVER 300 FEET IN LENGTH)
Fig 2-42	REVISION		



NOTES:

(1) Each hydrant must be gated between the hydrant and street main.

(2) Each hydrant shall be placed in such a manner that the 4 1/2 inch outlet faces the street.

(3) Fire hydrants shall be placed a minimum of 4 feet and maximum of 10 feet from the edge of the road surface or turnout, or as otherwise approved by the respective fire district and water service entity.

(4) Barrel must be of dry type.

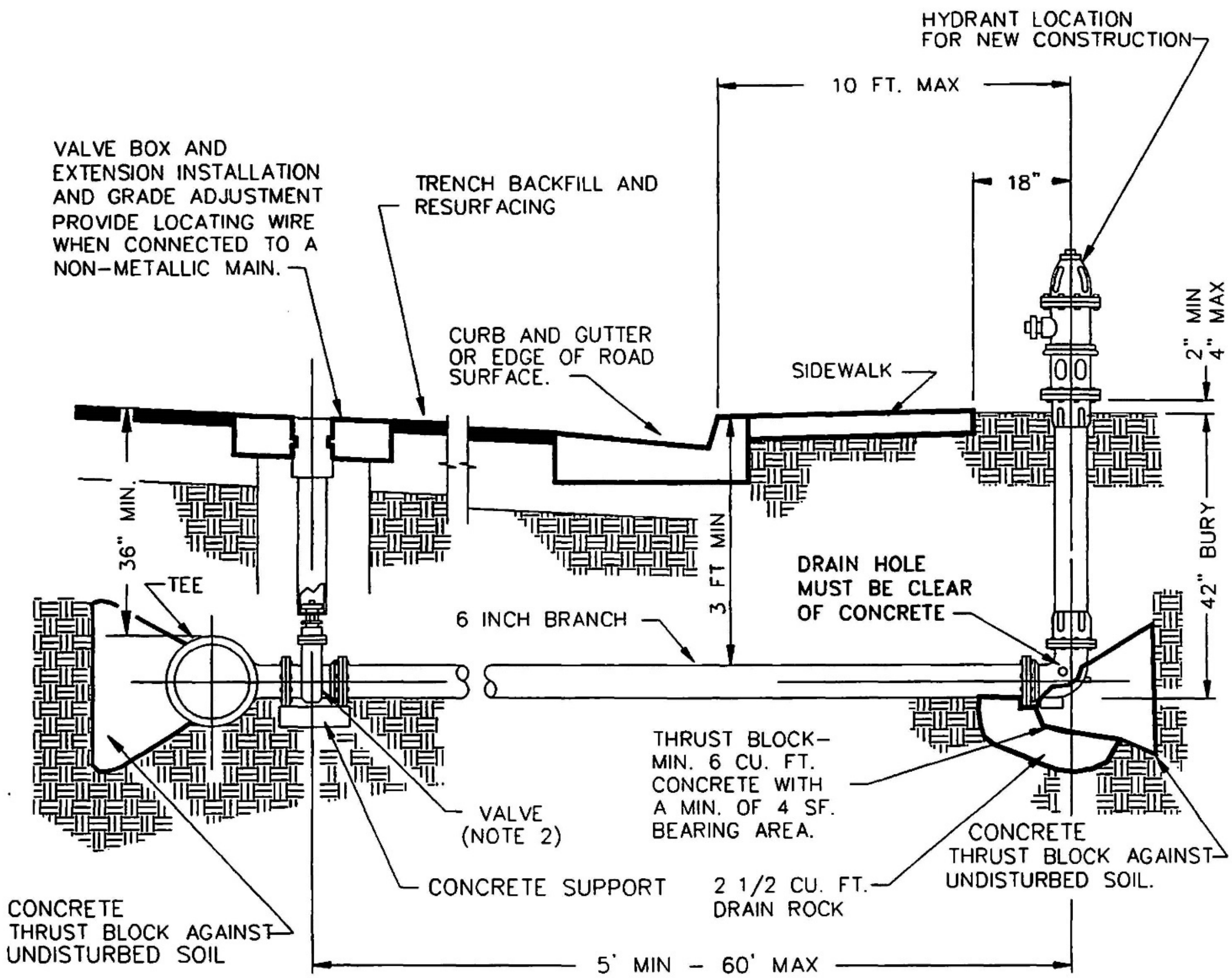
(5) Hose threads on outlets shall be National Standard dimensions.

(6) Hydrants shall NOT be less than 18 inches or more than 25 inches above the grade of the roadway or driveway.

STATE OF CALIFORNIA
COUNTY OF SHASTA
FIRE DEPARTMENT

MINIMUM FIRE STANDARD
FIRE HYDRANT
DRY BARREL TYPE

Fig. FS-1



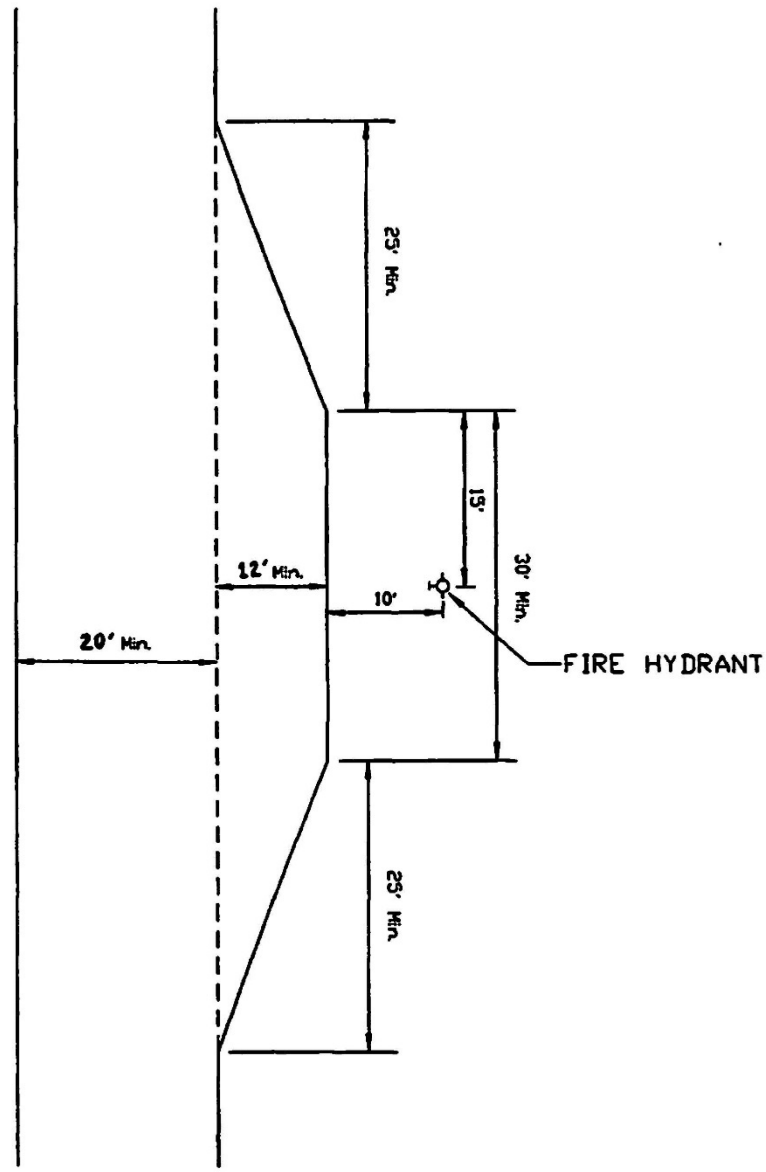
NOTES:

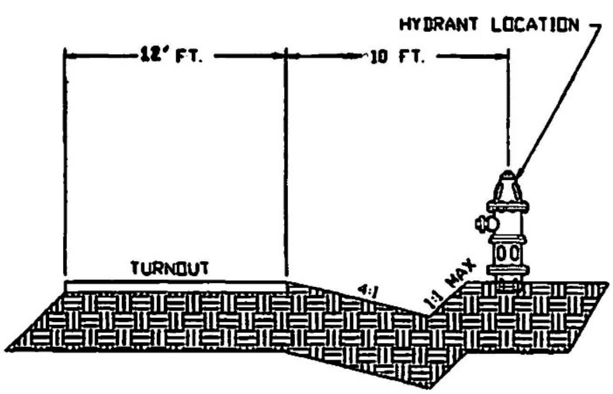
1. ALL CONSTRUCTION SHALL BE INSPECTED BY THE RESPONSIBLE AGENCY PRIOR TO BURIAL.
2. FOR ALLOWABLE FIRE HYDRANTS, VALVES, PIPE AND FITTINGS SEE SECTION 5.36. (GATE VALVE ACCORDING TO A.W.W.A. STANDARDS)
3. HYDRANT BURY DEPTH MAY VARY WITH PRIOR APPROVAL OF THE WATER SERVICE ENTITY.
4. PRIVATE ON-SITE HYDRANT LOCATIONS TO BE APPROVED BY THE FIRE AGENCY HAVING JURISDICTION.

STATE OF CALIFORNIA
COUNTY OF SHASTA
FIRE DEPARTMENT

FIRE HYDRANT INSTALLATION

Fig. FS-2





STATE OF CALIFORNIA

COUNTY OF SHASTA

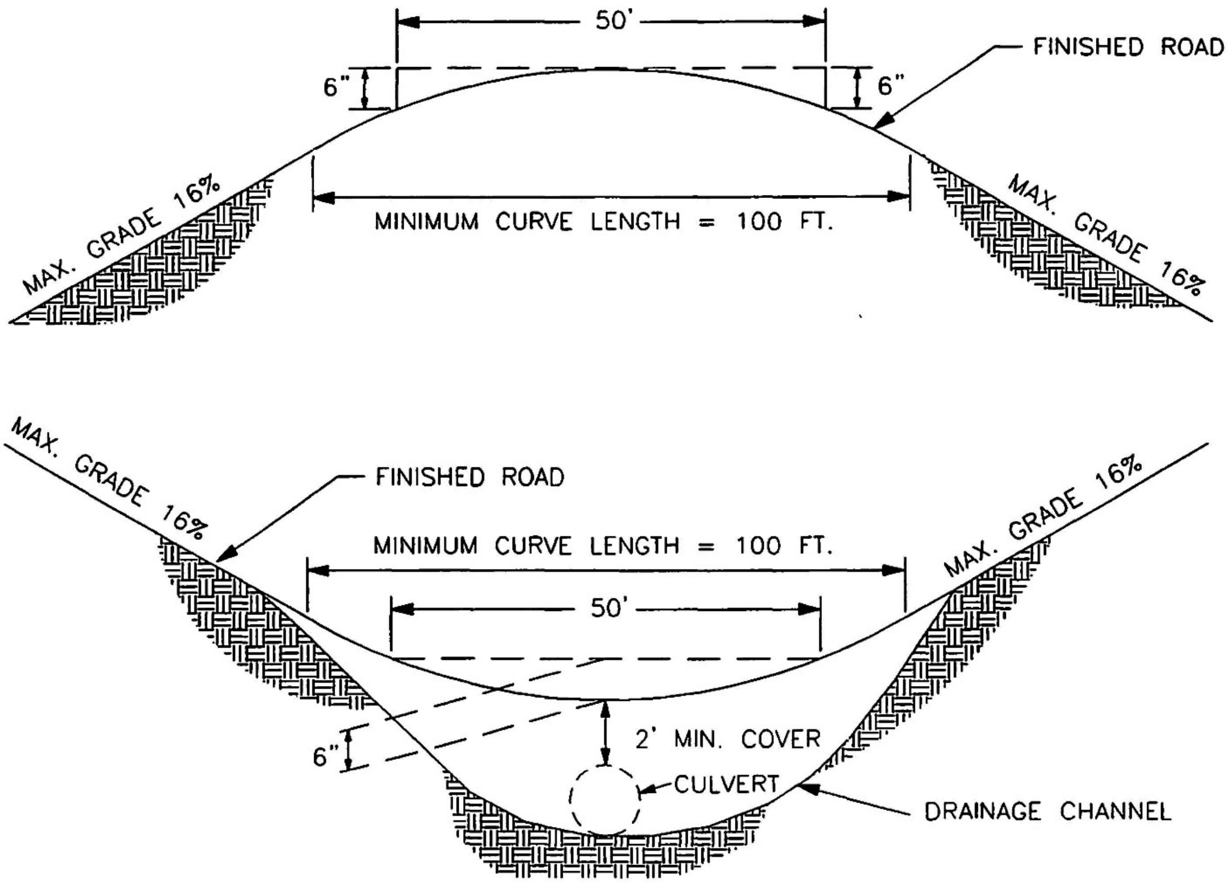
FIRE DEPARTMENT

TURNOUT

FOR FIRE HYDRANTS

Fig. FS-4

*** NOT DRAWN TO SCALE



NOTES:

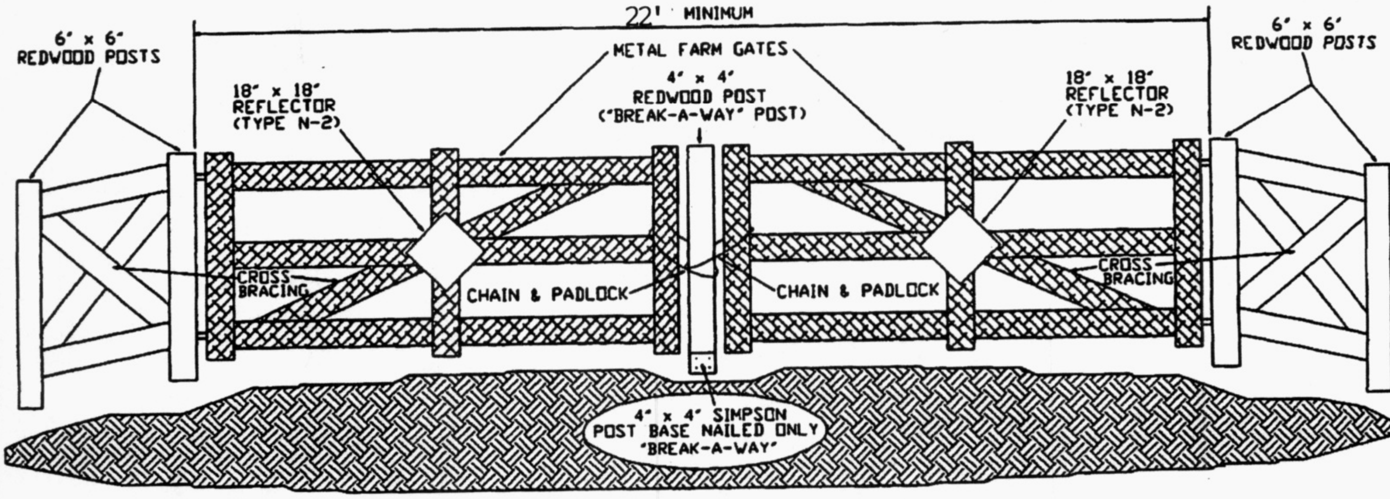
1. Culvert size to be established by a licensed Engineer.
2. Culverts should have a minimum depth of 24" of cover or an amount equal to 1/2 of the diameter of the culvert, whichever is greater.
3. Contact the Shasta County Building Division to determine whether a grading permit is required.
4. Contact the California Department of Fish and Game prior to grading within creeks and drainages.

STATE OF CALIFORNIA
COUNTY OF SHASTA
FIRE DEPARTMENT

TYPICAL VERTICAL CURVES

FOR PRIVATE RESIDENTIAL DRIVEWAYS

Fig. FS-5



*** NOTES: 1) All exposed surfaces to be painted with 2 coats of white exterior grade paint.

2) Set all posts in 3' of concrete.

3) 2 SEPARATE CHAINS AND PADLOCKS, <u>ONE SET FOR EACH GATE</u>

STATE OF CALIFORNIA
COUNTY OF SHASTA
FIRE DEPARTMENT

BREAK-A-WAY
GATE ASSEMBLY

Fig. FS-6

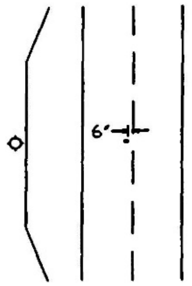


FIGURE 1
TWO LANE STREET

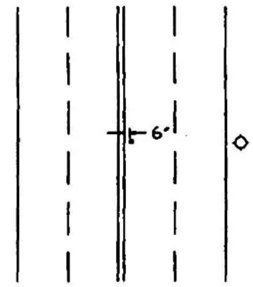


FIGURE 2
MULTI-LANE STREET

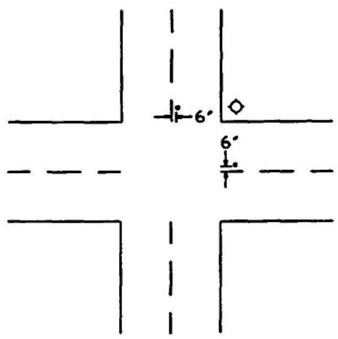


FIGURE 3
AN INTERSECTION

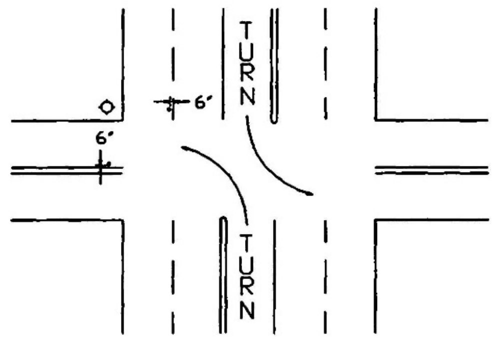


FIGURE 4
FOUR LANE STREET WITH
TURN LANE AT INTERSECTION

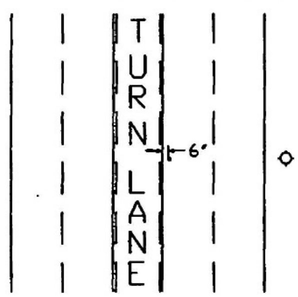


FIGURE 5
MULTI-LANE STREET
WITH TURN LANE

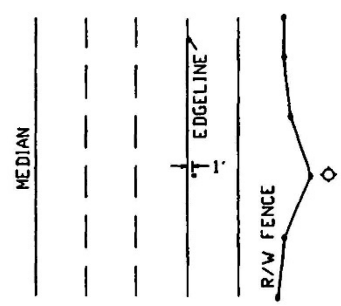


FIGURE 6
FREEWAYS AND EXPRESSWAYS

◇ = FIRE HYDRANT

· = BLUE PAVEMENT MARKER

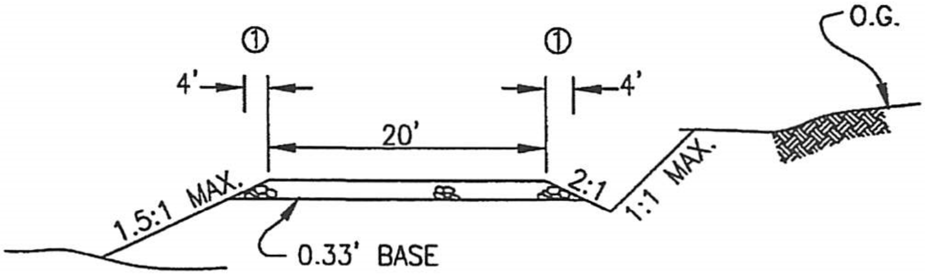
.JTE: REFLECTIVE SURFACE OF BLUE DOT TO FACE DIRECTION OF VEHICLE TRAVEL

STATE OF CALIFORNIA

COUNTY OF SHASTA
FIRE DEPARTMENT

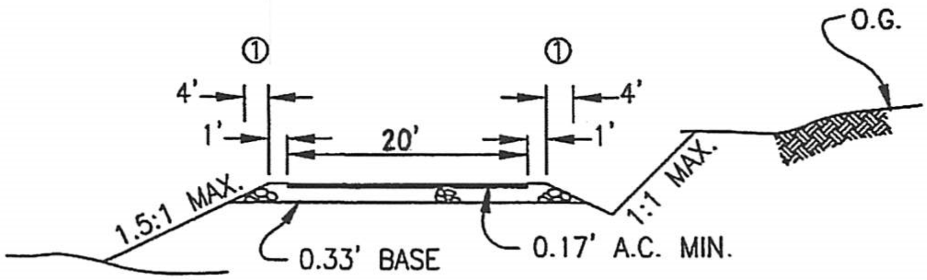
TYPICAL
HYDRANT MARKER
LOCATION

Fig. FS-7



PRD EMERGENCY FIRE ESCAPE ROAD

① VEGETATION CLEAR ZONE, REMOVE VEGETATION SMALLER THAN 6-INCH IN DIAMETER A MINIMUM OF 4 FEET BEYOND THE EDGE OF ROAD



PAVED EMERGENCY FIRE ESCAPE ROAD

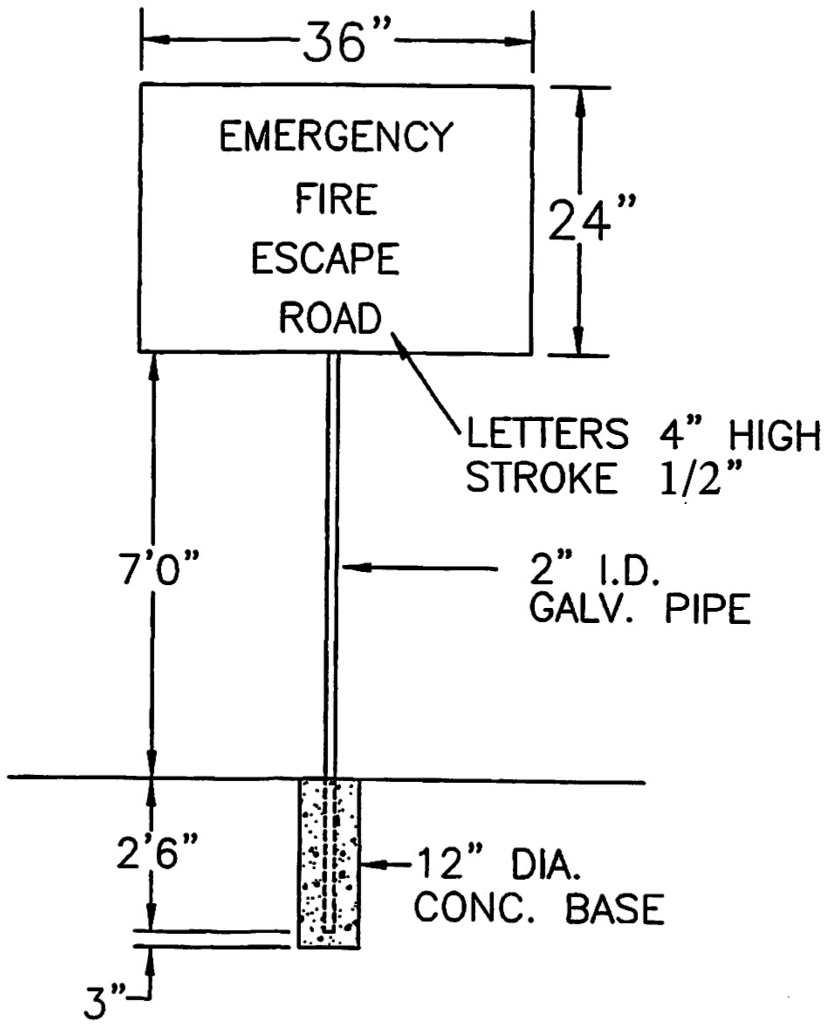
① VEGETATION CLEAR ZONE, REMOVE VEGETATION SMALLER THAN 6-INCH IN DIAMETER A MINIMUM OF 4 FEET BEYOND THE EDGE OF ROAD

TYPICAL SECTIONS

SCALE: NTS	DATE: 08-2004	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL SECTIONS FOR EMERGENCY FIRE ESCAPE ROAD

FS-8



REFLECTIVE WHITE LETTERS ON
REFLECTIVE GREEN BACKGROUND

SCALE: NTS	DATE: 01-2003	SHASTA COUNTY DEPARTMENT OF PUBLIC WORKS

SIGN

FOR EMERGENCY FIRE ESCAPE ROAD

FS-9

CHAPTER 7

COUNTY SERVICE AREAS

SANITARY SEWER

AND

WATER SYSTEM STANDARDS

CHAPTER 7 - COUNTY SERVICE AREAS
SANITARY SEWER AND WATER SYSTEM STANDARDS

A. GENERAL PROVISIONS

1. General Requirements

a. All sanitary sewer and water system improvements to be accepted by a County Service Area (CSA) shall conform to the requirements as described herein, unless otherwise approved by the CSA.

b. In the event of any conflict between these CSA standards and other standards (e.g. Shasta County road standards), these CSA standards shall govern.

c. In the event that the subject CSA is not presently capable of providing the desired water/sewer service to the subject parcel, it shall be the responsibility of the applicant to make any necessary improvements to the CSA facilities necessary to serve the property. Such improvements may include extension of water and/or sewer lines, improvements to supply, treatment, storage and distribution facilities, and any additional facilities that may be required.

d. All necessary CSA facility improvements necessary to serve the customer shall be constructed at the sole expense of the customer. Said facilities shall meet or exceed minimum standards of design and construction of facilities, as required by the CSA and these Standards. Any deviations from these Standards shall be approved by the CSA and certified by a Civil Engineer registered in the State of California.

e. All plans and specifications for improvements to CSA facilities shall be prepared by a registered civil engineer and shall be submitted to the CSA for approval. Plans and specifications shall be approved by the CSA prior to the commencement of any related construction. Any construction that is to be accepted by a CSA shall be done by a licensed contractor.

f. Where reduced or increased pressure is desired by the customer, he/she shall be responsible for installing and maintaining the necessary regulators, pumps, and relief valves at their sole expense. Said facilities shall not be installed on the supply side of the meter without written approval of the CSA.

g. An encroachment permit shall be required for all work within the County rights of way.

h. In no event shall service laterals extend more than 60' into public rights of way unless otherwise approved by the CSA.

i. Where sanitary sewer or water mains are not aligned within County rights of way, a 20-foot minimum width easement shall be provided to the CSA, with terms approved by the CSA. Easements shall allow ingress and egress by maintenance personnel, vehicles and heavy equipment for the purposes of inspecting, maintaining and repairing CSA facilities. In addition, an all-weather gravel road, 12-foot minimum width, shall be provided to all blowoffs, hydrants, air valves, manholes and similar facilities.

2. Acceptance and Ownership

a. Prior to acceptance of sanitary sewer or water system improvements, the applicant shall submit, to the CSA, as-built plans, a certificate of completion, and all other items specified by the CSA and shall pay all inspection, capital improvement, connection fees and other charges as established by the CSA and the County.

b. Prior to acceptance of any sanitary sewer or water system improvements, all facilities to be operated and maintained by a CSA shall be dedicated to the CSA, along with all related rights of way and easements. The CSA shall assume ownership of all water service facilities through the meter, including the meter box and cover. All facilities past the outlet side of the meter shall remain the property of the customer, and the maintenance and repair of the facilities shall be the responsibility of the customer. Likewise, the CSA will assume ownership for all sewer facilities to the property line, including the cleanout. All sewer facilities past the property line shall remain the property of the customer, and the maintenance and repair of the facilities shall be the responsibility of the customer. The CSA shall assume no responsibility for facilities they do not accept. Maintenance, repair and operation of all non-accepted facilities shall remain the responsibility of the owner and the CSA shall assume no obligations thereto.

c. An agreement shall be executed by the applicant guaranteeing all dedicated facilities for a period of one year after acceptance by the CSA against defects in design, materials and workmanship. The agreement shall require a bond in the amount of seventy-five percent of the estimated construction cost of the improvements, unless waived by the CSA.

3. Fees and Costs

a. A deposit for the CSA to review and inspect a proposed community water or sewage disposal system will be required. This deposit shall be in accordance with the Fee Schedule for Plan Check and Inspection Deposit in Chapter 2 of these development standards. Should the water or sewer improvements be part of a subdivision or other development project, only one deposit will be required in accordance with the cost of the entire project.

b. In addition, for annexations of existing facilities or formation of new districts fees shall be as set forth in Appendices 7-1 and 7-2.

4. Household Equivalents

a. The household equivalents used for design purposes and to calculate sewer fees are listed in Table 7-1. As a minimum each parcel shall be assigned one household equivalent.

TABLE 7-1

SEWER HOUSEHOLD EQUIVALENTS

NO.	COMMERCIAL, RESIDENTIAL, AND SPECIAL GROUPS	* HOUSEHOLD EQUIVALENT
1	Residential - Single Family & Duplex	1.0/Unit
2	Residential - Multiple Family, Apartment	.6/Unit
3	Residential Mobile Home	1.0/Unit
4	Mobile Home Park	.8/Space
5	Bakery - Wholesale	1.0/1000Ft²
6	Barber Shop	0.3/Chair
7	Bar w/o Dining Facilities	2.0/Establish
8	Beauty Shop	0.5/Chair
9	Car Wash - Self-service w/recycle	1.0/Bay
10	Church (schools not included)	0.2/1000Ft²
11	City, County, Federal Buildings	0.8/1000Ft²
12	Department and Retail Store	0.5/1000Ft²
13	Convalescent Home	0.5/Bed
14	Health Club	0.8/1000Ft²
15	Hospital	1.0/Bed
16	Industry, Light (dry)	0.1/1000Ft²
17	Laundromat	0.5/Washer
18	Laundry (Industrial)	Case by Case
19	Medical & Dental Office	1.0/1000Ft²
20	Motel Without Dining Facilities	0.5/Room 0.6 w/Kitchen
21	Mortuary	1.5/Slumber Room
22	Professional Office	0.8/1000Ft²
23	Recreational Hall	Case by Case
24	Repair Shop	.50/Stall
25	Restaurant: A. Large 24-hour Chain B. Large (> 2500 Ft²) C. Small (< 2500 Ft²) D. Pizza Parlor E. Fast Food Establishment: I. Major Chain II. Local	 4.6/1000Ft² 4.6/1000Ft² 4.6/1000Ft² 4.6/1000Ft² 4.6/1000Ft² 4.6/1000Ft²
26	School: A. Elementary B. Secondary (w/Showers)	 0.08/Student 0.10/Student
27	Service Station: A. With Convenience Store B. Highway Location - High Volume C. Other Location	 0.5/Pump 0.75/Pump 0.5/1000Ft²
28	Theater	0.02/Seat
29	Market: A. Supermarket (Chain Store Size) B. Small Convenience Market (no gas) C. Market w/o Garbage Disposal	 0.75/1000Ft² 0.5/1000Ft² 0.5/1000Ft²
30	Warehouse	Case by Case

* See Section B.3. "Flow Criteria"

b. Household equivalents for buildings that are undefined or intended for multiple types of occupancy shall be determined by the zoning as defined in the Shasta County Code. These household equivalents are given in Table 7-2.

TABLE 7-2

SEWER HOUSEHOLD EQUIVALENTS
FOR FACILITIES WITH UNDEFINED OR MULTIPLE OCCUPANCY TYPES

ZONE	DEFINITION PER SHASTA COUNTY CODE	* HOUSEHOLD EQUIVALENT
C-1	Local Convenience	$1.3/1000Ft^2$
C-2	Community Commercial	$2.0/1000Ft^2$
C-O	Office Commercial	$1.3/1000Ft^2$
C-H	Highway Commercial	$1.8/1000Ft^2$
C-R	Commercial Recreational	$1.5/1000Ft^2$
C-M	Commercial Light Industrial	$1.8/1000Ft^2$

* See Section B.3. "Flow Criteria"

5. Classifications

a. All single family dwellings, public schools, churches, and nonprofit organizations with water services not greater than 3/4 inch in diameter shall be classified as residential services. Any service greater than 3/4 inch in diameter shall be classified as commercial.

b. Upon approval of the CSA, motels, duplexes, apartment houses, mobile home parks, and other residential uses with multiple living units on a single parcel may be granted water service with a single meter.

6. Reimbursement to Developer

a. The CSA may require the oversizing of the improvements to provide additional capacity for the benefit of existing CSA customers, or for the future benefit of properties not presently served by the CSA. In the event that such oversized facilities are to be accepted by the CSA and dedicated to the public, the developer may request the CSA to administer a reimbursement agreement, persuant to Section 2.A.6. "Reimbursement to Developer" of the Shasta County Development Standards, for the costs of oversizing.

7. Policies And Standards Not a Limitation

a. The policies and standards established by this section are not a limitation upon the powers of an approving authority to protect public health and safety and to ensure consistency between the projects and all elements of the General Plan, all other applicable laws, policies and standards of Shasta County, the CSA, and all applicable state and federal laws and standards. The CSA may, with appropriate findings, deviate from the design or construction standards for an individual project in order to be consistent with adjacent or neighboring projects; to avoid physical obstructions which are extremely difficult or impossible to remove; to avoid irreparable damage to a natural feature; and to handle similar situations which are unforseen by these standards.

B. CSA SANITARY SEWER DESIGN AND CONSTRUCTION CRITERIA

1. General Requirements

a. Sewers shall meet the following design requirements except where specifically approved otherwise by the CSA. Any sewers installed within another utilities' LAFCO Sphere of Influence shall also meet that agency's standards, which shall govern in the event of conflict. All construction shall conform to latest edition of Standard Specifications for Public Works Construction (SS), unless modified herein.

2. Acceptable Materials

a. Trunks, mains, collectors, and sewer service connections (4" and larger) shall be PVC — solid wall SDR 35 per ASTM D-3034. Between a residential structure and the property line, laterals may be ABS conforming to ASTM D2751-83a.

3. Flow Criteria

a. Except for CSA #8, Palo Cedro, design of sewer lines within the Shasta County Service Areas shall be based upon an average daily flow of 250 gallons per household equivalent per day times a peaking factor (Figure S-1) plus 1,500 gallons per acre per day for stormwater and groundwater infiltration. The sewer lines in CSA #8 shall be based upon an average daily flow of 195 gallons per household equivalent per day times a peaking factor (Figure S-1) plus 1,500 gallons per acre per day for stormwater and groundwater infiltration.

4. Resistance Factor

a. Mains and collector sewer lines shall be designed with a minimum Manning coefficient of $n = 0.013$.

5. Minimum Slope

a. The minimum slope allowed for sewer lines shall be:

TABLE 7-3
MINIMUM ALLOWABLE SEWER LINE SLOPE

DIAMETER	NORMAL MINIMUM SLOPE	ABSOLUTE MINIMUM	NOTE
6"	0.0065	0.0052	Absolute minimum slopes for larger sewers shall be based on 2 feet per second flow when full.
8"	0.0040	0.0033	
10"	0.0030	0.0025	
12"	0.0025	0.0020	

b. Any dead end line with a length of 200 feet, or less, shall have a minimum slope of S = 0.0065.

6. Minimum Size

a. The minimum size sewer line shall be 6-inch, except 4-inch may be used for laterals for individual services. For mains which serve C, I or MU general plan land use areas the minimum size shall be 8-inch. Sewer mains serving over 100 connections shall be 8-inch minimum. Where master plans have been developed, the sewers shall be sized pursuant to such plans. When such plans are not available the sewer shall be sized on anticipated ultimate development in the tributary area.

7. Minimum Radius

a. The minimum allowable radius of curvature in the sewer lines shall be as shown in Table 7-4.

TABLE 7-4
MINIMUM RADIUS CURVES FOR SEWER LINES
(RADII IN FEET)

Based on 1½ times the manufacturers' recommended minimums	
DIAMETER	PVC SDR 35
6"	225
8"	300
10"	375
12"	450
15"	525

8. Minimum Cover

a. Minimum depth of cover shall be as follows:

(1) 5.0 feet over main line in street and 3.0 feet in cross country areas

(2). 4.5 feet to invert of service connections at property line unless otherwise approved by the CSA.

9. Manhole Spacing

a. Manhole spacing and locations shall be as follows:

(1)	Sewers 6- to 8-inch	:	400	feet maximum
(2)	Sewers 10- to 12-inch	:	500	feet maximum
(3)	Sewers 15-inch and larger	:	1,000	feet maximum

(4) At all angle points in horizontal and vertical alignment (except where vertical curves are permitted)
(5) At the terminal end of all lines (except where rodholes are permitted)
(6) At all connecting sewers

10. Drop Manholes

a. Drop manholes will not be permitted unless approved by the CSA.

11. Rodholes

a. Rodholes will only be allowed on a sewer less than 200 feet long, and when the line serves four or less connections.

12. Final Testing

a. Prior to acceptance of the sewer, the lines shall be tested for leakage, cleaned, flushed, balled, mandrelled and televised. Sewer extensions of less than 1,000 feet with no vertical curves between manholes are not required to be televised. All final testing discussed herein shall be considered to be part of the work and shall be performed at the expense of the applicant.

13. Plugging

a. The downstream end of all new lines shall be plugged until the sewer is accepted by the CSA. The plug will be removed by CSA personnel at the time the sewers are placed into operation.

14. Maximum Depth of Cover

a. Mains shall not be designed with cover exceeding 15 feet from finish surface grade, without special permission from the CSA.

15. Acceptable Depth for Service

   a. Sewer depth shall be such as to obtain gravity service to all potential building sites using a minimum building sewer grade of 1 percent (1/8-inch per foot) with the connecting service invert at the crown of the main sewer, and 18 inches to invert at the building site.

16. Crown Matching and Manhole Inverts

   a. Where pipe sizes increase, the crowns shall match in elevation and the manhole invert shall slope the diameter difference. On all manholes with other than straight through piping the manhole invert shall slope at least 0.17 foot.

17. Vertical Curves

   a. Vertical curves are permitted only when a straight grade is deemed impractical by the CSA.

18. Sewer/Water Main Separation

   a. Sewers shall normally be 10-foot minimum from water mains (clear dimensions). A 15-foot spacing between water and sewer, typically with sewer 5 feet to one side of road centerline, is required for urban construction . In rural areas water and sewer main lines shall be outside the pavement edge on opposite edges of the road and should not lie directly below any surface drainage ditches. Sewers shall be separated from water mains pursuant to State Health Department Standards when lesser spacing is necessary for practical construction.

19. Property Line Cleanouts

   a. Property line cleanouts shall be installed on laterals on all sewer systems.

20. Laterals Connecting at Manholes

   a. Laterals may enter directly into manholes providing the invert is at the grade of the crown of the exiting sewer.

21. No Service Connections to Force Mains

   a. Laterals shall not be connected to force mains.

22. No Joint Service Laterals

   a. Joint use of a single lateral by two property owners is not permitted.

23. Individual Pumping Systems

   a. Use of individual sewage pump stations or sewage pumps in combination with septic tanks will not be permitted unless approved by the CSA.

24. Plans

a. Sewer improvement plans shall be at 1" = 100' or larger scale. A profile must be included. Ground elevations along the sewer, at lateral connection points, and at potential building sites, shall be based on field surveys or topographic maps prepared in accordance with National Mapping Standards with contour intervals of 2 feet or less. Bench mark data, north arrow, scale, street names, invert elevations, property and right of way lines, existing utilities, sewer grades, sewer locations, and special construction features shall be shown on the plans.

25. Inspection

a. All sewer construction shall be subject to inspection by the CSA. No work shall be performed without a minimum of five working days advance written notice to the CSA.

26. Compaction Testing

a. Where facilities are to be dedicated to the CSA, compaction tests shall be conducted by a California registered Civil Engineering or Geotechnical Engineering Company, or by an approved materials testing laboratory. Tests shall be taken at a minimum of every 1,000 feet, and no less than two per job, and two additional tests shall be performed for each failing test. Test locations shall be selected by the CSA's inspector. Compaction tests shall be done in compliance with California test methods 216 and 231.

C. WATER SYSTEM DESIGN AND CONSTRUCTION CRITERIA

1. General Requirements

a. Water systems shall meet the following design requirements except where specifically approved by the CSA. Any water system installed within another utilities' LAFCO Sphere of Influence shall also meet that agency's standards which shall also govern in the event of a conflict. All construction shall conform to latest edition of Standard Specifications for Public Works Construction (SS), unless modified herein and shall conform to Title 22, State of California Water Works Standards.

2. Pipe Material

a. Water main piping shall be either ductile iron pipe or PVC. Services 3" and larger shall be ductile iron, or Class 150 C900 PVC. Services less than 3" shall be copper, except services from 1 1/2 inches to 3 inches may be Schedule 80 PVC.

3. Pipe Size

a. All water main piping serving fire hydrants shall be 6-inch minimum.

b. Where master plans have been developed, the water main pipe size shall conform to the master plan. In the absence of a master plan, the pipe size shall be adequate to maintain a minimum pressure of 45 psi, and not cause the static pressure to drop more than 20 percent of normal under peak domestic demands at ultimate development. During fire flows, coincident with the maximum daily demand, residual pressures in the mains shall not fall below 20 psi.

c. When piping is needed only to accommodate service connections the size shall be large enough to have not more than 3 pounds per square inch of (psi) pressure loss when all services are operating at their maximum meter capacities. Minimum size shall be 2-inch.

4. Fire Hydrants

a. Fire hydrant type, spacing and installation details shall conform to the latest version of the Fire Safety Standards for Shasta County.

5. Blowoffs

a. Blowoffs shall be provided at all pronounced low points and on any main which dead ends more than 10 feet past a fire hydrant.

6. Requirements for Reduced Pressure Backflow Valves, Double Checks, And Detector Checks

a. Backflow prevention using approved devices to control cross connections shall be accomplished pursuant to the State of California, Title 17, Regulations Concerning Cross Connections. Backflow prevention devices shall be installed on private property, but as close to the water meter connection as practical, and at locations which are available for inspection by, CSA, County and Health Agencies personnel. Backflow devices shall conform to the attached standard details when applicable. For sizes and types of backflow preventers not shown in these standards, the details in the latest City of Redding standards shall be used.

b. Fire services may or may not require a backflow prevention device. Each such service shall be reviewed with respect to State of California Title 17, Assembly Bill 2503, and the memorandum from the State Fire Marshall's Office of December 10, 1984 regarding Cross Connection Control Requirements on Certain Classes of Fire Sprinkler Systems AB 2503.

7. Air Valves

a. Air valves shall be combination types installed on all high points in the distribution system, except when an active service connection can be placed at the high point and there is no reason for air to accumulate at that high point other than during construction, repair, or total system pressure loss. An air valve shall always be placed at the first high point where air could gain entry into the system from a well, a surface water supply, or from a hydropneumatic tank.

b. Air valves shall have a minimum nominal size of 1-inch. Two-inch or larger sizes shall be used on mains larger than 10 inches in accordance with engineering principles as recommended by air valve manufacturers.

8. Valves

a. Line valves shall be spaced generally no more than 1,000 feet apart (pursuant to California Waterworks Standards) except in rural locations or on pipelines larger than 12-inch in diameter. Valves should generally be placed at the beginning of all dead end runs and at intersections of gridded piping.

9. Minimum Cover

a. Minimum depth of cover shall be 3.0 feet for water mains.

10. Plans

a. Improvements plans shall be prepared by a State of California registered civil engineer in accordance with standard care of the industry. Plans shall be at 1" = 100' or larger scale. High points shall be identified with an elevation. Plans shall include north arrow, scale, street names, property and right of way lines, existing utilities, connection details, location of pipeline within right of way, locations of all appurtenances including: services, valves, fire hydrants, air valves, blowoffs, and other special construction features.

11. Inspection

a. All water system construction shall be subject to inspection by the CSA. No work shall be performed without a minimum of five working days advance written notice to the CSA.

12. Compaction Testing

a. Where facilities are to be dedicated to the CSA, compaction tests shall be conducted by a California registered Civil Engineering or Geotechnical Engineering Company, or by an approved materials testing laboratory. Tests shall be taken at a minimum of every 1,000 feet, and no less than two per job, and two additional tests shall be performed for each failing test. Test locations shall be selected by the CSA's inspector. Such tests shall be considered to be part of the work and shall be performed at the expense of the applicant. Compaction tests shall be done in compliance with California test methods 216 and 231.

D. TECHNICAL SPECIFICATIONS FOR TRENCH EXCAVATION, BACKFILL AND SURFACE RESTORATION

1. General

   a. Trench backfill above the pipe zone will be divided into the following classifications:

      (1) CLASS "A" BACKFILL: Use in all paved areas, graveled roads, shoulders, driveways, and at other locations as shown on the Plans. (See Standard Details)

      (2) CLASS "C" BACKFILL: Use in all areas where Class "A" backfill is not utilized. (See Standard Details)

      (3) CONCRETE ENCASEMENT OR CONCRETE CAP: May be installed when there will be insufficient cover over the pipe for proper protection and prior approval has been obtained from the CSA. (See Standard Details)

2. Materials

   a. Materials will be divided into the following classifications:

      (1) TRENCH STABILIZATION MATERIAL: Clean imported gravel, free from clay balls and organic matter. Reasonably uniform gradation from fine sand to 2-1/2-inch maximum. Gradation shall be such as to fill all large voids with fines to prevent piping of native soils and prevent rapid and free movement of groundwater.

      (2) PIPE BEDDING: Imported clean sand or well graded sand gravel mix, maximum size of 3/4-inch, free from all organic matter and debris; minimum sand equivalent of 28.

      (3) IMPORTED GRAVEL BACKFILL: A reasonably well-graded silty sand or a well-graded silt, sand, and gravel mixture with a maximum particle size of 3 inches and a minimum sand equivalent of 28. Aggregate base material may be substituted.

         (a) Select native material meeting the above requirements may be used; however, proof that the select native materials meet these requirements will be required.

      (4) NATIVE BACKFILL: Material excavated from the trench. Free of roots and debris with no rocks larger than 6 inches in greatest dimension.

(5) AGGREGATE BASE: Aggregate base shall conform to requirements of Chapter 2, Section G-6, "Aggregate Base," of the Shasta County Development Standards.

(6) PERMANENT PAVEMENT: Permanent pavement shall conform to the requirements of Chapter 2, Section G-5, "Asphalt Concrete," of the Shasta County Development Standards.

(7) TEMPORARY PAVEMENT: Temporary Pavement shall conform to Class "D2" crushed aggregate per SS 203-6 with SC-800 liquid asphalt per SS 203-2.

(8) TACK COAT: Tack coat shall conform to SS-lh emulsified asphalt.

(9) CONCRETE: All concrete for pipe encasements shall, at a minimum, conform to Class 420-C-2000 concrete per SS. 201-1. All concrete for cap in Class "A" backfill shall be Class D high early strength Portland cement concrete (7-sack Type III cement with 2 percent calcium chloride by weight) Caltrans Standard Specifications.

(10) SLURRY MIX: Slurry mix shall consist of a concrete mix with each cubic yard containing one sack of Portland Cement, 12 gallons of water, 2,600 pounds of 3/8-inch rock, and 800 pounds of sand.

3. Workmanship

a. Workmanship will be divided into the following classifications:

(1) EROSION CONTROL: All trench excavation, backfill and surface restoration shall comply with Chapter 4, Section D7, "Erosion Control," of the Shasta County Development Standards.

(2) EXCAVATION: Water entering the trench shall be controlled such that it does not interfere with bedding, backfill, and pipe placement. The depth of the trench for water piping shall be such as to maintain the minimum cover requirements and to conform to the general slope and grade of the existing terrain. No low spots or high spots will be allowed except at air valves, blow-off valves, where service connections are at high points in pipe profile, or instances where unknown utility locations require variations from the slopes of the existing terrain. The depth of the trench for sewers shall be such that the pipe inverts may be laid at the Plan elevations.

(3) OVER EXCAVATION: Any part of the trench extending below the proper grade shall be corrected with approved bedding material.

(a) If soft, spongy, unstable, or other unsuitable material is encountered upon which the bedding material or pipe is to be placed, this unsuitable material shall be removed to a depth approved by the CSA and replaced with trench stabilization material suitably densified.

(4) BEDDING: Bedding shall be defined as that material supporting, surrounding, and extending to 6 inches above the top of the pipe. Where it becomes necessary to remove boulders or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with bedding material.

(a) Prior to pipe installation, bedding shall be placed to a minimum depth of 4 inches and then leveled and shaped to provide a firm base for the pipe. Bell holes shall be dug to allow the pipe to be supported by the bottom of the pipe barrel over its full length.

(b) After the pipe has been laid and approved for covering, bedding shall then be placed and densified by hand tamping with an approved T-bar tool. Particular care shall be taken to provide solid backing against the underside of the pipe. The degree of compaction shall not be less than 90 percent of the laboratory maximum density. Bedding shall be placed in 8-inch maximum lifts. A vibrating plate compactor shall be used at the top of the bedding material, 6 inches above the top of the pipe. Bedding shall be placed in the manner described above, regardless of the class of backfill above the bedding material. For water mains the applicant shall then install the pipe findertape in the trench as shown on the Standard Details.

(5) BACKFILL: Class "A" backfill shall be placed in uniform layers not to exceed 8 inches in loose thickness and compacted to 95 percent relative compaction. Compaction shall be by mechanical tamping, vibration, or other approved methods. Compaction shall immediately follow the pipe backfill operation.

(a) Class "C" native backfill shall be firmly compacted by mechanical means. No specific compaction requirements must be met, however, any settlement of trenches during the one year guarantee period shall be promptly repaired at no additional cost to the CSA.

(6) COMPACTION: Where tests indicate the compaction is unsatisfactory, the CSA may reject the work up to half the way to the next acceptable test.

(a) The CSA may order additional compaction tests at any location where work has been found not to be in conformance with the Specifications. Frequency and other requirements for compaction testing is described in the Design Criteria.

(7) TEMPORARY SURFACE RESTORATION: Refer to SS 306-1.5.1. Delete the last two paragraphs and add, "Temporary pavement shall be

placed within 24 hours after completion of the backfill operation except for the road crossings (or other locations where two-way traffic is impaired) where temporary pavement or slurry mix backfill shall be placed to finish grade at the end of each working day. Where slurry mix backfill to finish grade is used rather than temporary paving, the trench surface shall be repaired with temporary paving as needed in the event of raveling. The temporary pavement mixture shall be placed and compacted per SS 302-5.4 and 302-5.5 except that the mixture may be laid cold. A tack coat will be required to the edges of existing paving per SS 302-5.3. No prime coat is required."

(8) PERMANENT TRENCH SURFACE RESTORATION: Prior to the installation of permanent pavement the temporary pavement, if used, shall be removed and the subgrade prepared per SS 301-1 excluding Section 301-1.7. Aggregate base placement shall conform to SS 301-2.2 and 301-2.3. Permanent trench surface restoration shall, unless otherwise directed by the CSA, be applied to the limits of existing pavement. Existing pavement widths from centerline or reference points will be measured where the pipeline will be along the edge of the road. The paving will be replaced to these measured widths and any obliterated fog line striping. Pavement replacement adjacent to normal trench surface restoration may be ordered as well. Placement and compaction of the permanent pavement shall be in accordance with SS 302-5.4, 302-5.5, 302-5.6, and 302-5.7. The contact surface of all cold pavement joints, valve boxes, and the like shall be painted (tack coat) with Grade ss-1h emulsified asphalt immediately before the adjoining asphalt is placed.

(9) SETTLEMENT: Settlement of pavement over trenches during the one year guarantee period shall be considered a result of improper or inadequate compaction of the backfill or base materials. All pavement deficiencies noted during the guarantee period shall be promptly repaired at no additional cost to the CSA, regardless of the acceptability of previous compaction tests.

(10) CONCRETE THRUST BLOCKS: Concrete thrust blocks shall be installed at points along underground pressure piping where a hydraulic thrust exerts a force upon an unrestrained fitting. Thrust blocks shall conform to thrust block details as shown in these Standards.

E. TECHNICAL SPECIFICATIONS FOR SANITARY SEWER

1. General

a. Types of pipes will be divided into the following classifications:

(1) TYPES OF PIPES:

(a) Sewer main and lateral pipe to the property line shall be polyvinyl chloride (PVC).

(b) Lateral pipe from the property line to the structure shall be PVC or ABS sewer pipe.

2. Materials

a. Types of materials will be divided into the following classifications:

(1) POLYVINYL CHLORIDE PIPE AND FITTINGS: PVC pipe and fittings shall comply with ASTM D3034. The minimum standard dimension ratio shall be SDR 35. The joints shall be Ring-Tite manufactured by J-M, Fluid-Tite manufactured by Certainteed, or approved equal.

(2) ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE: ABS pipe and fittings shall conform to ASTM D2751-83a. All joints shall be solvent welded.

(3) PIPE COUPLINGS: Pipe couplings used for joining different types of pipe shall be water-tight neoprene using stainless steel bands and shall be Fernco, Calder Co., or approved equal.

(4) CLEANOUT BOXES: Protective boxes used for lateral cleanouts shall be Cook Concrete Products, No. 10T12 Traffic Box, Christy G-5, or equal. All lids shall have the word "SEWER" cast into the cast iron cover with prominent letters.

(5) LATERAL TAPS: Lateral outlets on the main sewer shall normally be made with a tee or wye tee such that lateral horizontal alignment is 90° to main. When approved by the CSA, a tap may be made in the main using a hole saw. The coupon shall be removed and a Romac style CB saddle shall be installed pursuant to manufacturer's directions.

(6) SEWER SADDLE: Sewer saddles used for joining laterals to main line sewers shall be water tight with adjustable stainless steel strap, bolts, nut, and washers. The body shall be ductile iron with corrosion resistant paint. The gasket shall be rubber compounded for sewer use. The saddle shall be

Romac "CB," Sealtite, or equal. The applicant shall obtain approval from the CSA prior to installation.

3. Workmanship

(1) INSTALLATION OF PIPE:

(a) Before lowering into the trench, the pipe shall be inspected for defects, and all cracked or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Belled ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe.

(b) After lowering the pipe into the trench, the bell or coupling end and spigot shall be cleaned of any foreign matter. The joint shall be made in accordance with the manufacturer's printed instructions. Care shall be taken not to buckle or disturb previously laid pipe.

(c) Each joint shall be inspected to insure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made. The laid pipe shall be true to line and grade and, when completed, the sewer shall have a smooth and uniform invert.

(d) Connections to pipe stubs of a different pipe material shall be made with a suitable connector. Connectors must be approved by the CSA prior to installation.

(2) LINE AND GRADE TOLERANCE:

(a) Sewers shall initially be installed within $\pm$1/4-inch (.02') of planned grade. Following backfill and within one year from construction, the sewer grade shall not vary more than $\pm$1-inch from grade and be such as to not cause stagnant water to pond with a depth of more than 1½ inches.

(b) The horizontal alignment of sewers shall not deviate more than 2 inches from the planned alignment.

(3) TEES AND LATERALS: The exact location of laterals shall be approved by the CSA. Tee branches shall be fully supported by firm material. Pipe and bends shall be installed to the same standards as specified above. Rubber ring caps shall be installed at the ends of all laterals.

(4) CLEANING SEWERS: The pipe shall be cleaned in the following manner:

(a) The cleaning shall be completed with an inflatable rubber ball, of a size that will inflate to fit snugly into the pipe, with a rope or cord fastened to the ball so the ball's position can be known and controlled at all times. The ball shall be placed in the last cleanout or manhole on the pipe to be cleaned, and water shall be introduced behind it. The ball shall be passed through the pipe with only the force of the water impelling it. All debris flushed out ahead of the ball shall be removed at the first manhole where its presence is noted. In the event cemented or wedged debris, or a damaged pipe shall stop the ball, the obstruction shall be removed.

(5) MANDREL TEST: All PVC sewers, except laterals, shall have a mandrel test in accordance with SS 306-1.2.12.

(6) WATER-TIGHTNESS TEST:

(a) Tests for water-tightness shall be performed in the presence of the CSA's representative. The applicant shall furnish all labor, materials, tools, and equipment required to make the tests. No testing for final acceptance of pipe will be done until the trench has been fully backfilled and acceptably compacted to finish grade, or if the sewer is under pavement, to the pavement subgrade.

(b) All sections of pipe shall be tested. Tests shall be made from manhole to manhole or manhole to rodhole. The sewer shall be complete with laterals, and trenches shall be backfilled prior to testing.

(c) Where leakage is in excess of the specified rate, the sewer shall immediately be uncovered, repaired, and retested until the amount of leakage is reduced to a quantity within the specified rate before the sewer will be accepted.

(d) The CSA will determine whether the test is to be by exfiltration or by infiltration. In most instances, an exfiltration test will be required.

(7) EXFILTRATION TEST: All sanitary sewers shall be tested with air unless approved otherwise by the County.

(8) AIR TESTING:

(a) Air testing shall be done immediately following cleaning of the pipe. Air testing shall be performed in accordance with the Uni-Bell Plastic Pipe Association's "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe." See Table 7-5.

(b) Air shall be slowly supplied to the plugged pipe installation until the internal air pressure reaches 4.0 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe, except that the maximum pressure shall not exceed 9 psi. At least 2 minutes shall be allowed for temperature stabilization before proceeding further.

(c) The rate of air loss shall then be determined by measuring the time interval required for the internal pressure to decrease from 3.5 to 2.5 pounds per square inch greater than the average back pressure of any groundwater that may submerge the pipe. Test sections with less than 625 square feet of internal surface area shall be considered acceptable when the leakage rate does not exceed 0.0015 cubic feet per minute per square foot of internal surface area. Test sections with greater than 625 square feet of internal surface area shall be considered acceptable when the leakage rate does not exceed 1.0 cubic foot per minute. See Table 7-5 for maximum allowable test times that correspond to these limits.

(8) TESTING WITH WATER: When directed, testing with water shall be done by filling the upper manhole with water to a depth of at least 3 feet over the top of the pipe or groundwater level, whichever is higher, with the end plugged at the lower manhole. The rate of leakage shall be determined by measuring the amount of water required to maintain the water level in the upper manhole. The test shall be maintained for a period of at least 2 hours. Leakage shall not be in excess of the rate of 20 gallons per inch of pipe diameter per 1,000 feet of pipe per day.

(9) INFILTRATION TEST:

(a) In the event that sufficient groundwater is present, as determined by the CSA, an infiltration test shall be required. In this case, the pipe shall be tested for water tightness by installing plugs at the upper end of the pipe and at the lower end on the exit side of a manhole. The rate of leakage will be determined by periodically removing and measuring the water accumulated at the lower manhole.

(b) Leakage shall not be in excess of the rate specified for water testing by exfiltration.

(10) TELEVISION INSPECTION: Upon completion of balling and cleaning, mandrel testing and leakage testing, and all backfill and compaction to grade, the main sewers (excluding laterals) shall all be television inspected. (Unless exempted for extensions smaller than 1,000 feet per Design Criteria.) During the television inspection, a continuous flow of water of from 1 to 10 gallons per minute shall be flowing in the sewer to allow observation of the profile and the determination of acceptability of any observed sags. Any sags greater than allowed, pipe offsets or broken pipe shall be repaired. Television inspection shall occur no sooner than 7 days after completion of the sewers and no less than 30 days following

completion of all sewers for the project. Television inspection shall conform to Section 5 in the 1990 Edition of National Association of Sewer Service Companies (NASSCO).

TABLE 7-5

SPECIFICATION TIME REQUIRED FOR A 1.0 PSIG PRESSURE DROP FOR SIZE AND LENGTH OF PIPE INDICATED FOR Q = 0.0015

1 Pipe Diameter (in)	2 Minimum Time (min:sec)	3 Length for Minimum Time (ft)	4 Time for Longer Length (sec)	Specification Time for Length (L) Shown (min:sec)							
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46

NOTES:
1. If length of test section is less than the length for minimum time as shown in Column 3, then required test time equals maximum time shown in Column 2.
2. If length of test section exceeds length for minimum time as shown in Column 3, then required test time is computed based on formula in Column 4 where "L" = Length of pipe section in feet.
3. The length of laterals connected to the test section is normally disregarded unless the test fails by a very small amount, then the test time can be recomputed using the appropriate formula.

F. TECHNICAL SPECIFICATIONS FOR MANHOLES

1. Materials

a. PRECAST CONCRETE MANHOLE SECTIONS:

(1) All precast sections, including riser sections, cones, grade rings, flat slab tops, eccentric cones, all per ASTM C478. Grade rings shall be standard product, manufactured particularly for use in manhole construction, sized to fit the cones on which they are to be placed, and the wall height shall be not less than 2 inches high, nor more than 6 inches high.

(2) All precast components shall have bell and spigot or tongue and groove ends.

b. MANHOLE FRAMES AND COVERS: All manhole frames and covers shall be casted iron conforming to ASTM Designation A48, Class 30. Each cover shall have the word "SEWER", "S", or "SANITARY SEWER", cast into the top with 2-inch high letters. Castings shall be of a consistently high quality and shall be free of material and manufacturing defects. Following cleanup and final machining, an asphaltic paint or similar protective coating shall be applied.

c. RODHOLE FRAME AND COVER: Cast iron, conforming to ASTM A48, Class 30. D&L Model H6530 (8"), H6520 (6"), Traffic Box, or equal, with the word "SEWER", "S", or Sanitary Sewer cast into the cover with prominent letters.

d. MORTAR: A proportion of one part Portland cement to two parts clean, well graded sand which will pass a 1/8-inch screen. Admixtures may be used not exceeding the following percentages of weight of cement: Hydrated lime, 10 percent; diatomaceous earth or other inert materials, 5 percent. Consistency of mortar shall be such that it will readily adhere to the surfaces. Mortar mixed for longer than 30 minutes shall not be used.

e. PRECAST MANHOLE BASES: Bases shall be a minimum of 60-inch diameter, 4 inches of concrete below outlet invert with No. 4 horizontal reinforcing bars at 6 inches on center, as manufactured by E.W. Cook Co., Teichert, Inc., or equal. Riser sections in pre-cast bases shall have wall reinforcement equal to standard manhole risers, plus additional reinforcement at openings.

f. WATERSTOPS: Waterstops shall be neoprene rubber gaskets with multiple fins and a stainless steel cinch band.

g. MECHANICAL RUBBER SEAL (MRS): Mechanical rubber seal (MRS) shall be used at all connections to existing manholes. The MRS shall be a rubber boot type coupling using only rubber, stainless steel or PVC compounds as manufactured by Calpico Co. LinxSeal, KOR-N-SEAL Company, Millford, NH

(603/673-8680), PSX by Press Seal Gasket Corp., Ft. Wayne, IN (219/483-0521), Z LOK XP by A LOK Products, Tullytown, PA (215/945-5600), or equal. The internal cavity between the pipe and the structure on the inside of the structure shall be filled with polyurethane caulk (Vulkem, Sikaflex, or equal) flush to the interior surface.

2. Workmanship

a. CAST IN PLACE CONSTRUCTION:

(1) Manholes shall be constructed only when the temperature is above 32°F. All work shall be protected against freezing. Water shall be removed from the excavation and the excavation maintained "dry" during construction of the manhole and during the time required for the concrete or mortar to develop sufficient strength to resist rupture by groundwater pressure. All pipes connected to manholes shall have a joint within two pipe diameters of the manhole wall.

(2) Manhole inverts shall be formed as shown in the Standard Details, either by laying pipe through and cutting out the top portion before completion of the base of the manholes or by forming "U" shaped channels in the concrete base slab. Cut edges of pipe laid through the manhole shall be fully covered by concrete when the manhole invert is complete. The finished invert shall be smooth and true to grade. No mortar or broken pieces of pipe shall be allowed to enter the sewers.

(3) A groove shaped to match the tongue of the first precast concrete riser section of the manhole shall be formed in the base slab. A circular metal form suited to the particular precast manhole manufacturer's joint shall be used to form the groove.

b. PRECAST CONSTRUCTION:

(1) Except as specified herein, all precast manhole sections and grade rings shall be set in joint sealing compound. Joint sealing compound components shall be applied in the field.

(2) The top joint between the frame and the first grade ring shall be set with mortar for adjustment of the final cover elevation. Mortar joints shall not be more than 2 inches thick. Excess mortar shall be trimmed flush.

(3) Joint sealant shall be applied in accordance with the manufacturer's recommendations to the surfaces shown on the Plans. Surfaces receiving joint sealant shall be dry and cleaned of all oil, grease, and loose particles. Sealant shall be applied to the previously placed manhole section.

(4) The upper manhole section shall be placed immediately after placing sealant. All excess joint sealant forced out of the joint on the inside of the manhole shall be removed or troweled smooth.

(5) After completion of the manhole, all plugs shall be completely removed from the sewers and all loose material shall be removed from the manhole.

c. LATERAL SEWER CONNECTIONS: Direct connections to manholes shall be installed with the crown of the lateral sewer pipe 4 inches higher than the crown of the downstream main sewer pipe. The manhole invert shall be channeled for lateral sewers in the same manner as for main sewers.

d. PIPE STUBS: Pipe stubs for future connections shall extend one and one-half to two pipe diameters beyond the concrete base and shall be plugged with standard gasketed plugs in couplings or caps.

e. CONNECTION TO EXISTING MANHOLES:

(1) The connection shall be made in such manner that the modified manhole is equal to a new manhole in appearance and performance. A channel approximately 2 inches larger all around than the connecting pipe shall be cut in the existing manhole base. The rough cut channel shall be finished to its final smooth and uniform shape with mortar.

(2) Particular care shall be taken to obtain a watertight joint where new pipes must penetrate existing manholes. Pipe openings shall be core drilled. A mechanical rubber seal and then mortar shall be installed inside of manhole at cavity. The mechanical rubber seal shall have stainless steel bolts and nuts. Any other method of penetration shall be approved by the CSA.

f. WATER-TIGHTNESS TEST:

(1) Rodholes shall be tested for water-tightness along with the sewers to which they are connected.

(2) All manholes will be visually inspected by the CSA; there shall be no evidence of leakage of water into any manhole from outside sources or any imperfections which allow such leakage. All manholes shall be tested for water-tightness by the applicant and observed by the CSA. The test shall be made, with all connecting pipes plugged, by filling the manhole with clean water to within 2 inches of the bottom of the cast iron frame. The leakage rate for a 4-foot diameter manhole shall not exceed 0.25 gallons per hour per foot of depth or 2.0 gallons per hour, whichever is less, over a test period of not less than one hour. (NOTE: Two gallons per hour leakage is a drop of about 1-inch in a 24-inch diameter grade ring.) Allowable leakage rates will be proportionately increased for manholes with diameters greater than 4 feet.

(3) Visible leaks in a manhole that are observed during the one year guarantee period shall be suitably repaired as approved by the CSA.

G. TECHNICAL SPECIFICATIONS FOR WATER MAIN PIPE AND APPURTENANCES

1. Materials

a. WATER MAIN PIPE: Water main pipe 4 inches through 12 inches in diameter, unless otherwise shown, shall be polyvinyl chloride (PVC) or ductile iron (DI). Two-inch and smaller piping shall be copper tubing except where otherwise approved by the CSA.

b. POLYVINYL CHLORIDE PIPE (PVC):

(1) Polyvinyl chloride pipe (PVC) shall be manufactured, tested, and marketed in accordance with AWWA C900 and shall be Class 150, SDR 18, unless otherwise approved by the CSA.

(2) PVC pipe smaller than 4-inch in diameter shall be Schedule 40 thickness class conforming to ASTM 1785. Pipe joints shall be solvent welded. Fittings shall be Schedule 40 solvent weld-type conforming to ASTM D2466.

(3) All fittings for 4-inch and larger PVC pipe shall be either cast iron or ductile iron conforming to ANSI A21.10 (AWWA C110) and cement mortar lining and bituminous coated ANSI A21.4 (AWWA C104) and ANSI A21.6 or ANSI A21.51. As an option for mechanical or push on joint, fittings shall conform to AWWA C153. Buried fittings shall be wrapped in polyethylene film conforming to AWWA C105.

(4) Fittings for 4-inch and larger PVC pipe may be either mechanical joint or a push-on joint such as Tyler or equal.

(5) PVC pipe shall not be stored or handled in a manner that will permit exposure to sunlight or high temperatures for an extended period.

c. CAST IRON AND DUCTILE IRON PIPE AND FITTINGS:

(1) Ductile iron pipe shall conform to SS 207-9.2.1 and SS 207-9.2.2 and AWWA C151. Ductile iron pipe 4 inches and smaller shall be Class 51, and 6 inches and larger shall be Class 50, except where thicker classes are required for threading flanges or other connections.

(2) Pipe shall be furnished with flanged, mechanical joint, or push on joint for the type of connections.

(3) Fittings shall be either cast iron or ductile iron fittings manufactured in accordance with SS 207-9.2.3 (AWWA C110). Mechanical joint or push on joint may, as an option, conform to AWWA C153.

(4) All pipe and fittings shall be cement lined and sealed; and coated in accordance with the SS 207-9.2.4 (AWWA C104).

(5) The pressure rating, metal thickness class, net weight of pipe without lining, length of pipe, and name of manufacturer shall be clearly marked on each length of pipe in accordance with AWWA C106.

(6) All flanges shall be flat faced ANSI Class 125. Flange gaskets shall be full-faced, 1/8-inch thick rubber.

(7) Flanged pipe shall be shop fabricated to the exact lengths required so that no field cutting or threading is required, except where flanged coupling adaptors are specified.

(8) Bolts and nuts for all underground connections shall be low alloy steel in accordance with the ASTM A193 Class B or AWWA C111 such that the bolts are cathodic to the coupling. Bolts and nuts for aboveground connections shall be either low alloy steel as specified above or cad-plated bolts in accordance with ASTM A307 Grade A or B. Bolts and nuts inside valve boxes and submerged or damp locations shall be 304 stainless steel.

(9) Where Ductile Iron or Cast Iron Pipe and Fittings are buried, the pipe and fittings shall be encased with polyethylene film conforming to AWWA C105.

d. PIPE FINDER TAPE: Pipe finder tape shall be a mylar encased aluminum foil bearing the words, "CAUTION: buried waterline below." Printing shall be under the mylar (reverse printed) so as to be readable through the clear mylar. Surface printing on the tape is not acceptable. The tape shall be blue in color, 2 inches wide, Lineguard Detectable Marking Tape, Type 3 Allen Systems, Inc. Detecto-Tape, or equal.

e. LOCATION WIRE: Location wire shall be solid copper No. 10, insulated, soft drawn wire.

f. COPPER TUBING: Copper tubing shall be per ASTM B88, Type K. Soft annealed copper shall be used without fittings where buried or encased in concrete. Size as specified on the Plans or in these Specifications shall be OD of the tubing. End connections shall be compression style.

g. <u>GALVANIZED STEEL PIPE (GSP)</u>:

(1) Galvanized steel pipe shall be hot dip galvanized, standard weight (Schedule 40) conforming to ASTM A120, unless otherwise approved by the CSA. Fittings shall be hot dip galvanized malleable iron Class 150 conforming to ASTM A388 and ANSI B16.3. Connections shall be threaded in accordance with ANSI B2.1, Pipe Threads, unless otherwise approved by the CSA.

(2) A coating shall be applied to the exterior surfaces of all buried galvanized steel pipe and fittings. The coating shall be conformable polyethylene-backed butyl tape, 35 mils thick, such as Polyken 930 manufactured by the Polyken Division of the Kendall Company, Chicago, Illinois; Tapecoat Company, Inc., Evanston, Illinois; or equal. The surface preparation, type of primer and application, and application of tape, including the amount of lap, shall be in accordance with the recommendations of the coating manufacturer.

h. <u>SERVICE SADDLES</u>: Service saddles shall be all brass or bronze when used on PVC pipe, 360-degree support around the pipe. Service saddles for blow-off assemblies and for use on ductile iron pipe shall have ductile iron bodies with two Type 304 stainless steel straps. All service saddles shall be designed for use on PVC pipe or DI pipe, whichever is being used. Brass or bronze service saddles shall be Mueller, Ford, or equal. Service saddles for blow-off assemblies shall be Romac 202S, Ford, or equal.

i. <u>GATE VALVES, TWO INCHES AND LARGER</u>: Gate valves, two inches and larger, for use on PVC, DI and GSP piping shall be 125-pound, totally encapsulated disk, solid wedge resilient seat valves, with non-rising stem, open to left, and have O-ring seals. Exposed valves shall have handwheel operators. Buried valves shall have two-inch square wrench nuts. The valves shall be Mueller, Waterous, or equal, and conform to AWWA C509. Buried gate valves shall be wrapped in polyethylene film pursuant to AWWA C105.

j. <u>VALVE BOXES AND MISCELLANEOUS BOXES</u>: Valve boxes and miscellaneous boxes shall be provided for all valves placed underground. Boxes shall be traffic rated with cast iron ring and cover and concrete main body, Brooks Products, Inc., No. 1-RT, Christy G-5, Cook Concrete Products No. 10T12, or equal. Boxes shall be furnished with 8-inch PVC pipe (SDR 35 MIN) extension sleeves. The lid shall be marked "WATER." The bottom of valve box extensions shall be centered and cut to fit the valve and then sealed with polyurethane foam, mortar, or other approved sealant to prevent soil migration into the box extension.

k. GATE VALVES, EXPOSED, TWO INCHES AND SMALLER: Gate valves, exposed, two inches and smaller, shall be 125-pound, wedge disk type, with non-rising stem, screwed connections, furnished with handwheel operators. Valves shall be bronze and shall open left. The valves shall be Powell No. 207, Crane No. 438, or equal. Use only bronze valves on copper piping.

l. BURIED BUTTERFLY VALVES: Buried butterfly valves shall be tight closing, rubber seated, Class 150, in conformance with AWWA C504 and shall have a cast iron body and disk construction with stainless steel shafts and bearings requiring no lubrication. Valve ends shall be flanged mechanical joint or push on joint. Flanges shall have 125-pound facing and drilling. Valves shall be complete with a sealed reducing-type underground operator and 2-inch square operating nut. Valve operators shall be capable of withstanding an overload input torque of 450 foot pounds at full open or closed position without damage to the valve or valve operators and shall require 48 turns to change the valve setting from full open to full closed and shall be Dresser Model 450, Mueller Line Seal III, or equal.

m. EXTENSION STEMS: Extension stems shall be provided for all buried valves set deeper than 3 feet to the operating nut. Extension stems shall be a minimum of 1-1/2 inches in diameter. Extension stems shall be Schedule 40 steel pipe, with a welded plate box at the bottom which fits over the valve operation nut, a set screw to secure the bottom box to the valve nut, have a 2-inch operating nut welded to the top of the stem, and extend to within 12 inches of the ground surface.

n. CORPORATION STOPS: Corporation stops shall be bronze, full bore, sized per service line Mueller, Ford, Jones No. J-3403, or equal. End configurations shall be IPS, flare or pack joint.

o. WATER METERS: Water meters for individual services shall be a Sensus Model SRSG, or approved equal, complete with one meter coupling on the outlet for adapting to IPS pipe. Meters shall all read in gallons or cubic feet as specified by the CSA.

p. ANGLE METER STOPS: Angle meter stops shall be bronze, as manufactured by Ford, Jones, Mueller, or equal, complete with padlock wings, flare nut suitable for copper tubing, and meter coupling nut and gasket for meters specified above.

q. METER BOXES: Water boxes for meters shall be as follows:

TABLE 7-6
WATER BOXES

METER SIZE	NOTE	BOX SIZE MINIMUM I.D.	COOK CONCRETE* BOX/VAULT #	Christy* Box/Vault #
5/8"x3/4"	(a)	10¼"x17¼"	B0.75	B9W/B9G Lid
1"	(a)	12"x20"	B1.0	B12 W/B12G Lid
1½"	(a)	13¼"x24"	B1.5	B30 W/B30G Lid
2"	(a)	17"x30"	B2.0	B36 W/B36G Lid
3"	(b)	30"x48"	B4.0	B48
4"	(b)	30"x60"	B5.0	B52
6"	(b)	48"x78"	V4.0 6.5	R37P

*or approved equal

Notes:

(1) Reinforced concrete cover with 5"x8" cast iron hinged reading lid.

(2) Steel checker plate lids with 5"x8" or 10" round self closing reading lid centered over meter register. For 3" and 4" meters a two piece lid is required. For 6" meters a four piece lid is required.

(3) Vault design for meters and associated equipment larger than 6" require the approval of the CSA. Size and depth should be adequate to allow access for maintenance and/or meter removal.

(4) Vault design for combination domestic/fire detector meters shall meet manufacturers recommendations and shall require the approval of the CSA.

(5) H-10 steel traffic lids shall be required for any box in driveways, parking areas, shoulders or areas with rolled curb.

r. COMBINATION AIR RELEASE AND VACUUM VALVES: Combination air release and vacuum valves shall have cast iron bodies and covers and stainless steel floats, float guides, bushings, and level pins of stainless steel or bronze. Valves shall be designed for operating service to 300 psi, and shall be APCO, Crispin, or approved equal.

s. COMBINATION AIR VALVE (CAV) ENCLOSURE/BOX: Combination air valve (CAV) enclosure/box shall be as follows:

Case 1 - **Above Grade Enclosure** - See Standard Detail W-21. (Available from Cook Concrete Products with precast concrete slab, or other fabricators)

Case 2 - **Below Grade Box**

TABLE 7-7
BELOW GRADE BOXES

VALVE SIZE	NOTE	BOX SIZE MINIMUM I.D.	COOK CONCRETE* BOX #	CRISTY* BOX #
2", 3" & 4"	(a,c)	17"x30"	B2.0	B36
6" & 8"	(b,c)	30"x48"	B3.0	B48

* or approved equal

Notes:

(1) For 2", 3" & 4" valve box a one piece lid shall be required.

(2) For 6" & 8" valve box a two piece lid shall be required.

(3) Lids shall be solid reinforced concrete marked "Water," except when boxes are in driveway traffic areas or next to rolled curb and gutter, where H-10 steel traffic lids are required.

t. BACTERIOLOGICAL SAMPLING STATION ENCLOSURE: Bacteriological sampling station enclosure shall be as follows:

(1) See Standard Detail W-13 for Materials and Plumbing Installation.

(2) See Standard Detail W-14 for Materials and Enclosure Design.

u. BACKFLOW DEVICE ASSEMBLY BOXES, VAULTS: Backflow device assembly boxes and vaults shall be as follows:

Double Check (DC)

- Carson Industry Box No. 1419-13 w/No 1419-3 lid - ¾" or 1" (DC)
- Carson Industry Box No. 1320-13 w/No 1320-3 lid - 1½" or 2" (DC)
- Carson Industry Box No. 1730-12B and lid - 3" or 4" (DC)
- Cook 6U vault or Christy R37 pit w/approved lid by Water Utility - 6" or 8" (DC)
- or equal

Single Check (SC)

Christy B-40 w/B40D or equal.

v. BLOWOFF VALVE BOXES: Blowoff valve boxes for blow-off assemblies shall be Cook No. 2.0 meter boxes, Christy B36, or equal.

w. FIRE HYDRANTS:

(1) Fire hydrants shall be waterous Pacer WB67, with oil reservoir, bronze seat ring, weather shield and bronze nut, mechanical attached nozzles, Mueller Super Centurion 200, Kennedy Guardian K-81A, or equal, equipped with chained nozzle caps. The fire hydrants shall have a five and one-quarter inch minimum hydrant valve, two 2-1/2-inch hose nozzles, and one 4-1/2-inch steamer nozzle. The operating nut shall be a 1-inch pentagon nut. The hose and steamer nozzles, operating nut, and direction of opening shall be per National Standard Specifications. The hydrant shall have a 42-inch bury to the bottom of the connecting pipe and shall have an automatically operated stop and drain. Fire hydrants shall conform to AWWA C502.

(2) A 6-inch diameter lateral and gate valve conforming to these Specifications shall be provided from the main waterline to each hydrant.

x. FLANGED COUPLING ADAPTERS (FCA) AND FLEXIBLE COUPLINGS (FC):

(1) Flanges coupling adapters (FCA) and Flexible Couplings (FC) shall be of the style and type recommended by the manufacturer and approved by the CSA. Steel couplings shall be fusion epoxy lined and coated (8 mil minimum thickness). All couplings shall be supplied with low alloy steel nuts and bolts per AWWA C111 or equal. Flanged coupling adapters shall be furnished and installed with adequately sized thrust protection anchor bosses and anchor studs unless thrust is restrained by concrete thrust blocks. The pipe shall be drilled for installation of the studs. Flanged coupling adapters and flexible couplings shall be sized to be compatible with the pipe on which they are to be installed and shall be as manufactured by Dresser, Rockwell, or equal.

(2) Buried flanged coupling adapters and flexible couplings shall be wrapped with polyethylene film per AWWA C105.

2. Workmanship

a. All work shall conform to Plan details, the Standard Water System Details and the manufacturer's recommendations.

b. Materials shall be handled in a manner that will not damage the material or its coating. Before installation, each article shall be inspected, and any damaged material discarded. Any damaged coating shall be repaired.

c. The interior and ends of the pipe and appurtenances shall be clean. When it is necessary to cut pipe, such cuts shall be neatly made.

d. Pipe and fittings shall be installed in strict conformance with the manufacturer's recommendations. Maximum pipeline joint deflections and minimum curve radii shall conform to these Standards and with published tables prepared by the manufacturers. Additional vertical angle fittings shall be installed where required to maintain conformance with the manufacturer's published tables on maximum pipeline joint deflections and minimum curve radii. Up to one additional coupling per 20-foot length of PVC pipe or in 18-foot length of DI pipe may be installed in lieu of an additional vertical fitting, provided the installation is in compliance with the manufacturer's recommendations.

e. Pipes shall be laid with the bell end ready to receive the next pipe. Bell holes shall be dug and the trench bottom graded such that the pipe is supported along the barrel and not the bell.

f. In addition to exercising extreme care to keep the inside of the pipe clear of dirt and debris during installation, temporary plugs shall be inserted or placed over all ends of the pipe except during periods of continuous observation such as during pipeline installation.

g. PIPE CUTTING: All pipe shall be cut to fit accurately without damaging the pipe or lining and so as to leave a smooth end at right angles to the axis of the pipe.

h. PIPE THREADS: Pipe ends shall be reamed to the full bore of the pipe. Threads shall conform to ASNI B2.1. In making up threaded joints, an accepted thread lubricant shall be applied to the male threads only.

i. PIPE JOINTING: Pipe jointing for cast iron pipe shall conform to SS 306-1.2.6 and 306-1.2.8, respectively. Pipe jointing for PVC pipe shall conform to SS 306-1.2.9 or 306-1.2.10, as applicable.

j. METALLIC PIPE COVERINGS: All buried ductile iron pipe, fittings, and valves shall be wrapped with polyethylene film per AWWA C105. All galvanized iron pipe shall be tape wrapped pursuant to the description under Materials in this section.

k. FLANGED JOINTS: Flanged joints shall be square and watertight with even pressure on the gaskets.

l. WATER SYSTEM TESTING: Upon completion of the installation of the water mains and appurtenances and all parts of the system shall be pressure tested in the presence of a representative of the CSA. Each section of water main between line valves shall be tested separately by closing the adjacent line valves and bringing the isolated section up to a test pressure that will cause the pressure at the lowest point in the isolated section to be at least 150 pounds per square inch or 50 pounds per square inch above the maximum working pressure, whichever is greater, and maintain at least that pressure for a minimum of one hour. At the end of the test period, the test pressure shall be at least equal to the starting test pressure in order to properly determine any leakage.

m. Leakage shall not be in excess of 2 gallons per inch of diameter per 1,000 feet of pipe per 24 hours. Leakage shall be determined by pumping into the closed system from a barrel and maintaining the required pressure or by other means approved by the CSA. Where leakage is in excess of the specified rate, the amount of leakage shall be reduced to a quantity within the specified rate before the installation is accepted. In addition, all visible leaks shall be repaired.

n. Where interconnections are made between an existing and a new system at other than existing isolation valves the interconnection piping between the existing system and the first new isolation valve will not have to be pressure tested. However, when these interconnections are made and pressurized, any noticeable leaks shall be corrected.

o. Where the new system interconnects to an existing system at an existing isolation valve, the new system shall be either tested against the existing isolation valve or against a temporary thrust protected blind flange, cap or plug within 15 feet of the existing valve to test against.

p. If the second option is used the final connection to the existing valve after the pressure test is completed will not have to be tested but any noticeable leaks shall be corrected.

q. All Class 200 or SDR 14 8-inch piping shall be tested at 200 psi.

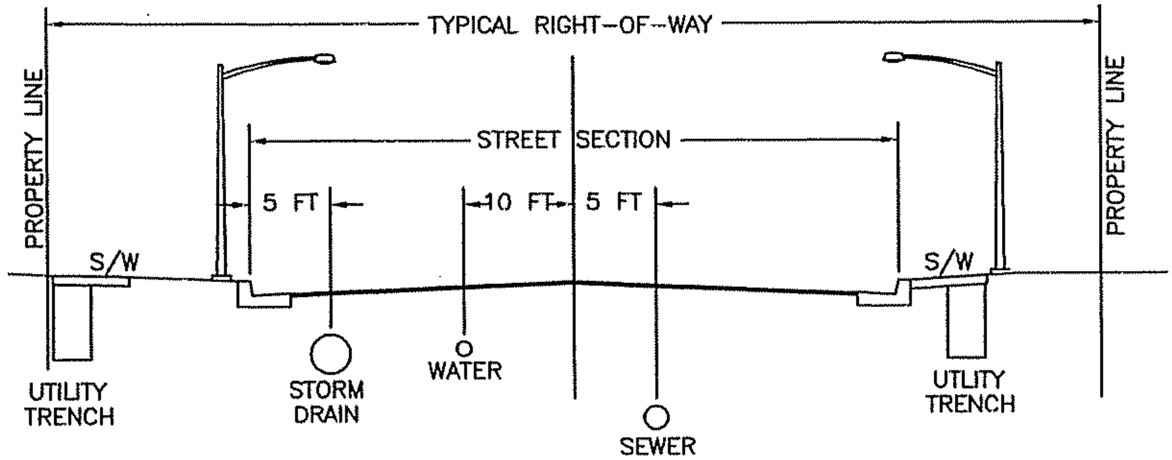
r. STERILIZATION FOR COMPLETED WATERLINES: Sterilization for completed waterlines shall be done per AWWA C651-86, Section 5.2, Continuous Feed Method. Once the water system has been successfully hydrostatically tested, it shall be flushed of all dirt and debris. Following adequate flushing, the entire system shall be chlorinated by one of the following methods: sodium hypochlorite or calcium hypochlorite and water mixture. Chlorinating agent shall be applied at the beginning of the section adjacent to the feeder connection and shall be injected through a corporation cock, hydrant, or other connection ensuring treatment of the entire line. Water shall be fed slowly into a new line with chlorine applied in amounts to produce a residual of not less than ten parts per million in all parts of the line for a period of not less than 24 hours. During the chlorination process, all valves and accessories shall be operated.

s. The tablet method of applying the chlorine as specified in AWWA C651-86 may be used. If this method does not provide adequate disinfection, chlorine shall be applied by one of the above described methods until acceptable bacteriological tests are obtained.

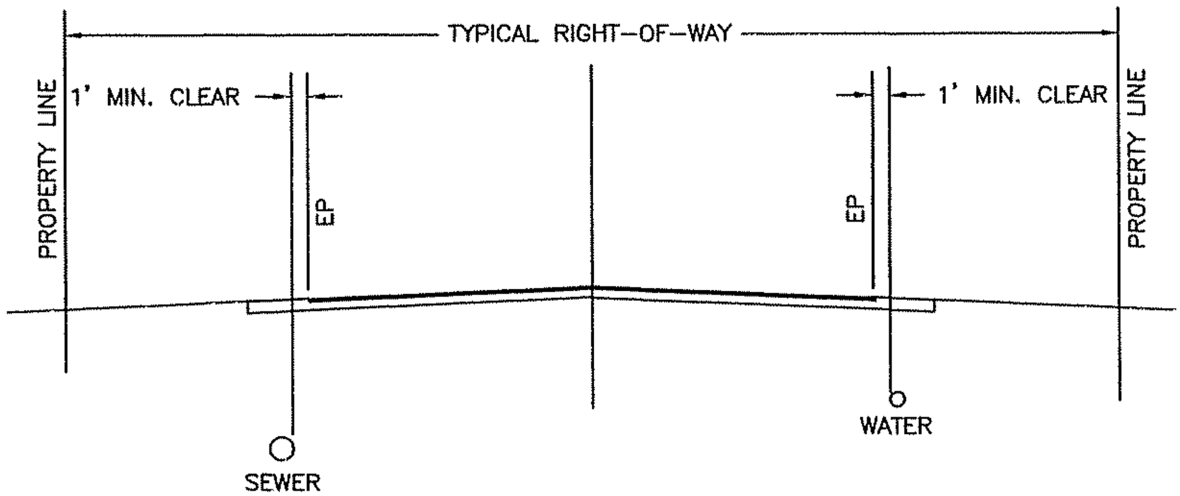
t. After chlorination, the water shall remain in the pipeline, or be diluted until the chlorine residual has dropped to below two parts per million before it is flushed from the extremities of the system. Furthermore, it may be necessary to land apply the chlorinated water or otherwise dechlorinate the water in order to discharge it to any storm drain, drainage channel or surface water where damage could occur to fish or other aquatic life or in violation of any governmental laws or regulations. All of the pipeline shall then be drained and refilled with a bacteriologically acceptable water supply. The new pipeline shall then be tested for bacteriological acceptability as determined by a minimum of four test samples for coliform bacteria taken from CSA selected points in the pipeline. If such tests indicate contamination, the pipeline shall be disinfected again.

u. At connections to the existing system where some sections of piping cannot be reasonably disinfected in the normal procedure, all new pipe, fittings, etc. shall be sprayed or swabbed inside and out with a strong (one to five percent) chlorine solution prior to installation and installed in a sanitary manner so as not to contaminate the system. Should contaminants such as dirt or dirty water be allowed to enter the existing piping, the existing water system shall be flushed and disinfected as required by the CSA.

FIGURE G-1



URBAN



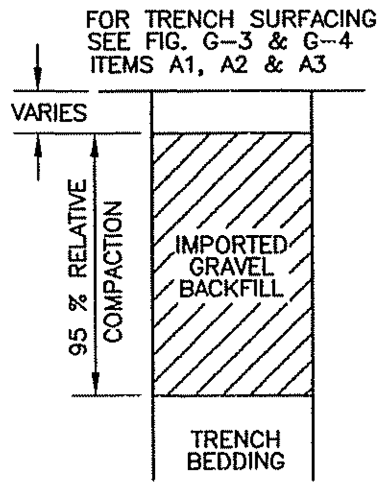
RURAL

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	UTILITY LOCATIONS
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE G-2

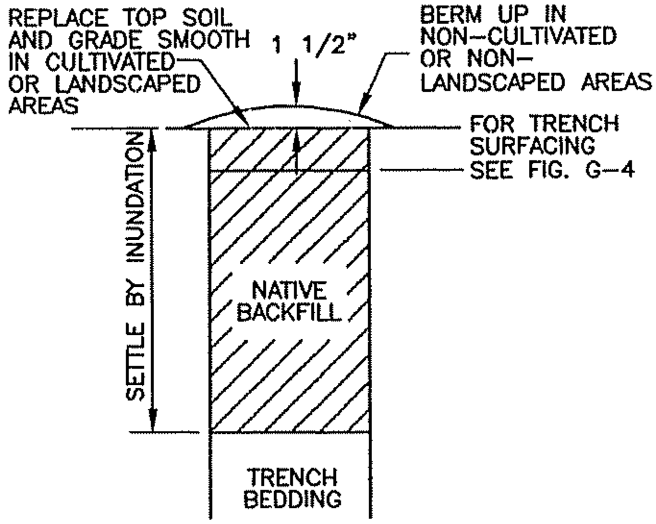
NOTES:

1. CONCRETE FOR ENCASING PIPE SHALL BE CLASS 420-C-2000.
2. BEDDING MATERIAL FOR ALL PIPE INCLUDING DUCTILE IRON SHALL BE GRAVEL OR CRUSHED ROCK AND SHALL HAVE A MAXIMUM SIZE OF 3/4" AND BE REASONABLY GRADED FROM COARSE TO FINE WITH A MINIMUM SAND EQUIVALENT OF 28.
3. IMPORT GRAVEL BACKFILL SHALL BE STREAM GRAVEL OR CRUSHED ROCK AND BE REASONABLY WELL GRADED FROM COARSE TO FINE WITH A MAXIMUM SIZE OF 3" AND A MINIMUM SAND EQUIVALENT GREATER THAN 28.
4. ON ALL CONCRETE ENCASED PIPES, PIPE SHALL BE SUPPORTED ON CONCRETE BLOCKS, GROUT PADS, OR BY OTHER APPROVED METHOD. TWO SUPPORTS SHALL BE REQUIRED PER JOINT OF PIPE. CARE SHALL BE TAKEN NOT TO FLOAT PIPE WHILE PLACING CONCRETE.
5. SERVICE LATERALS TO HAVE SAME BEDDING AND BACKFILL AS MAINS.
6. FOR CONC ENCASED PVC PIPE USE VERTICAL (METAL OR PLASTIC) SHEET IN TRENCH TO FORM CONTROLLED JOINT AT COUPLINGS AT MAXIMUM SPACE OF 10' ON CENTER. WRAP COUPLING WITH 2" THICK INSULATION. CENTER SHEET ON COUPLING.



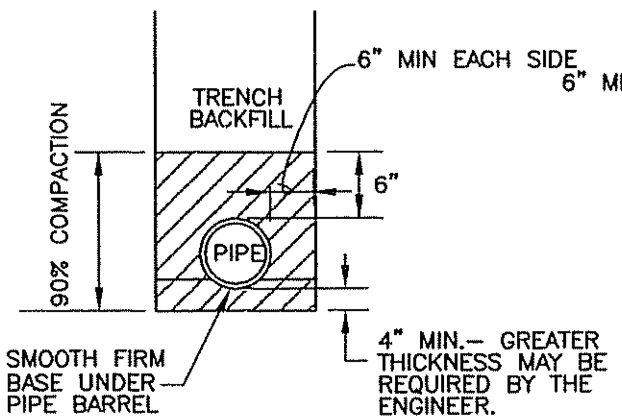
FOR TRENCH IN R/W WHERE NATIVE MATERIAL HAS A SAND EQUIVALENT OF LESS THAN 28

CLASS 'A'

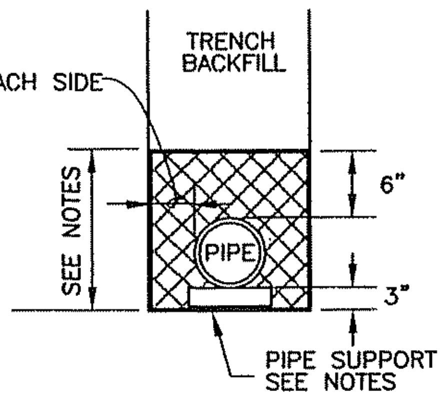


FOR TRENCH NOT IN R/W AND NOT IN STREAMBED

CLASS 'C'



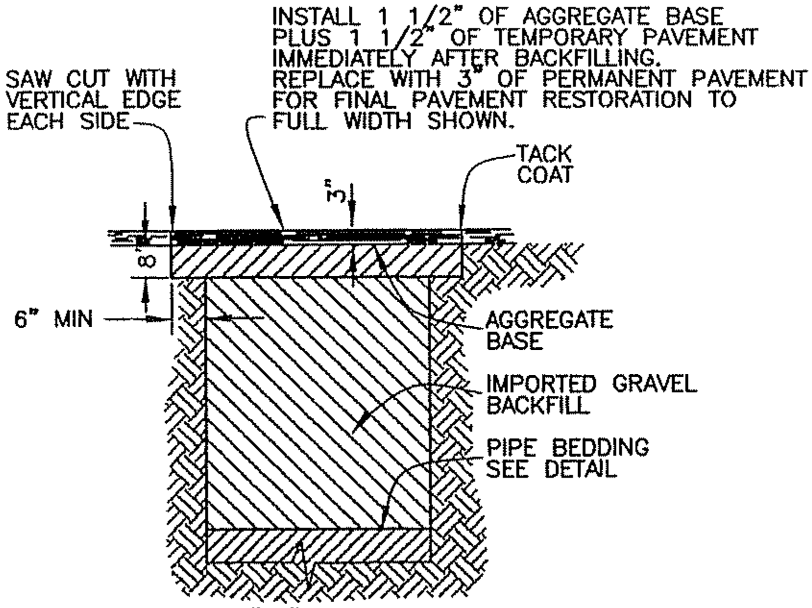
BEDDING



CONCRETE ENCASEMENT

SCALE: NTS	DATE: AUG 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY:	TRENCH BACKFILL
MARK / DATE	REVISION	WILLIAM E. LYMAN	

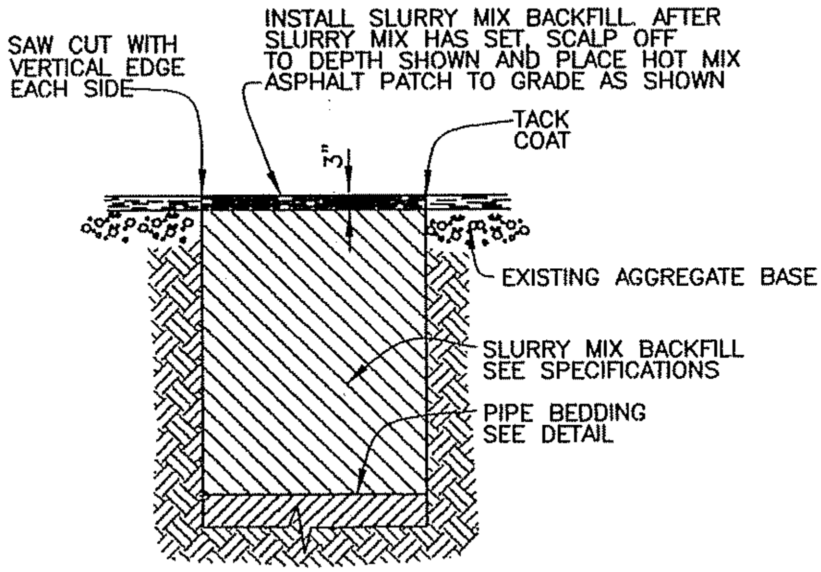
FIGURE G-3



CLASS "A1" BACKFILL WILL BE USED IN COUNTY ROADS WHERE PAVING IS LONGITUDINAL TO ROAD AND ACROSS DRIVEWAYS.

NOTE: WHERE REMAINING PAVING IS LESS THAN 1' WIDE AFTER TRENCHING, REMOVE AND REPLACE PAVEMENT TO EDGE OF EXISTING PAVING @ FULL THICKNESS.

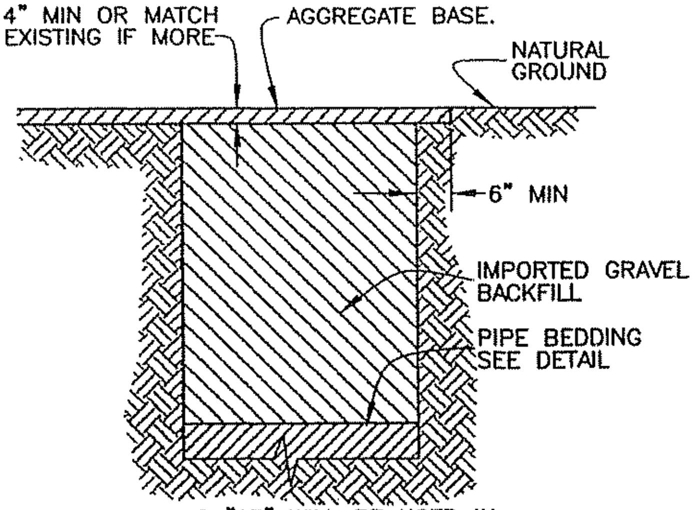
CLASS 'A1' BACKFILL



CLASS "A2" BACKFILL WILL BE USED IN ALL PAVED STREET CROSSINGS. IT MAY ALSO BE USED AT OTHER LOCATIONS IN LIEU OF CLASS "A1"

CLASS 'A2' BACKFILL

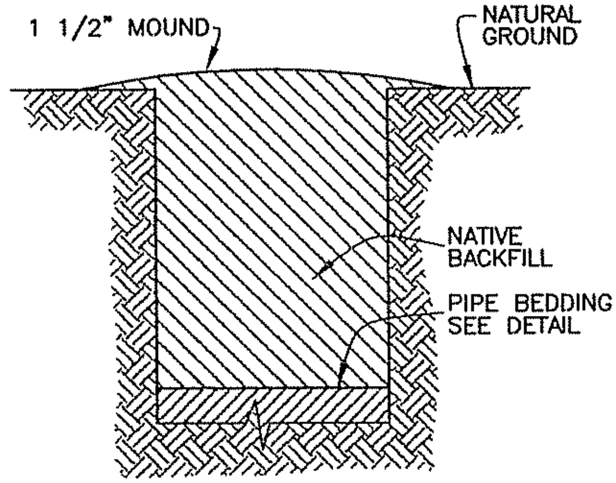
SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	TRENCH RESURFACING
MARK	DATE	REVISION		



CLASS "A3" WILL BE USED IN UNPAVED DRIVEWAYS, AND IN SHOULDERS OF COUNTY ROADS.

CLASS 'A3' BACKFILL

NOTE: WHEN IN CULTIVATED OR LANDSCAPED AREAS THE TOP 1' OF SOIL SHALL BE REPLACED WITH EXISTING OR IMPORTED TOP SOIL. THE SURFACE SHALL BE RE-LEVELED FOLLOWING INUNDATION AND TRENCH SETTLEMENT. LAWNS OR OTHER LANDSCAPING SHALL THEN BE REPLACED.

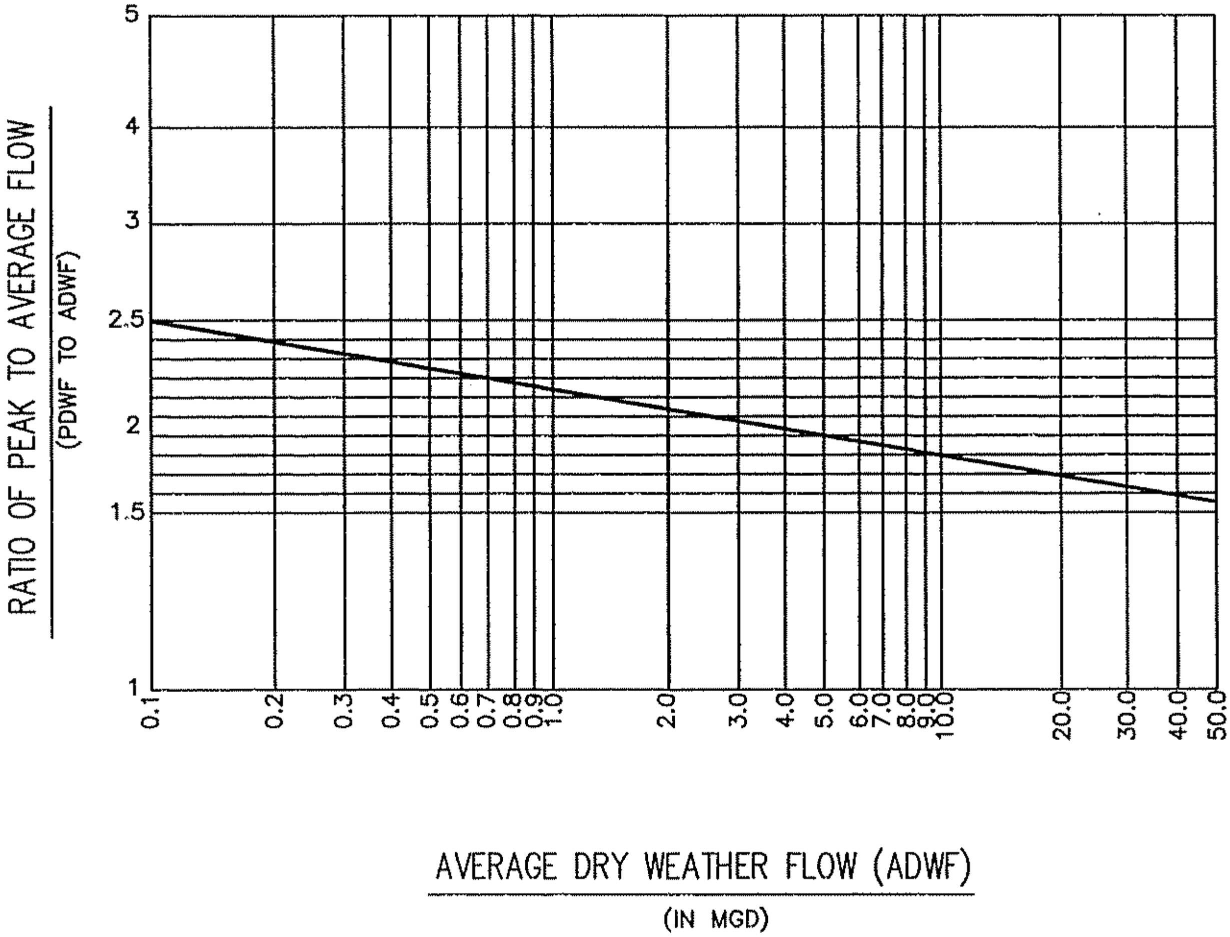


CLASS "C" BACKFILL WILL BE USED IN AREAS THAT ARE OUTSIDE PAVED AREAS, SHOULDERS AND FUTURE STREET AREAS.

CLASS 'C' BACKFILL

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	TRENCH RESURFACING
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-1



SEWAGE FLOW PEAKING FACTORS

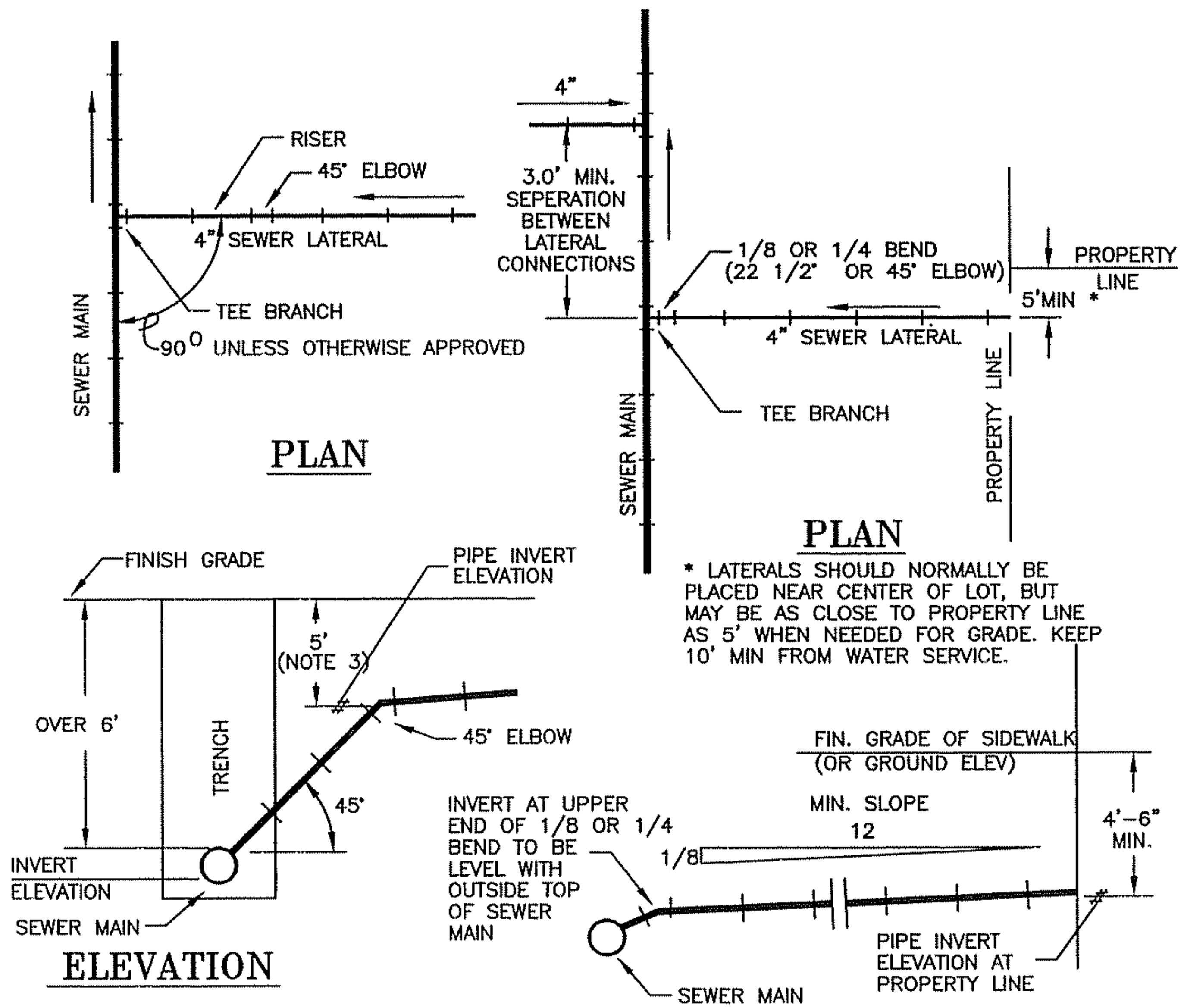
(DOES NOT INCLUDE I & I)

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	**PEAKING FACTORS**
MARK	DATE	REVISION		

FIGURE S-2

NOTES:

1. 90° TAPS ARE ACCEPTABLE.
2. RISERS SHALL BE INSTALLED WHEN DEPTH OF SEWER EXCEEDS 6 FT.
3. VERTICAL INSTALLATIONS (STOVEPIPING) WILL NOT BE ALLOWED.
4. WHERE MAIN IS IN AN EASEMENT, INSTALL A TEE, PIPE BRANCH TO PROPERTY LINE, CLEANOUT AND PLUG.



TYP. HOUSE CONNECTION RISER

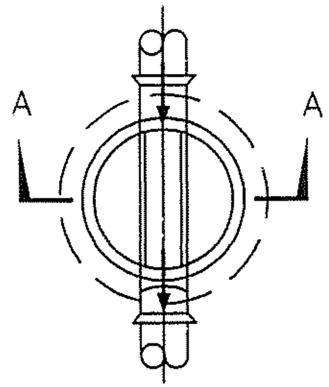
WHEN COVER OVER 6'

TYP. HOUSE CONNECTION

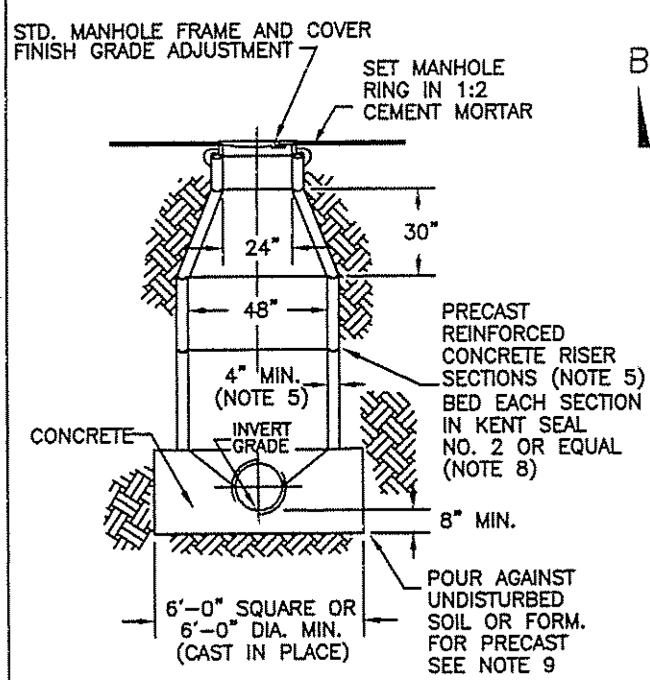
SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: William E. Lyman WILLIAM E. LYMAN	TYPICAL HOUSE CONNECTION
MARK	DATE	REVISION	

NOTES:

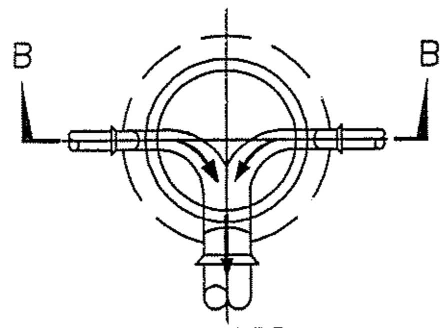
1. WHERE MANHOLES ARE NOT LOCATED IN STREETS OR TRAVELED WAY PLACE TOP OF MANHOLE 12" TO 18" ABOVE EXISTING GROUND UNLESS OTHERWISE SHOWN ON PLANS.
2. ALL CONCRETE USED IN MANHOLE BASE & COLLAR SHALL BE CLASS 520-C-2500.
3. ECCENTRIC TYPE CONC. CONE SECTION SHALL BE INSTALLED IN PLACE OF CONCENTRIC CONES WHEN DIRECTED BY THE COUNTY. WHEN ECCENTRIC CONE SECTION IS INSTALLED, THE VERTICAL WALL SHALL BE LOCATED DOWNSTREAM.
4. PIPE MAY BE LAID THROUGH A LINE MANHOLE EXCEPT WHEN A GRADE OR LINE CHANGE OCCURS. MINIMUM DROP THROUGH ALL OTHER MANHOLES SHALL BE THE DIFFERENCE IN DIAMETER IN UPSTREAM AND DOWNSTREAM PIPES OR 0.17 FT. WHICH EVER IS GREATER.
5. PRECAST REINFORCED CONCRETE PIPE SEGMENTS SHALL CONFORM TO ASTM DESIGNATION: C478-70 4" MIN. THICKNESS.
6. PRECAST REINFORCED CONCRETE MANHOLE RISER SECTIONS SHALL BE FORMED WITH MALE AND FEMALE ENDS.
7. PRECAST CONCRETE BASES MANUFACTURED BY COOK CONC. PRODUCTS OR TEICHERT AGGREGATE MAY BE USED IN LIEU OF POURED IN-PLACE BASES. PROVIDE 3" MIN COMPACTED & LEVELED SAND OR 3/4" MINUS GRAVEL UNDER PRECAST BASES.
8. ALL SEGMENTS SHALL BE BEDDED IN FLEXIBLE JOINT SEALANT: (KENT-SEAL NO. 2 OR EQUAL). A DOUBLE BEAD SHALL BE USED IF SEALANT IS 3/4-INCH OR 1-INCH DIAMETER. A SINGLE BEAD SHALL BE USED IF THE SEALANT IS 1 1/4-INCH OR GREATER DIAMETER.
9. ON CAST IN PLACE BASES USE CIRCULAR METAL FORM TO SHAPE FULL DEPTH GROOVE TO MATCH TONGUE ON RISER SECTION. BOTTOM OF GROOVE TO BE 1" MIN ABOVE TOP OF PIPE.
10. ON CAST IN PLACE BASES A RUBBER RING JOINT SHALL BE PROVIDED WITHIN 2 DIAMETERS OF BASE.



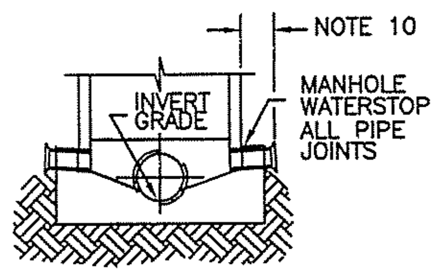
PLAN



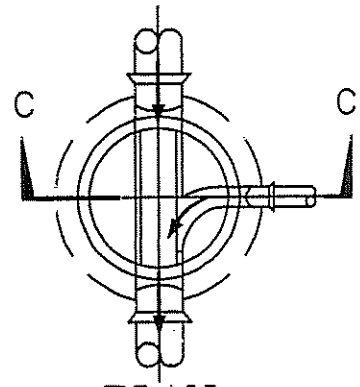
SECTION A-A



PLAN



SECTION B-B



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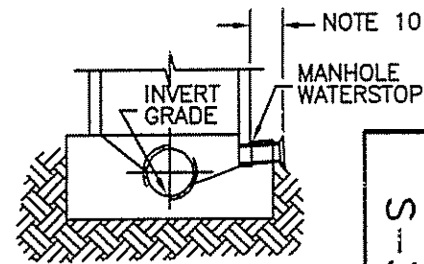


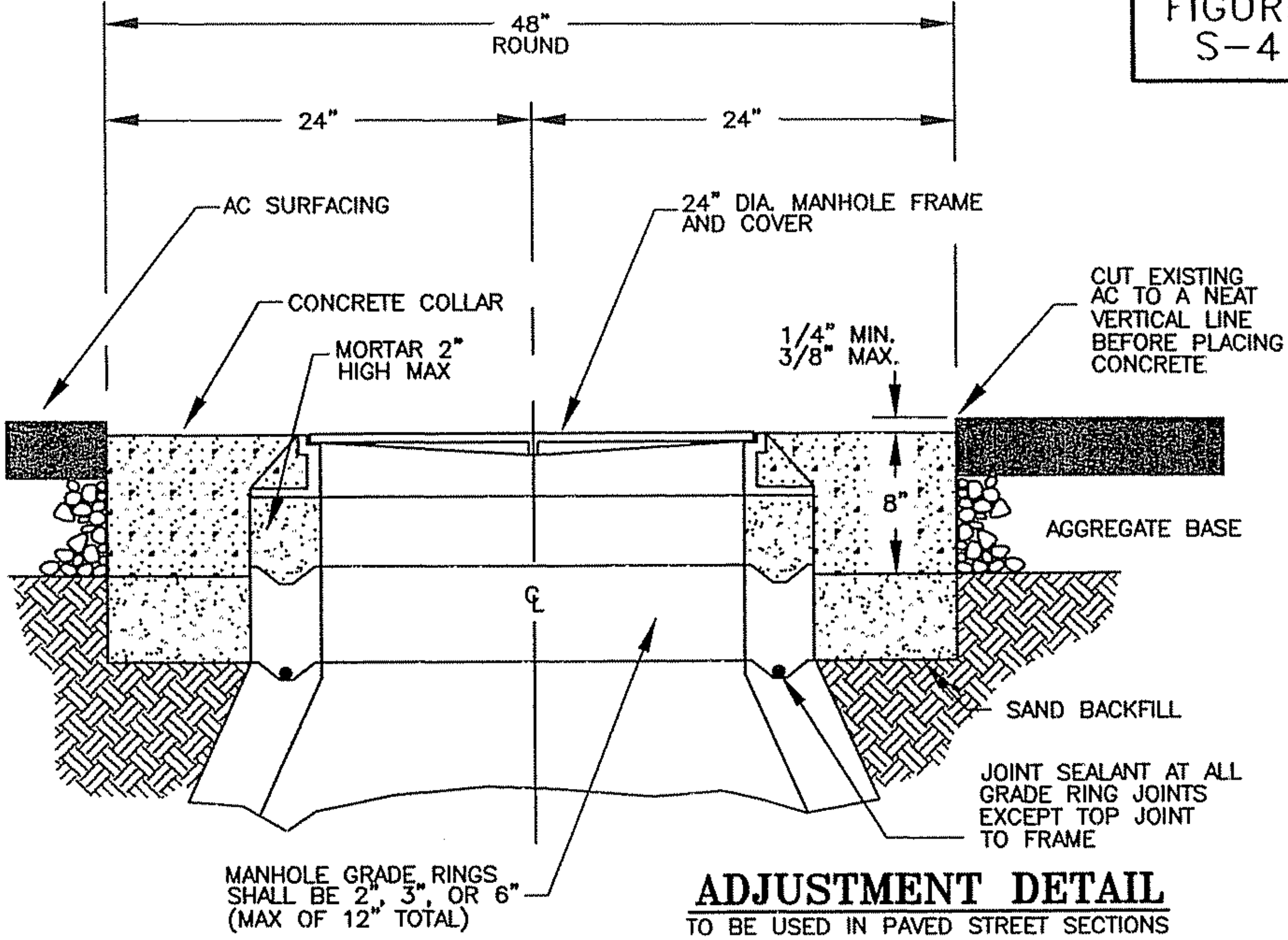
SECTION C-C

FIGURE S-3

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
		APPROVED BY: William E. Lyman
MARK / DATE	REVISION	WILLIAM E. LYMAN

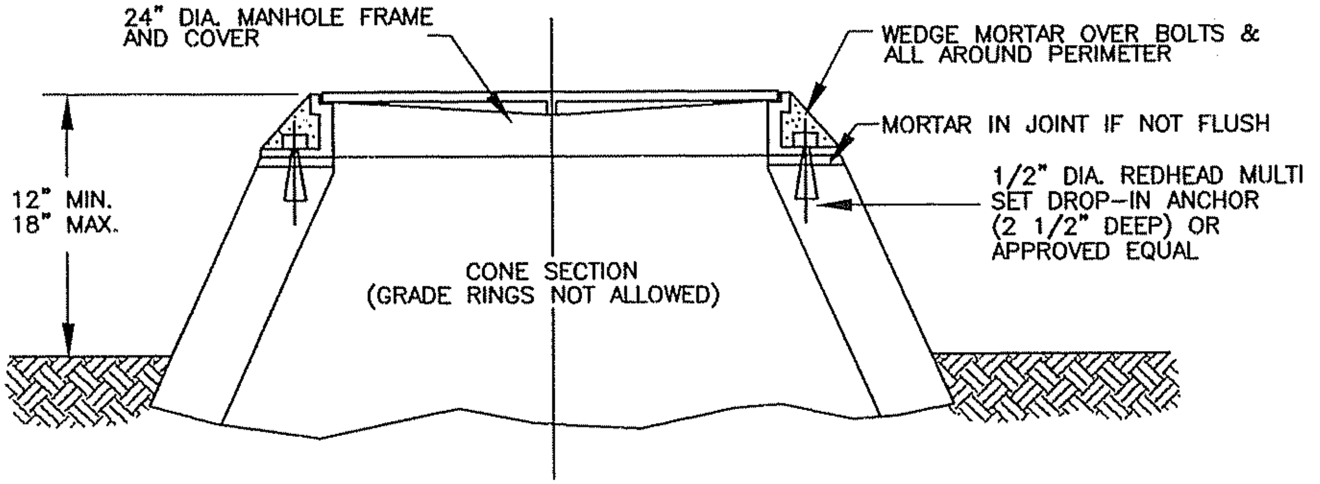
STANDARD 4 FT. SEWER MANHOLE

FIGURE S-4



ADJUSTMENT DETAIL

TO BE USED IN PAVED STREET SECTIONS



NOTE:

WHEN MANHOLES ARE IN SHOULDERS, THE SHOULDER SHALL BE PAVED TO EXTEND STREET GRADE WITH TAPPERED FLARES TO CONC COLLAR EXTENDING 20' ON EACH SIDE OF MANHOLE AND A MINIMUM OF 1' FROM THE MANHOLE LID.

ADJUSTMENT DETAIL

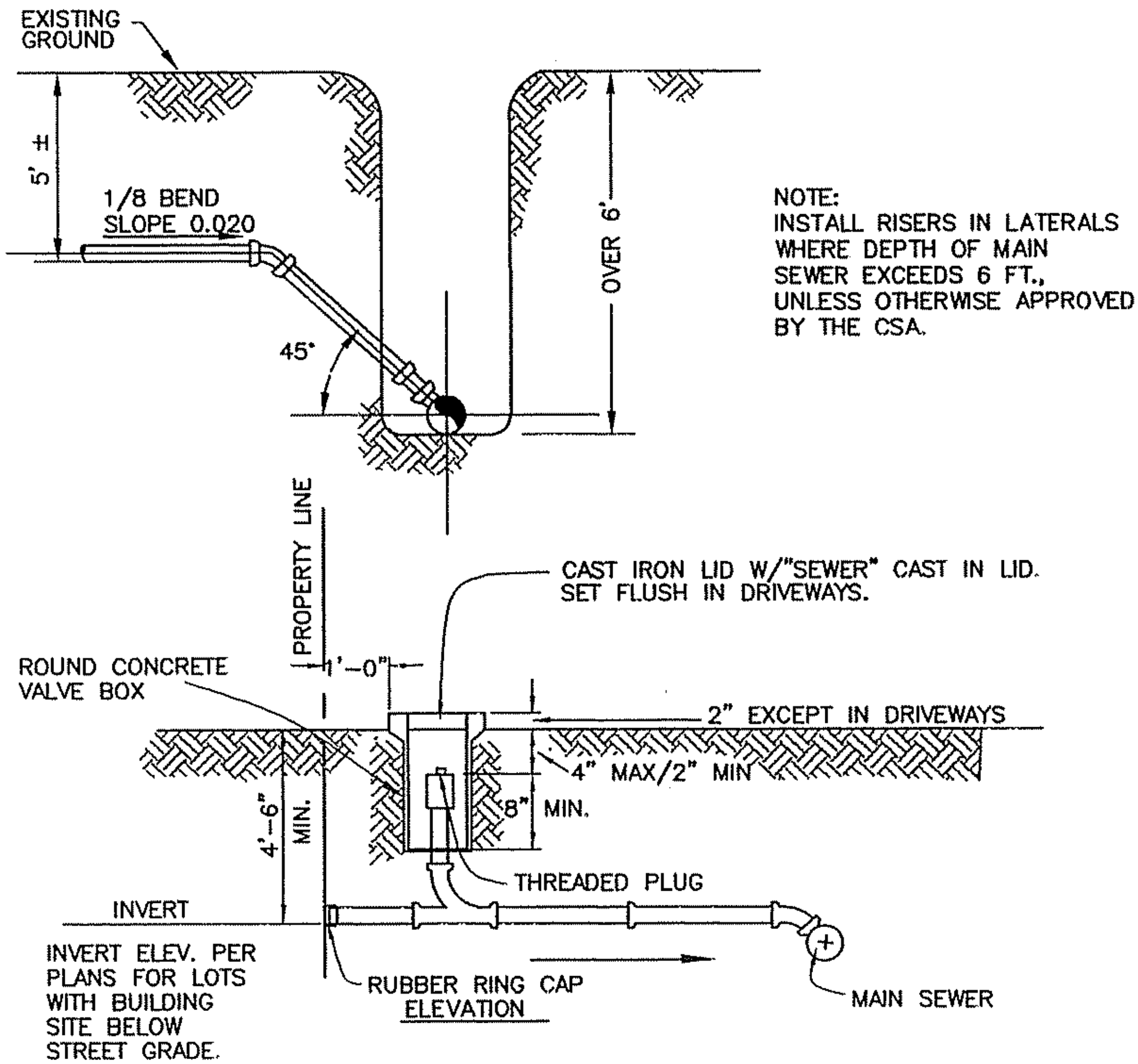
TO BE USED IN UNIMPROVED AREAS
(SHOWING REQUIRED FRAME ASSEMBLY ANCHORAGE)

SCALE: NTS	DATE: AUG 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: *William E. Lyman*	MANHOLE ADJUSTMENT AND ANCHORAGE DETAILS
MARK / DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-5

BACKFILL FOR SERVICE CONNECTION PIPE SHALL BE THE CLASS APPROPRIATE FOR THE SERVICE CONNECTION PIPE LOCATION.

SERVICE CONNECTIONS ARE 4-INCH-DIAMETER PIPE UNLESS OTHERWISE NOTED.



LATERAL CLEANOUT

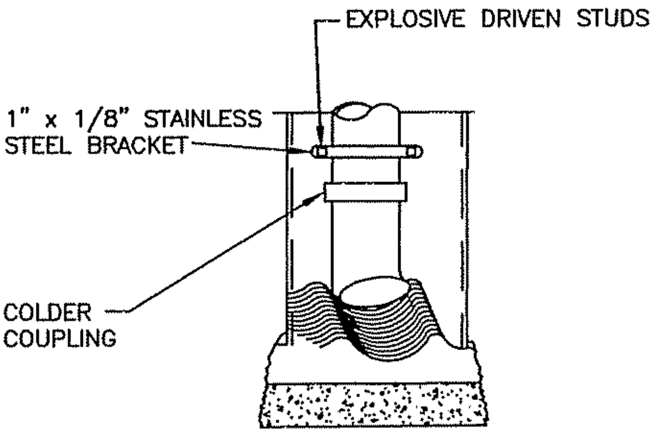
NTS

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
MARK / DATE	REVISION	APPROVED BY: William E. Lyman WILLIAM E. LYMAN	LATERAL CLEANOUT

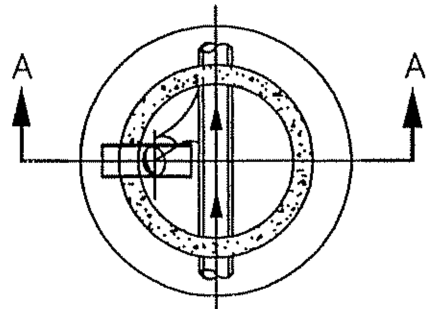
FIGURE S-6

NOTES:

1. INSIDE DROP MANHOLES ALLOWED WHEN THE GRADE DIFFERENCE IS 6' OR MORE ON EXISTING FACILITIES OR WHEN DIRECTED BY THE ENGINEER.
2. THIS TYPE DROP MANHOLE CONSTRUCTION MAY BE UTILIZED ONLY WHEN 8" OR SMALLER PIPE IS USED.
3. VERTICAL PIPE SHALL BE 6" FOR BOTH 6" AND 8" INCOMING LINES. 4" VERTICAL PIPE MAY BE USED FROM 4" INCOMING LINES.
4. CAST IRON SOIL PIPE SHALL BE USED IN THE DROP SECTION OF THE MANHOLE. USE NO HUB TEES.
5. A CALDER COUPLING OR EQUAL SHALL BE USED ON THE JOINT IMMEDIATELY OUTSIDE THE MANHOLE.
6. A MINIMUM OF ONE STAINLESS STEEL BRACKET PER JOINT OF PIPE SHALL BE USED. A MINIMUM OF TWO BRACKETS SHALL BE USED PER MANHOLE INSTALLATION.

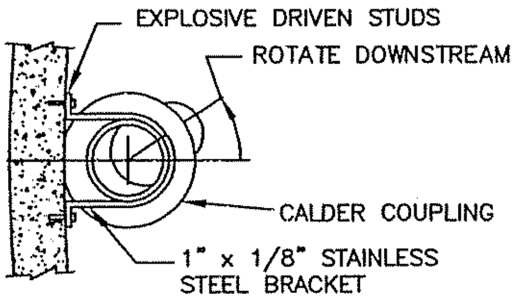


SECTION D-D

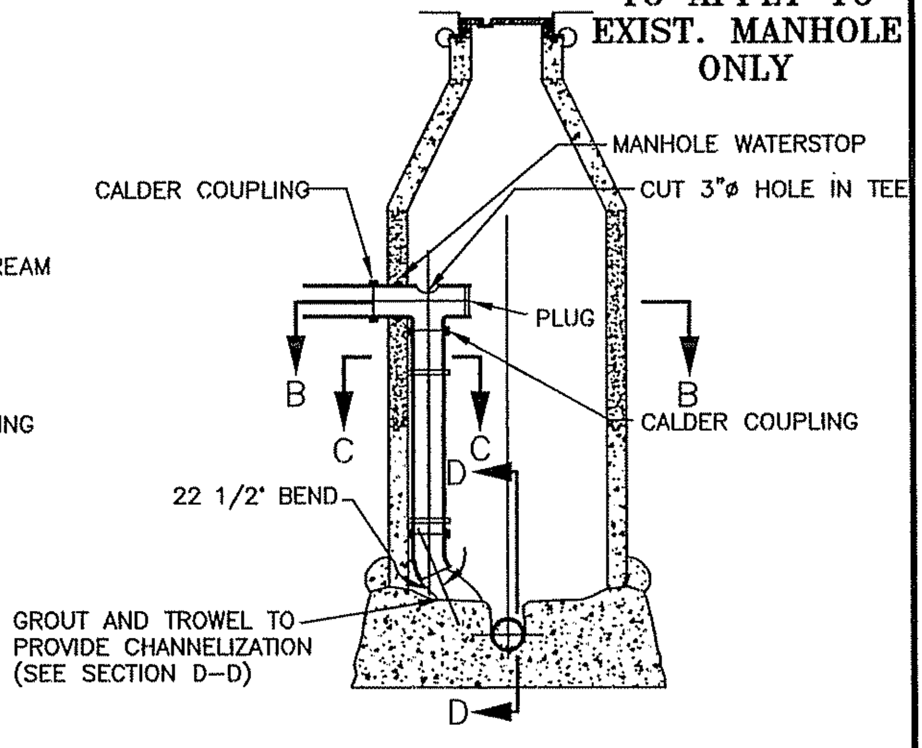


SECTION B--B

THIS STANDARD TO APPLY TO EXIST. MANHOLE ONLY



SECTION C-C



SECTION A-A

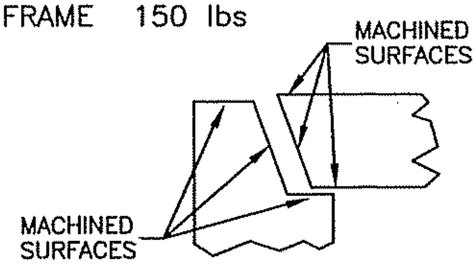
SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	STANDARD INSIDE DROP MANHOLE
MARK	DATE	REVISION	WILLIAM E. LYMAN	

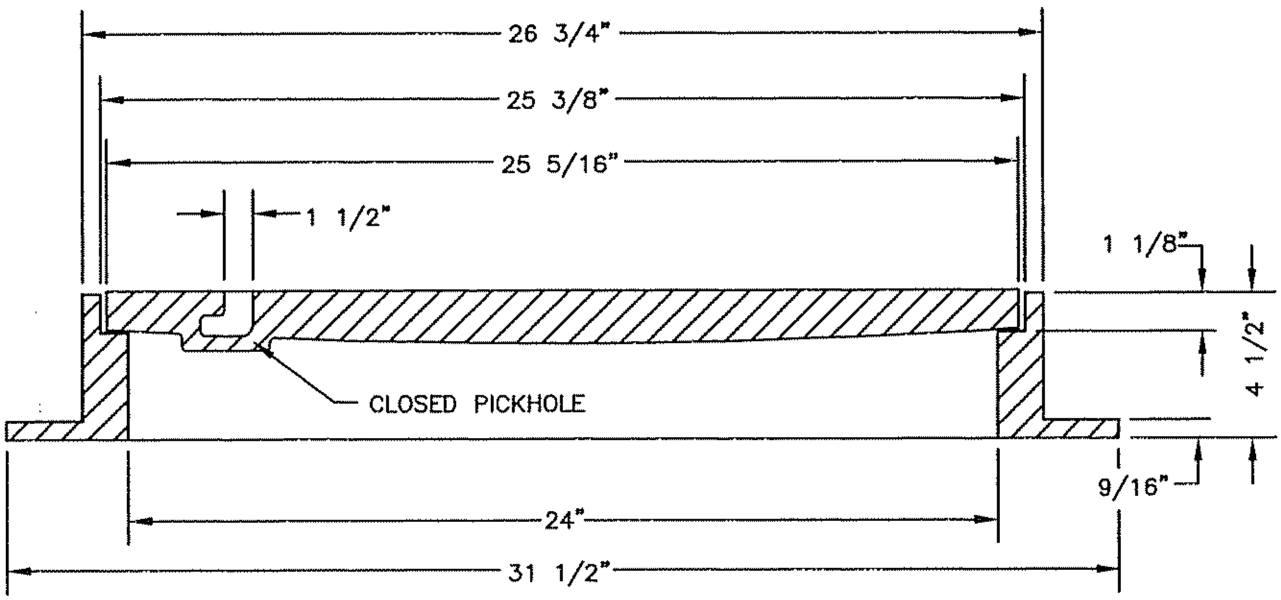
FIGURE S-7

ACCEPTABLE MANUFACTURERS

SOUTH BAY FOUNDRY
SFB 1900 CPH
COVER 130 lbs
FRAME 140 lbs

D AND L SUPPLY
D&L A-1024
COVER 130 lbs
FRAME 150 lbs





LID SECTION

NOTES:

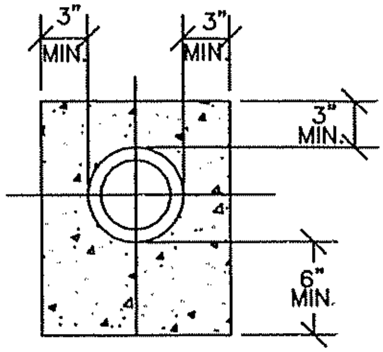
1. FRAME AND COVER FULLY MACHINED ON SURFACES AS SHOWN FOR PERFECT NO-ROCK, NO-STICK FIT.
2. STANDARD COVER MARKINGS "SANITARY SEWER". CASTING SHALL BE ORDERED WITH APPROPRIATE MARKING.
3. CASTING SHALL BE FURNISHED WITH BLIND PICKHOLES.
4. CASTINGS SHALL BE DIPPED IN ASPHALT PAINT.
5. ALL PARTS OF ACCEPTABLE ASSEMBLIES ARE INTERCHANGEABLE.

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	24 INCH MANHOLE COVER ASSEMBLY (STREET TYPE)
MARK	DATE	REVISION		

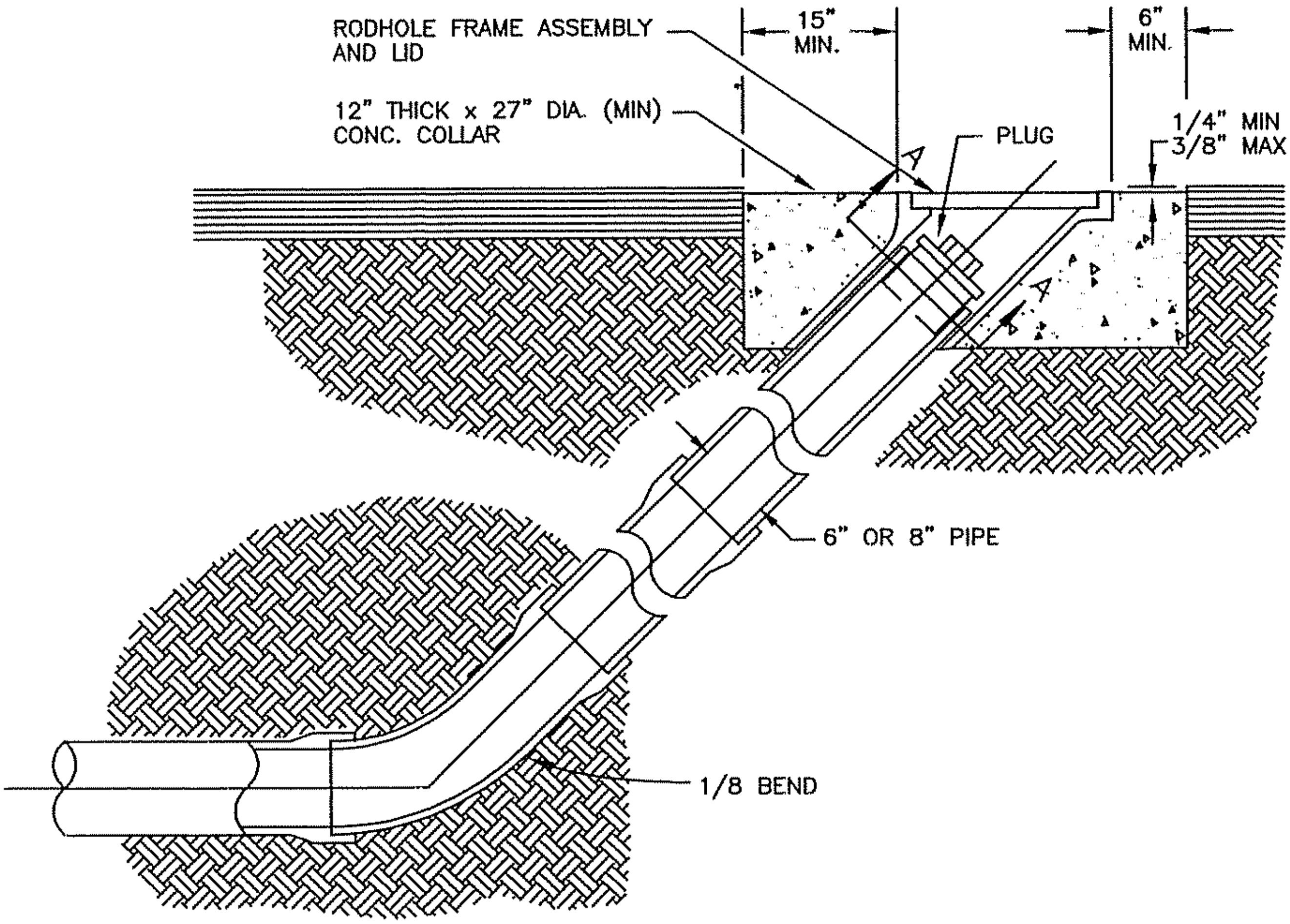
FIGURE S-8

NOTES:

1. ALL CONCRETE SHALL BE CLASS 520-C-2500.
2. CONCRETE COLLAR AROUND RODHOLE FRAME SHALL BE OVAL IN SHAPE TO MATCH FRAME ASSEMBLY.



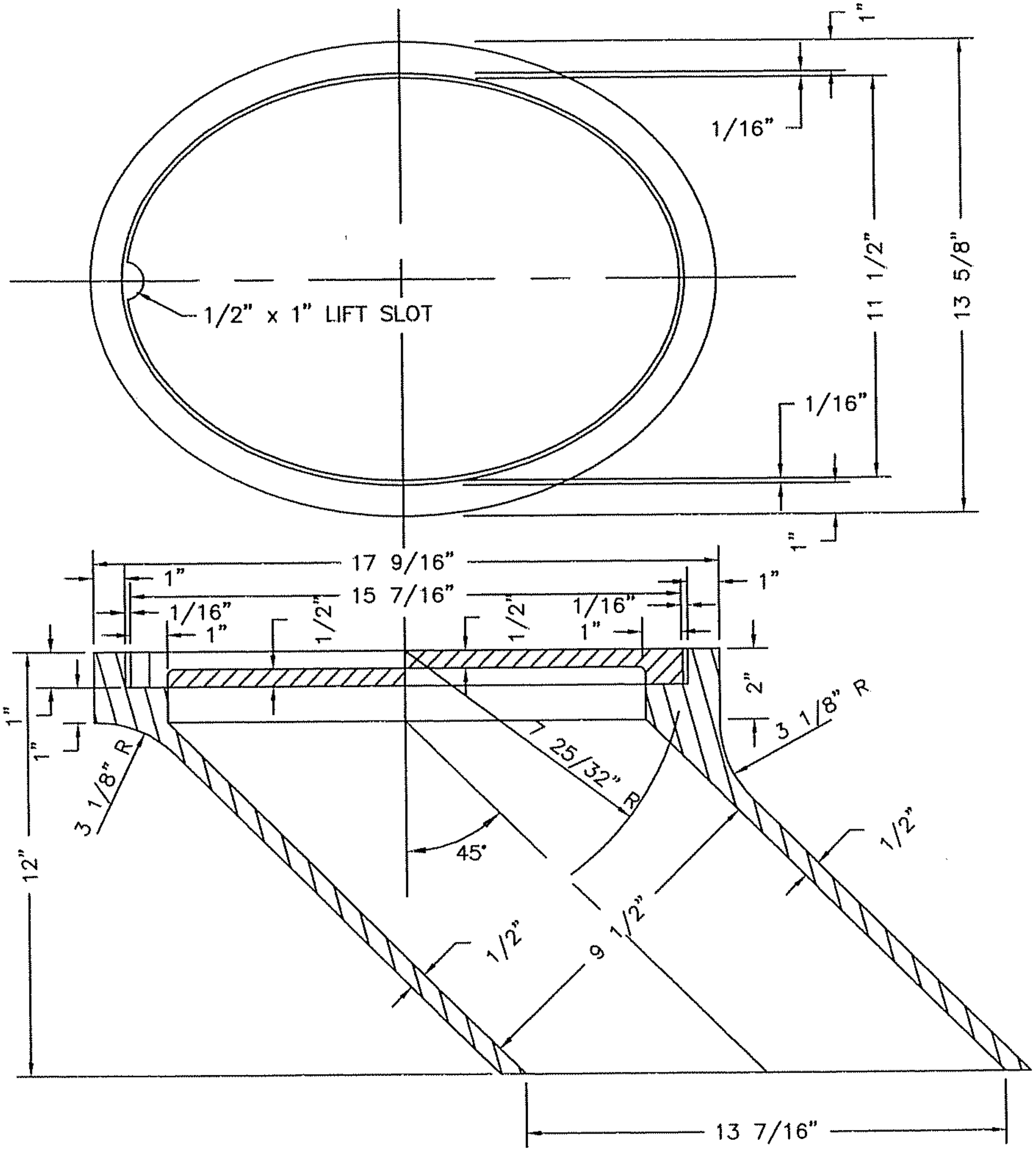
SECTION A-A



SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman WILLIAM E. LYMAN	RODHOLE INSTALLATION
MARK	DATE	REVISION		

FIGURE
S-9

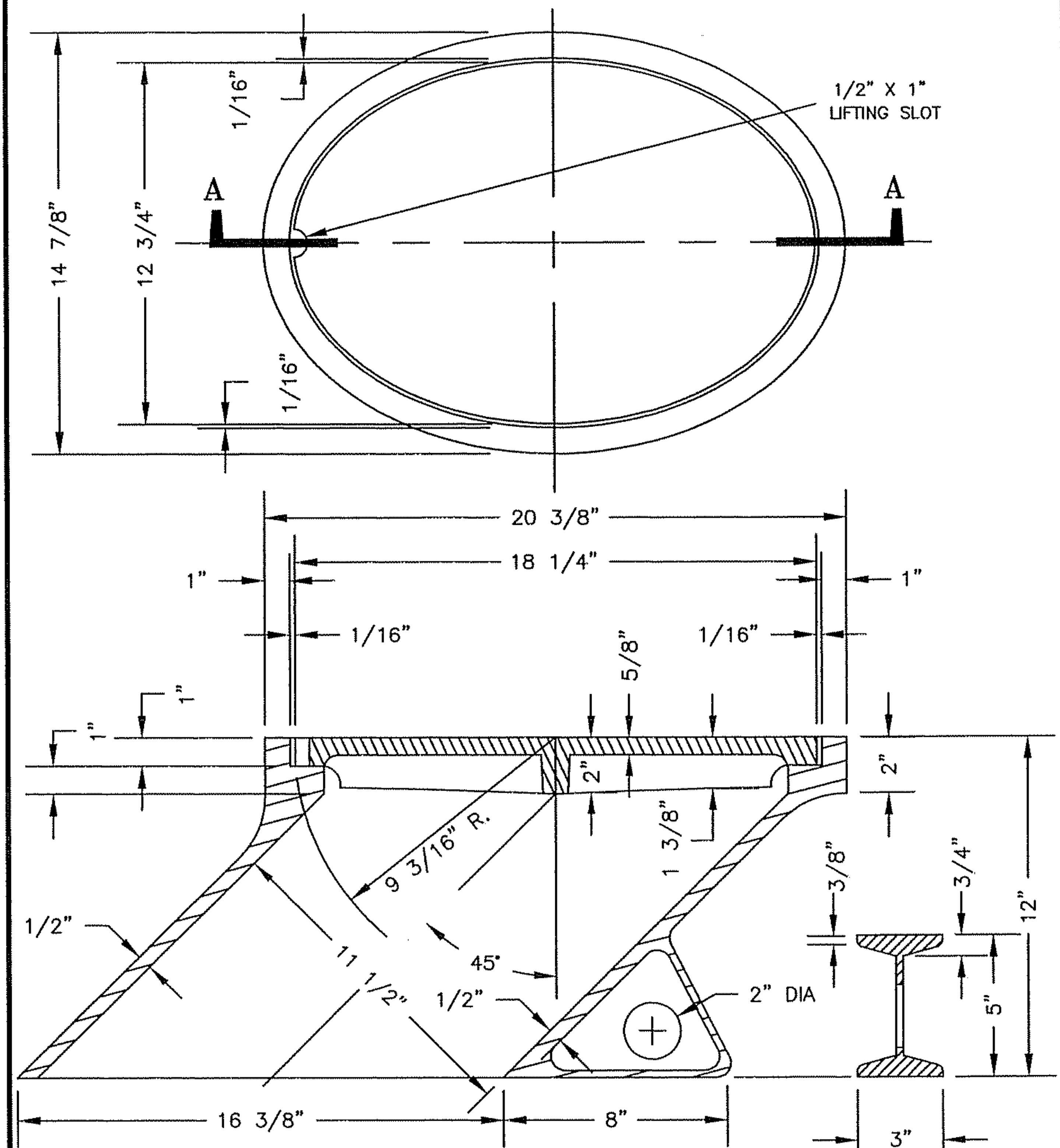
PINKERTON FOUNDRY NO. A-211 OR EQUAL.
FRAME PART NO. A-212 APPROX. WT. 104 LBS.
COVER PART NO. A-213 APPROX. WT. 22 LBS.



SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: *William E. Lyman*	RODHOLE FRAME AND COVER ASSEMBLY (6" SLOPE TYPE)
MARK | DATE	REVISION	WILLIAM E. LYMAN	

PINKERTON FOUNDRY NO. A-372 OR EQUAL
FRAME PART NO. A-373 APPROX. WT. 135 lbs.
COVER PART NO. A-374 APPROX. WT. 45 lbs.

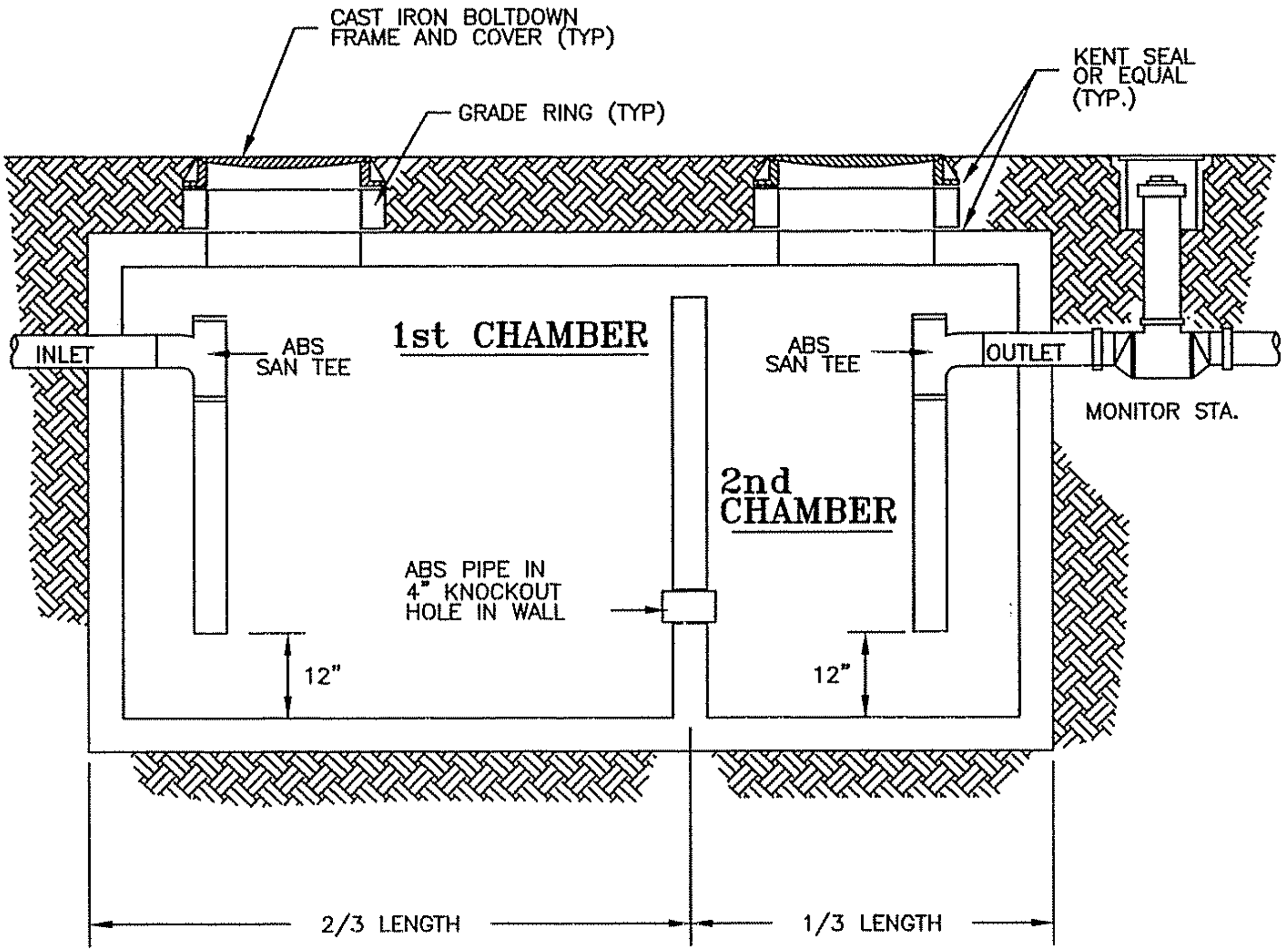
FIGURE S-9A



SECTION A–A

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: *William E. Lyman*	RODHOLE FRAME AND COVER ASSEMBLY (8" SLOPE TYPE)
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-10



SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	OIL AND GREASE INTERCEPTOR (OGI)
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S–10A

SHASTA COUNTY SERVICE AREA

OIL AND GREASE INTERCEPTORS (OGI)

REQUIREMENT:

Oil and Grease Interceptors are required for all industrial and for commercial food establishments where pretreatment of wastewater effluent is indicated as necessary to capture greases, oils, or food solids.

This standard applies to all new construction, tenant improvements, remodels, and existing systems which are in need of upgrading.

OGI's will be sized from industry submitted, certified food preparation facility survey information. The sizing criteria will follow the Uniform Plumbing Code (UPC) appendix H. The interceptor size (in gallons) will be established by the formula below.

SIZING CRITERIA:

(a) Parameters; The parameters for sizing a grease interceptor are hydraulic loading and grease storage capacity, for one or more fixtures.

(b) Sizing Formula; The size of the interceptor shall be determined by the following formula:

Number of meals per peak hour*	X	waste flow rate**	X	retention time***	X	storage factor****	=	interceptor size (liquid capacity)

* Meals Served at Peak Hour (or), Total Seating Capacity

** Waste Flow Rate:

a.	With dishwashing machine	6 gallon flow
b.	Without dishwashing machine	5 gallon flow
c.	Single service kitchen	2 gallon flow
d.	Food waste disposer	1 gallon flow

*** Retention Times

Commercial kitchen waste dishwasher	2.5 hours
Single service kitchen single serving	1.5 hours

**** Storage Factors

Fully equipped commercial kitchen	8 hour operation : 1 16 hour operation: 2 24 hour operation: 3
Single Service Kitchen	1.5

SCALE: NTS	DATE: SEPT 1996	• SHASTA COUNTY SERVICE AREAS •	
MARK / DATE / REVISION		APPROVED BY: William E. Lyman WILLIAM E. LYMAN	OIL AND GREASE INTERCEPTORS (OGI)

FIGURE S-10B

The minimum size OGI allowed by the County is 1250 gallons. For very large OGI requirements the maximum size required will be established on a case by case basis. Adjustments for extenuating circumstances will include establishment of an agreed upon OGI maintenance (pumping) schedule, between the facility owner/operator and the County.

DESIGN

All new construction and upgrades, having an OGI requirement, shall be constructed to include a sample monitoring station.

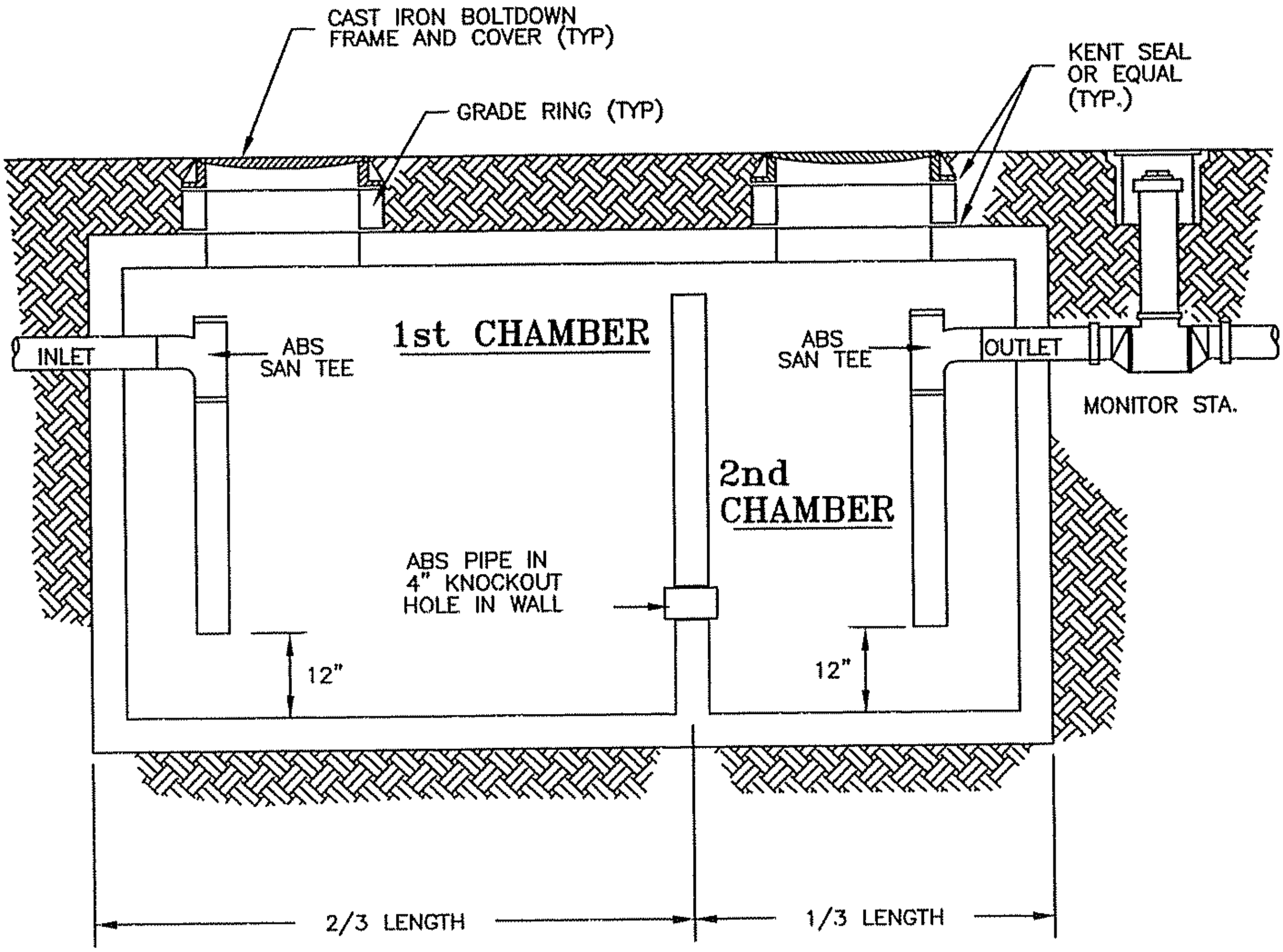
Facilities required to install OGI's and/or sample monitoring stations, shall install units of approved designs on file with the County Construction Standards.

If an existing undersized unit is structurally sound and installed properly, then, in lieu of replacing it with a larger unit, the owner may choose to install an additional unit in series with the existing unit to satisfy the total size capacity required.

All required OGI's shall be installed and properly maintained with all internal required plumbing of proper design and length in place at all times.

SCALE: NTS		DATE: SEPT 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY:	OIL AND GREASE INTERCEPTORS (OGI)
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-11



SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	SAND AND OIL INTERCEPTOR (SOI)
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-11A

SHASTA COUNTY SERVICE AREA

SAND AND OIL INTERCEPTORS (SOI)

REQUIREMENT:

Sand and Oil Interceptors are required for industrial and commercial establishments where pretreatment of wastewater effluent is necessary to capture solids (sand, silts etc.) or floatables (oils etc.).

This standard applies to all new construction, tenant improvements, remodels, and existing systems which are in need of upgrading.

SOI's will be sized from industry submitted, certified Industrial Waste Survey information or by County field inspection data. The sizing criteria will follow the Plumbing Code (UPC) appendix I–9. The UPC does not specify requirements for all specific applications; however, The basic formula may be easily adapted to differing applications or parameters.

SIZING CRITERIA:

(a) Parameters; The parameters for sizing the SOI units are hydraulic loading, retention time, and storage factor for one or more fixtures or industrial applications.

(b) Sizing Formula; The size of the SOI will be determined by use of the following formula:

Number of units washed per hour*	X	waste flow rate**	X	retention time***	X	storage factor****	=	interceptor size (liquid capacity)

* NUMBER of units washed per hour (ie.,auto's, engines, parts, etc.)

** Waste Flow Rate – gallons per unit cleaned (for intermittent use), or gallons per hour (for constant use)

*** Retention Times 2.0 hours

**** Storage Factors – vehicle/equipment/parts, etc. washing

a.	Self service/public	1.5 hours
b.	Employee operated automated/commercial	2.0 hours
c.	Other industrial/commercial applications	2.0 hours

The minimum size SOI allowed by the County is 100 gallons. Adjustments for extenuating circumstances will include establishment of an agreed upon SOI maintenance (pumping) schedule, between the facility owner/operator and the County.

SCALE: NTS	DATE: SEPT 1996	• SHASTA COUNTY SERVICE AREAS •	
MARK / DATE	REVISION	APPROVED BY: William E. Lyman WILLIAM E. LYMAN	SAND AND OIL INTERCEPTORS (SOI)

FIGURE S-11B

DESIGN

All new construction and upgrades, where SOI's are required, such units shall be constructed to include a sample monitoring station.

Facilities required to install SOI's and/or sample monitoring stations, shall install units of approved designs on file with the County Construction Standards. The use of auxiliary or alternate pretreatment systems in conjunction with or in lieu of an SOI unit must be approved by the County prior to installation.

If an existing undersized unit is structurally sound and installed properly, then, in lieu of replacing it with a larger unit, the owner may choose to install an additional unit in series with the existing unit to satisfy the total size capacity required.

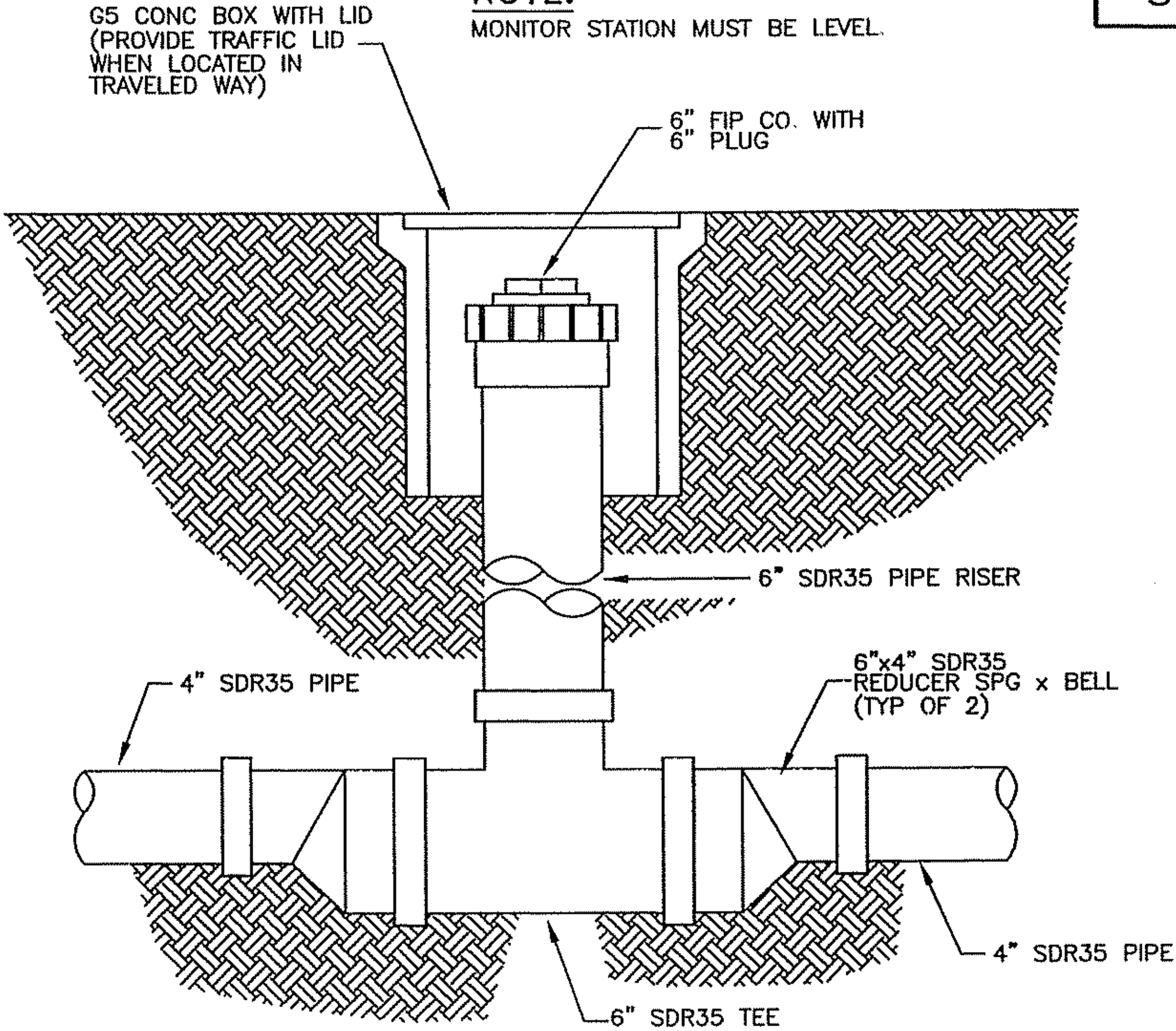
The standard SOI drawing (Figure S-11) applies to units of 100 through 1,500 gallon capacity. Units over 1,500 gallon capacity must have at least 3 compartments.

All required SOI's shall be installed and properly maintained with all internal required plumbing of proper design and length in place at all times.

SCALE: NTS		DATE: SEPT 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY:	SAND AND OIL INTERCEPTORS (SOI)
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE S-12

NOTE:
MONITOR STATION MUST BE LEVEL.



PARTS LIST

1	6" SDR35 TEE
2	6"x4" SDR35 REDUCER (SPG x BELL)
1	6" FIP COLLAR
1	6" PLUG
1	G5 CONC. BOX
1	G5 SEWER LID

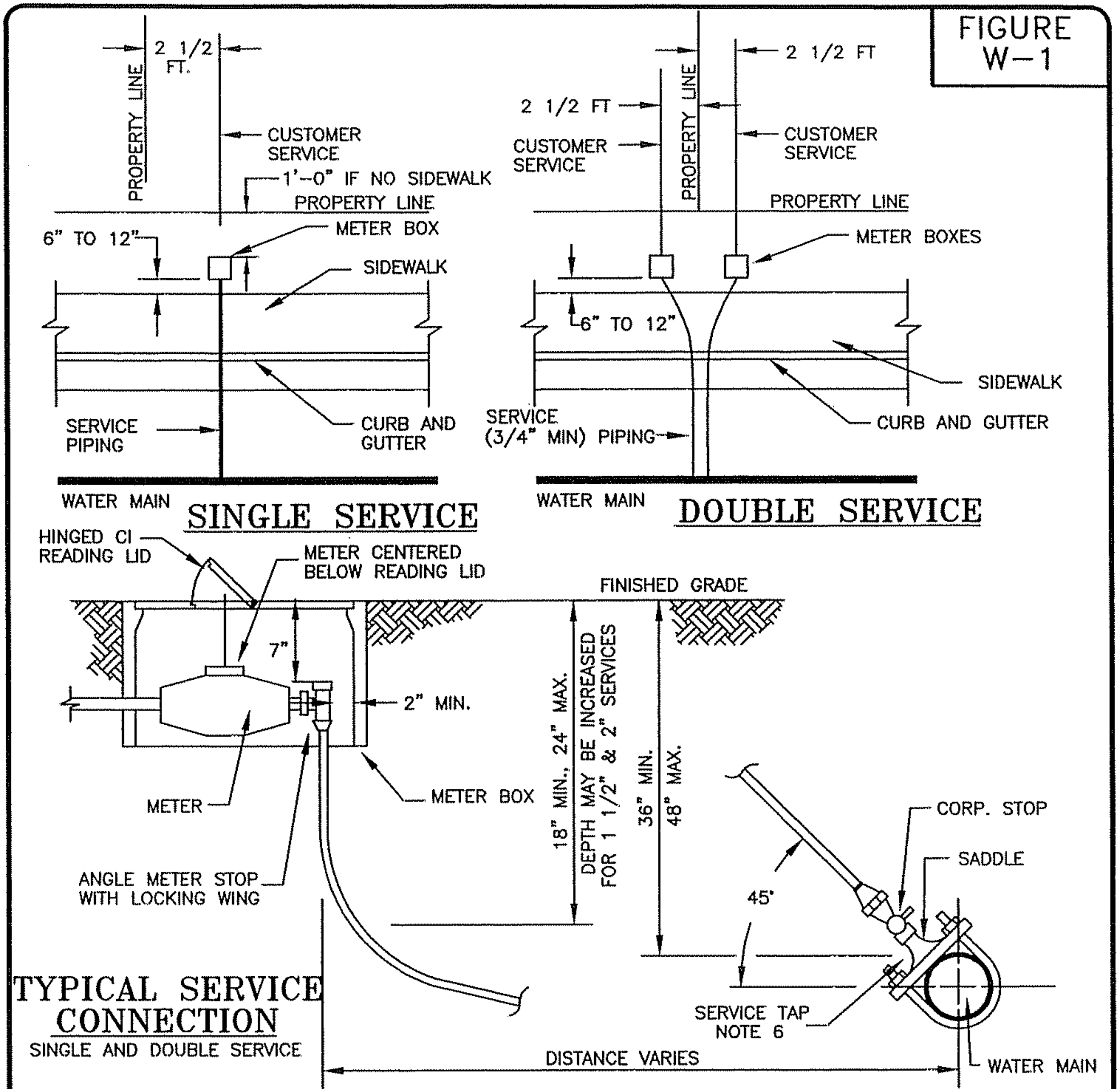
IF REQUIRED

1	4" ABS CPLG
1	4" ABS x SDR BUSHING

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK / DATE	REVISION	APPROVED BY: William E. Lyman — WILLIAM E. LYMAN

INTERCEPTOR MONITOR STATION

FIGURE W-1



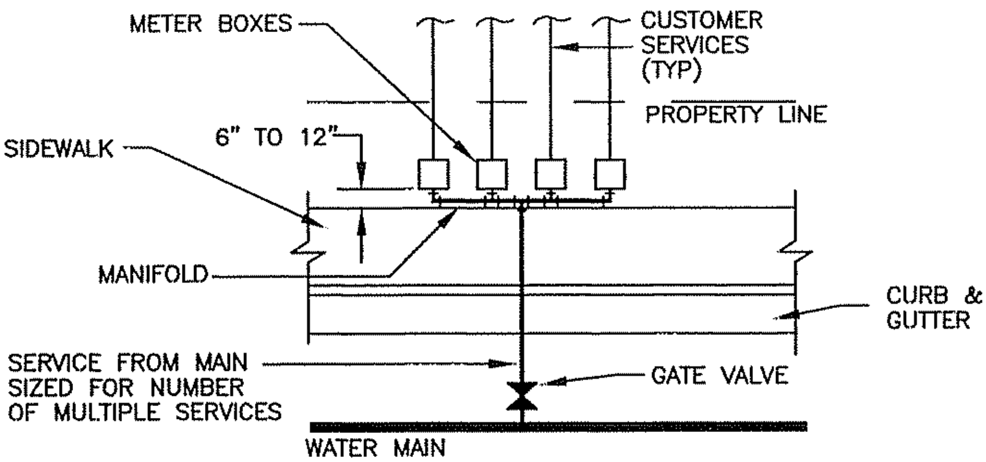
TYPICAL SERVICE CONNECTION
SINGLE AND DOUBLE SERVICE

NOTES:

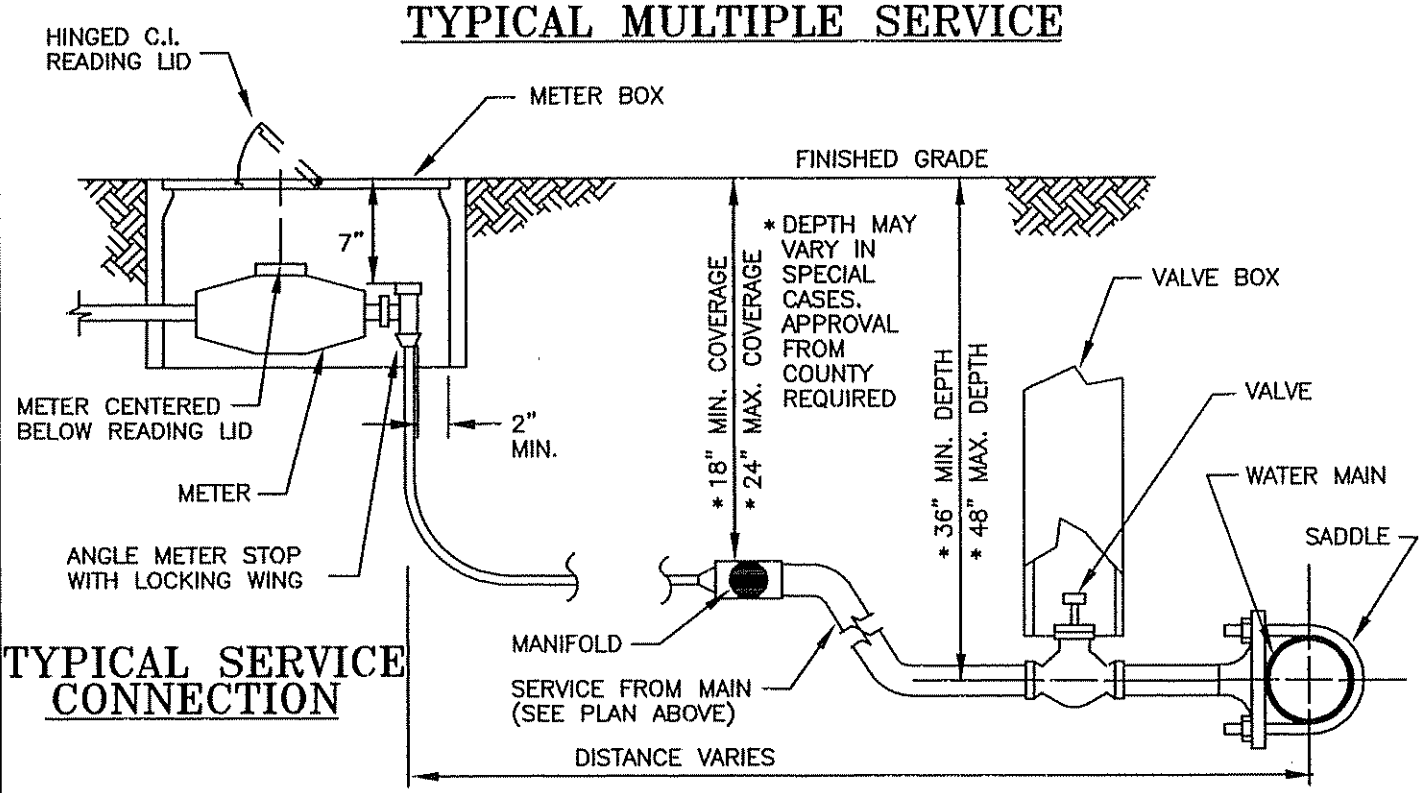
1. STANDARD METER SIZE SHALL BE 3/4" x 5/8", FOR 3/4" SERVICE.
2. OTHER SERVICE SIZES THRU 2" SHALL HAVE THE SAME SIZE METER AS THE SERVICE LINE SIZE INCLUDING FULL 3/4" SERVICE.
3. METER BOXES SHALL HAVE CONCRETE LIDS (STEEL TRAFFIC LIDS IN DRIVEWAYS, SHOULDERS, PARKING AREAS, OR AREAS WITH ROLL CURB) WITH HINGED CI. READING LIDS.
4. ANGLE METER STOP VALVE SHALL BE POSITIONED IN METER BOX SO THAT METER REGISTER WILL BE CENTERED UNDER READING LID.
5. METER BOXES AND SERVICE PIPING SHALL BE INSTALLED WITH A MINIMUM OF 2 1/2 FT. CLEARANCE FROM ALL ELECTRICAL TRANSFORMERS, LIGHT STANDARDS AND OTHER UTILITY BOXES OR VAULTS.
6. ONLY SERVICE TAPS FOR 1 1/2" AND 2" MAY BE TAPPED OTHER THAN AT A 45° ANGLE, BUT ONLY WITH PRIOR APPROVAL OF THE COUNTY.

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	WATER SERVICE CONNECTION SINGLE / DOUBLE 3/4" THRU 2"
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-2



TYPICAL MULTIPLE SERVICE



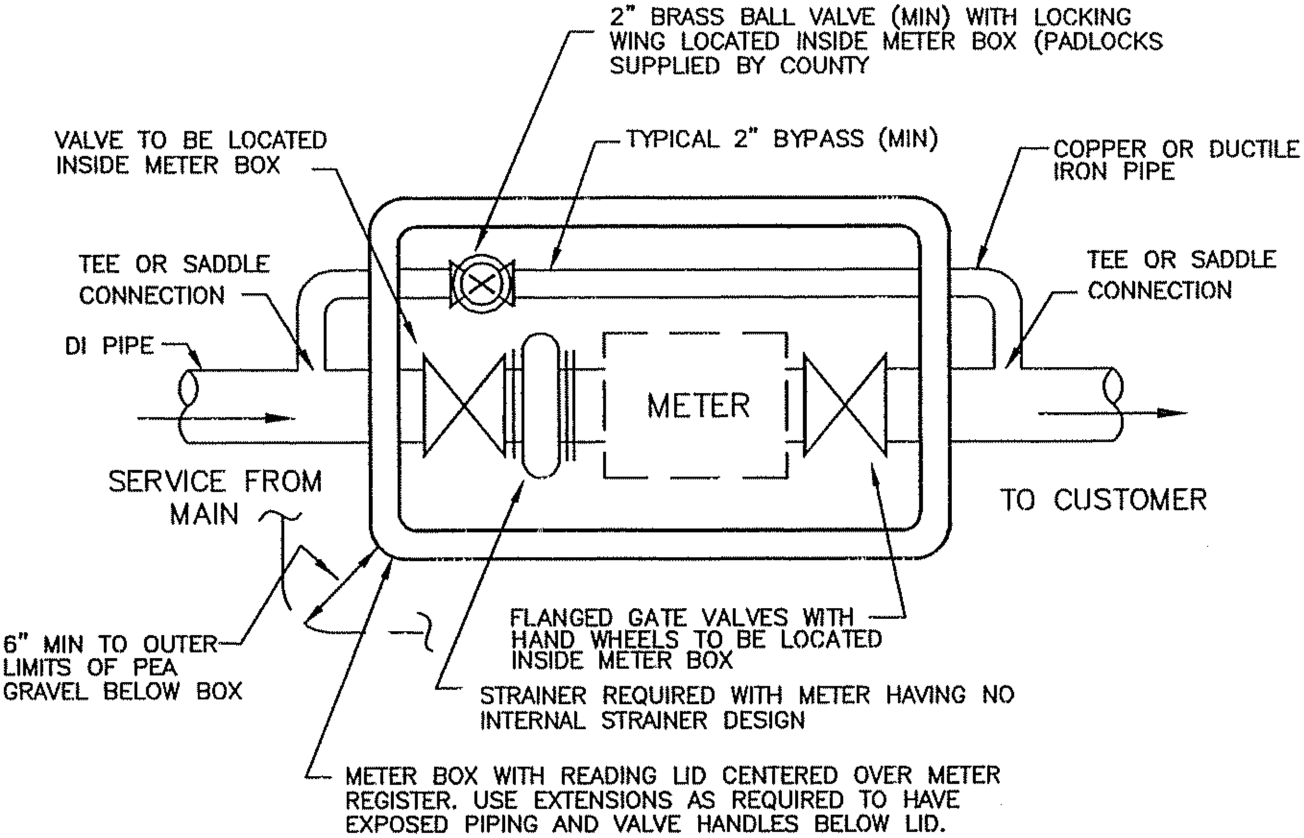
TYPICAL SERVICE CONNECTION

NOTES

1. REFER TO NOTES ON FIGURE W-1.
2. MANIFOLD TO BE SAME SIZE AS SERVICE FROM MAIN.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK / DATE / REVISION	APPROVED BY: William E. Lyman — WILLIAM E. LYMAN	**WATER SERVICE CONNECTION** 3/4" THRU 2" (3 SERVICES OR MORE)

FIGURE W-3



TYP. BYPASS INSTALLATION

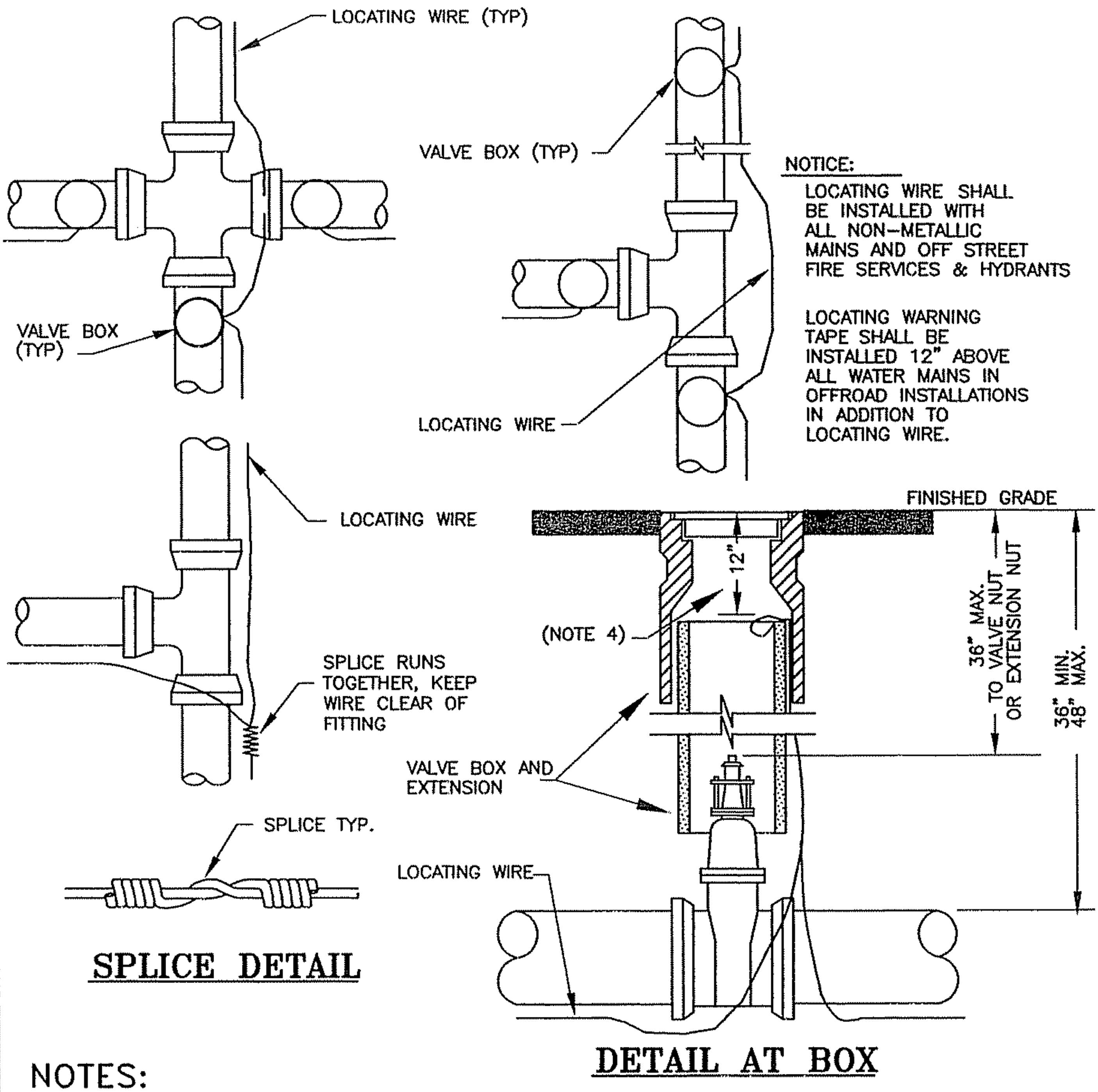
3 INCH AND LARGER

NOTES:

1. MAXIMUM DEPTH OF METER REGISTER TO BE TWENTY FOUR (24) INCHES.
   NOTE: ALL METERS WHICH, DUE TO PLUMBING PROBLEMS, CANNOT BE RAISED TO MEET THE ABOVE DEPTH LIMIT SHALL HAVE A REMOTE READ OR REGISTER EXTENSION. ITEMS TO BE SUPPLIED BY CUSTOMER AND APPROVED BY THE COUNTY.
2. ALL VAULTS FOR 3" AND LARGER SERVICES REQUIRE 12" MIN PEA GRAVEL DEPTH BELOW BOX
3. COPPER BYPASS TO BE DIELECTRICALLY SEPARATED FROM DI SADDLE OR TEE USING UNION OR NYLON BUSHING.
4. METER TYPE TO BE APPROVED BY COUNTY BASED ON CONDITIONS OF USAGE.
5. METER TO BE REMOVEABLE BY METER COUPLINGS OR FLANGED COUPLING ADAPTERS.

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	**WATER SERVICE CONNECTION** METER & BYPASS DETAIL 3" SERVICES & LARGER
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-4

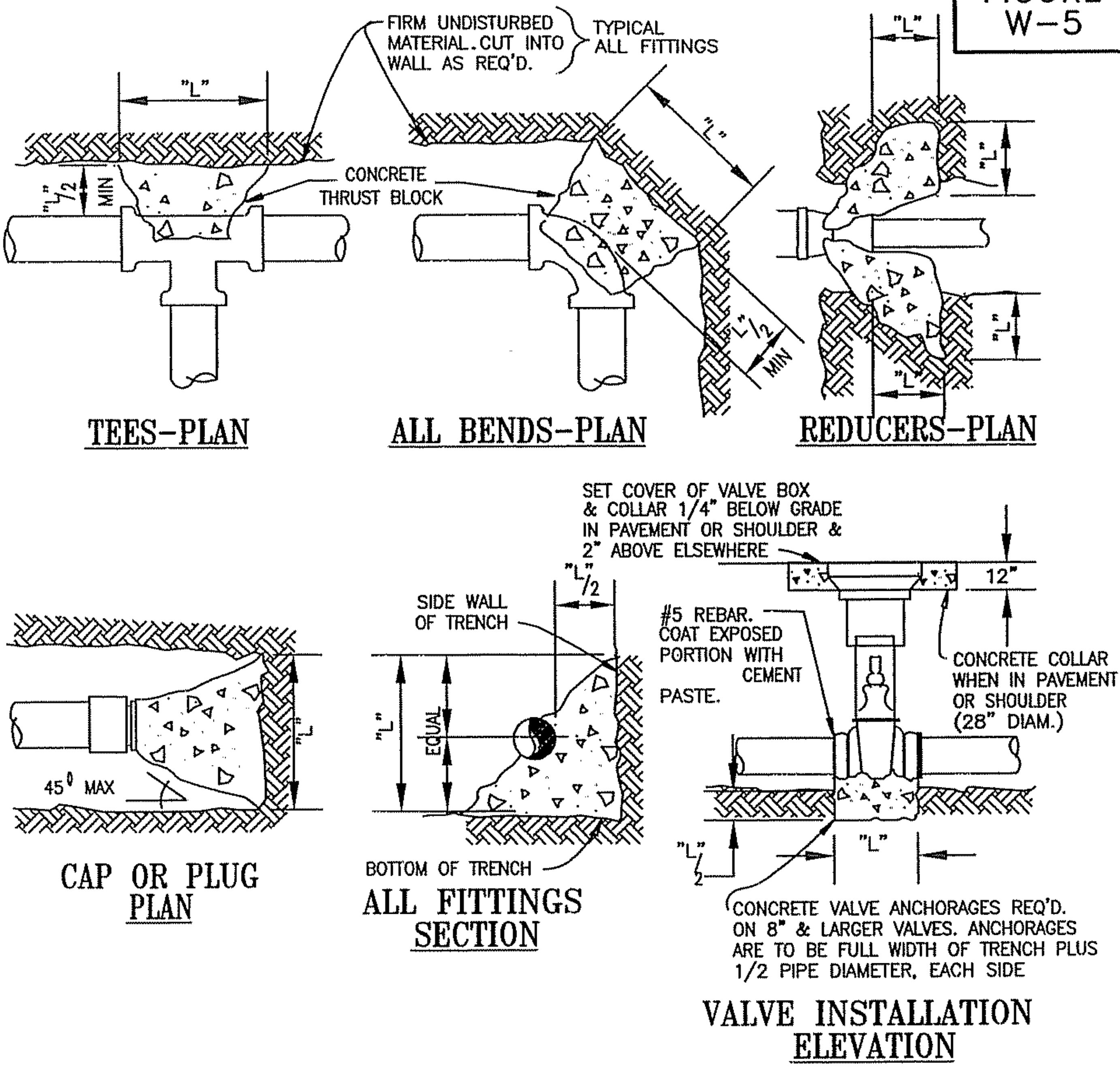


NOTES:

1. BARE WIRE SHALL NOT TOUCH VALVE OR FITTINGS (MAINTAIN 3 INCHES CLEAR DISTANCE)
2. LOCATING WIRE SHALL BE PLACED AT BOTTOM OF TRENCH, NEXT TO PIPE. (DO NOT ATTACH WIRE TO PIPE)
3. ALL VALVES, INCLUDING FIRE HYDRANT VALVES, SHALL HAVE LOCATING WIRES.
4. LOCATING WIRE SHALL BE INSULATED, #10 COPPER.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: William E. Lyman	**LOCATING WIRE WARNING TAPE**
MARK / DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-5



NOTES:

1. THRUST BLOCKS SHALL BE PROVIDED AT ALL BURIED PIPE FITTINGS OF 4" DIA OR LARGER. THRUST BLOCK SIZE IS BASED ON PIPE SIZE, 150 PSI TEST PRESSURE, & SOIL BEARING OF 1200 LB/FT . DIMENSION "L" IS SHOWN IN TABLE 1 & IS BOTH A VERTICAL & HORIZONTAL DIMENSION UNLESS SHOWN OTHERWISE. IF PIPE COVER HAS BEEN APPROVED TO BE LESS THAN 30", INCREASE HORIZONTAL THRUST BLOCKS IN PROPORTION TO 30 INCHES DIVIDED BY THE ACTUAL COVER.
2. SEE TABLE 1 ON FIGURE W-6 FOR "L" DIMENSIONS.

SCALE:	NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	THRUST BLOCK DETAILS
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-6

TABLE 1

NOMINAL PIPE DIAMETER INCHES	FITTINGS						
	TEE, WYE, OR PLUG	90° BEND	45° BEND	22-1/2° BEND	11-1/4° BEND	REDUCER (BASED ON LARGEST DIA.)	VALVE
4"	18	22	16	15	15	--	--
6"	26	31	23	17	15	--	--
8"	34	40	30	21	15	17	12
10"	41	49	36	26	18	21	12
12"	49	59	44	31	22	25	16
14"	58	68	50	36	26	30	16
16"	66	77	57	41	28	33	18
18"	74	88	65	45	32	37	REQUIRES
20"	81	97	71	50	36	41	SPECIAL
24"	97	115	85	61	43	49	DESIGN

TABLE 2

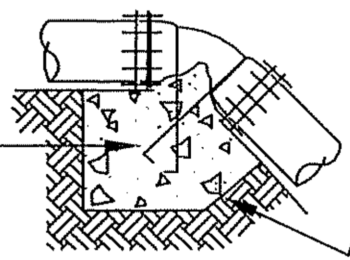
VERTICAL FITTING THRUST BLOCKS

WHERE VERTICAL BENDS ARE DIRECTED WITH THE THRUST TOWARD THE BOTTOM OF THE TRENCH, THEY SHALL HAVE THRUST BLOCKS PER HORIZONTAL BENDS EXCEPT CONCRETE SHALL BEAR AGAINST THE TRENCH BOTTOM.

WHERE VERTICAL BENDS ARE DIRECTED WITH THE THRUST TOWARD THE TOP OF TRENCH, THEY SHALL BE INSTALLED PER THE FOLLOWING DETAIL. MINIMUM ROD EMBEDMENT SHALL BE 30 INCHES FOR 12" AND SMALLER PIPE AND 36 INCHES FOR 14" AND LARGER PIPE.

CUBIC YARDS CONCRETE FOR VERTICAL FITTINGS (SEE DETAIL BELOW)

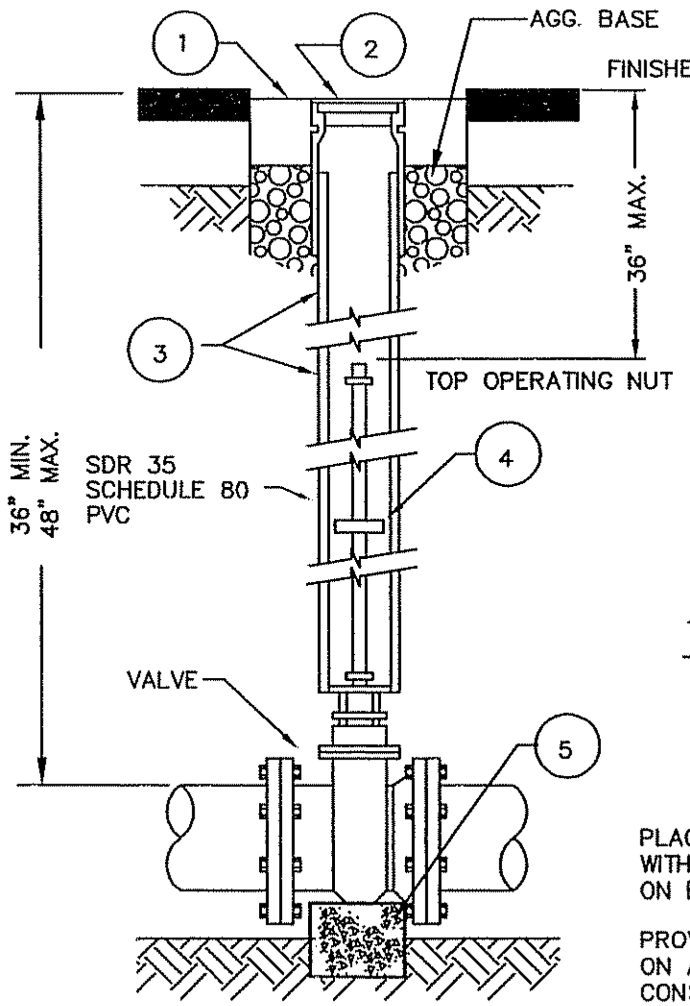
BEND ANGLE	PIPE DIAMETER						
	4"	6"	8"	10"	12"	14"	16" AND OVER
11-1/4°	0	0.4	0.7	0.9	1.3	1.8	REQUIRES
22-1/2°	0.4	0.8	1.3	1.8	2.5	3.4	SPECIAL
45°	0.7	1.4	2.4	3.5	4.9	6.6	
90°	1.3	2.5	4.3	4.3	9.1	12.2	DESIGN



ELEVATION

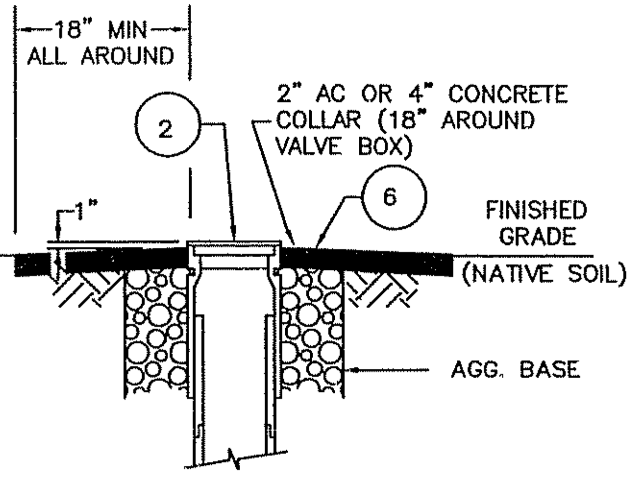
SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	THRUST BLOCK TABLES
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-7



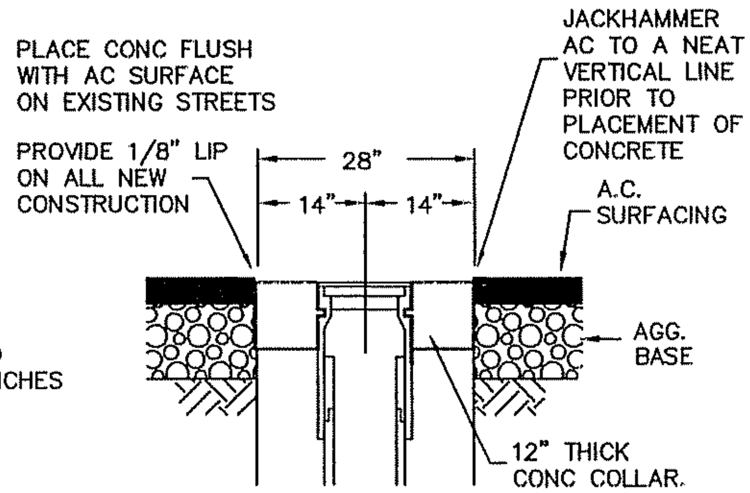
OPERATING NUT EXTENSION DETAIL

REQUIRED WHERE DISTANCE BETWEEN FINISHED GRADE AND TOP OF OPERATING NUT EXCEED 36 INCHES



VALVE COVER PLACEMENT

NATIVE GROUND DETAIL



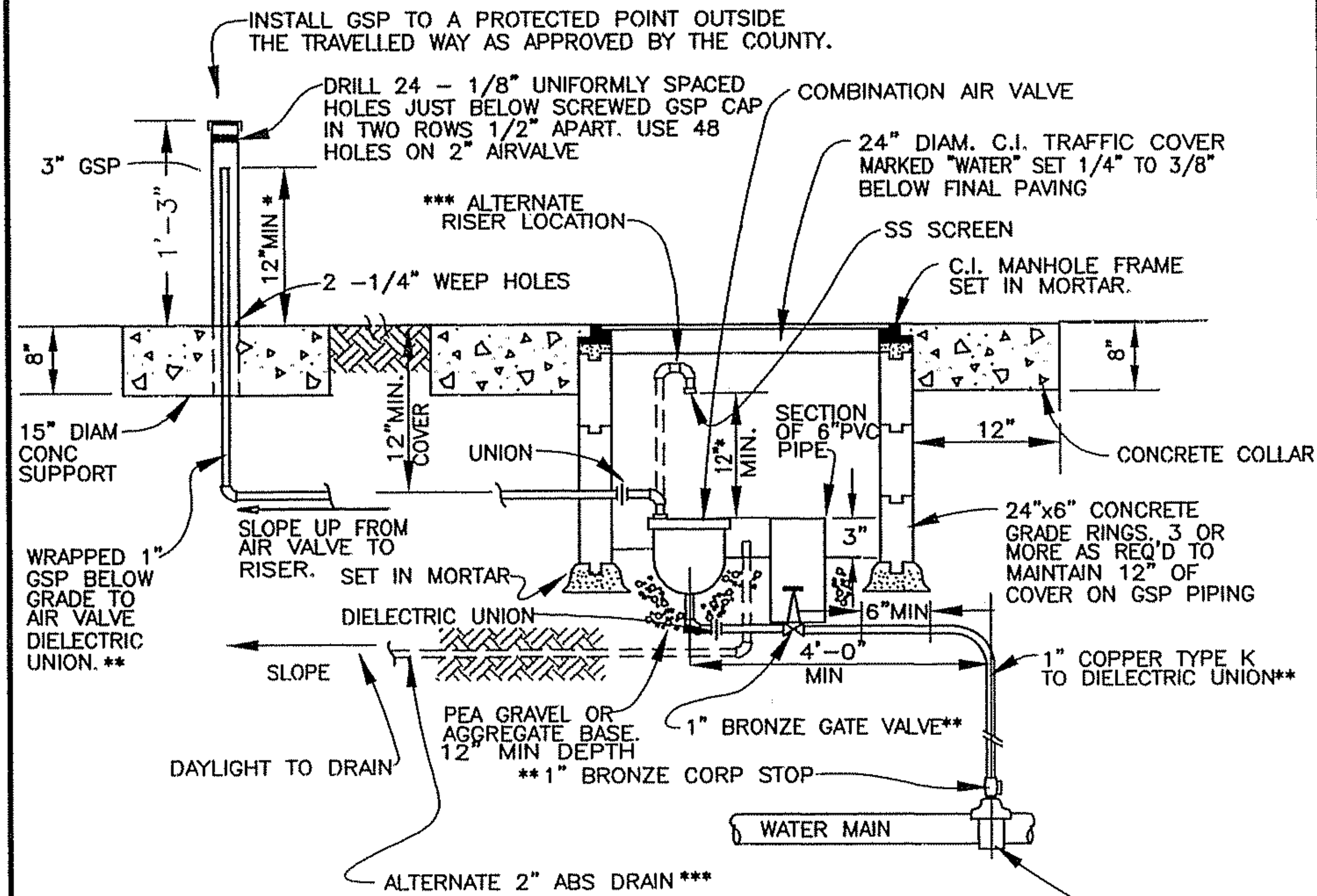
VALVE COVER ADJUSTMENT

NOTES:

1. 28" DIA. X 12" DEEP CONC. COLLAR
2. VALVE BOX
3. VALVE BOX EXTENSION
4. OPERATING NUT EXTENSION W/ 6" DIA. PLATE WASHER WELDED TO EXTENSION AT MID POINT OF ROD.(MIN. LENGTH OF ROD SHALL BE 24 INCHES)
5. PROVIDE CONC. SUPPORT UNDER 8" & LARGER VALVES. SEE FIGURE W-5.
6. PLACE 2" AC. OR 4" THICK CONC. COLLAR 18" AROUND VALVE BOX.
7. NO OPERATING NUT EXTENSION REQUIRED WHERE DISTANCE BETWEEN FINISHED GRADE AND TOP OF VALVE OPERATION NUT IS LESS THAN 36 INCHES.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	WATER VALVE DETAILS PAVED AND UNPAVED SURFACES
MARK | DATE	REVISION		

FIGURE W-8



*** NOTE: AN ALTERNATE TO THE GSP PIPING AND RISER ABOVE GRADE, WHERE APPROVED BY THE ENGINEER, IS TO PLACE THE GSP RISER WITHIN THE MANHOLE AND INSTALL A 2" ABS DRAIN TO APPROVED LOCATION AS SHOWN IN DASHED LINES ABOVE.

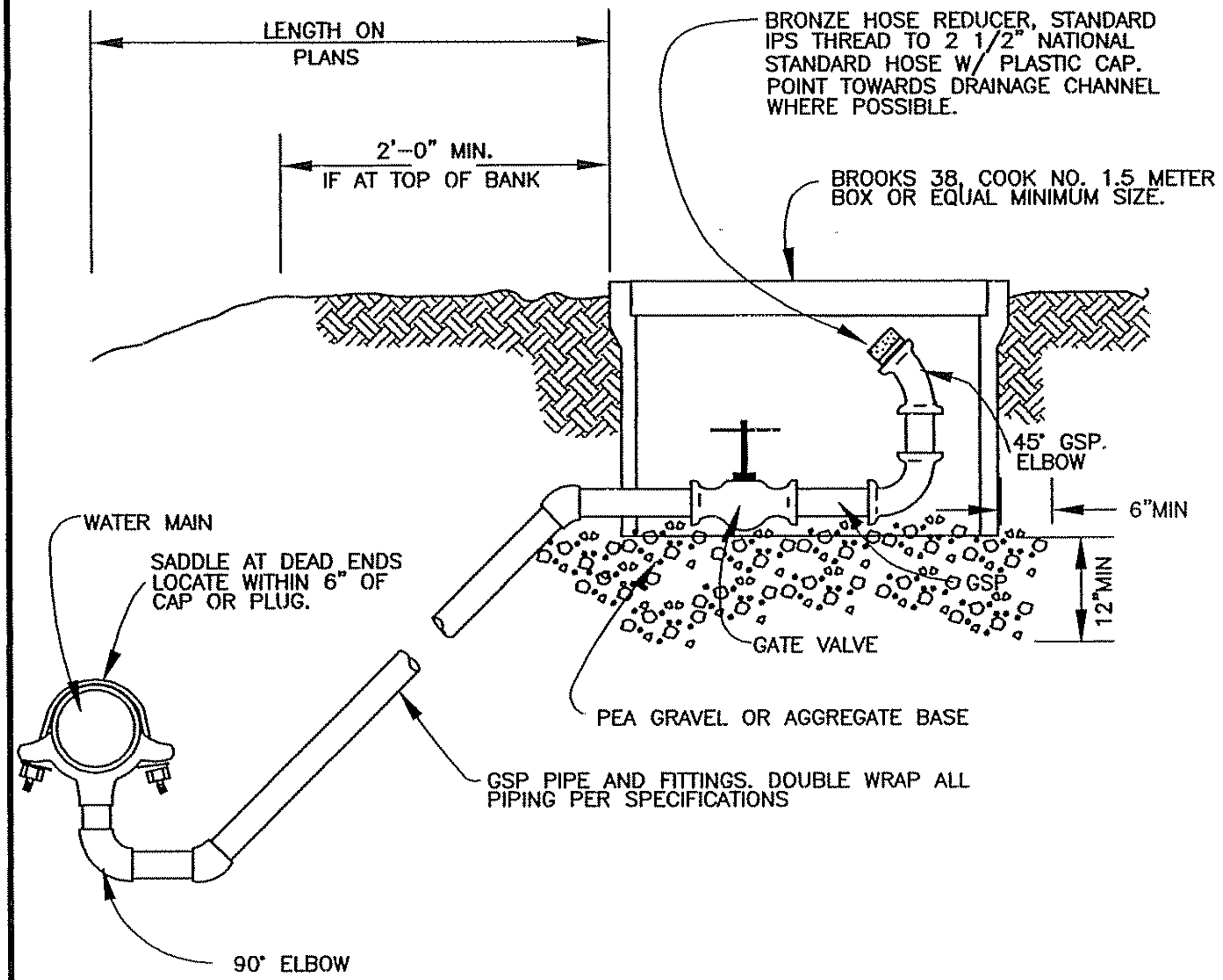
** NOTE: PIPE SIZE SHOWN IS FOR 1" AIR VALVE USE 2" FOR 2" AIR VALVE.

* NOTE: ALSO 12" MIN ABOVE MAX RECORDED FLOOD LEVEL.

**1" BRONZE SERVICE SADDLE AT HIGH SPOT IN WATER MAIN. USE DUCTILE IRON SADDLE WITH NYLON BUSHING ON DUCTILE PIPE

SCALE: NTS		DATE: AUG 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	ROADWAY AIR VALVE ASSEMBLY
MARK	DATE	REVISION	WILLIAM E. LYMAN	

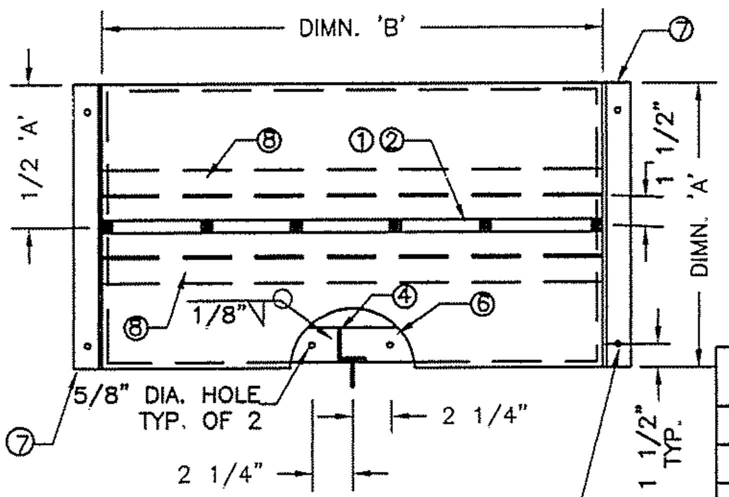
FIGURE W-9



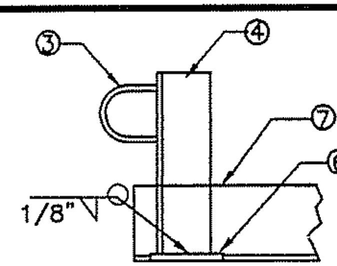
NOTE: BLOWOFF PIPING SIZE TO BE 1/4 OF PIPE DIAMETER, BUT NO SMALLER THAN 2".
PIPING DIAMETER & LENGTH FOR BLOWOFF SHALL BE AS SHOWN ON PLANS. EXAMPLE: 2",15'

SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	**BLOWOFF INSTALLATION**
MARK	DATE	REVISION	WILLIAM E. LYMAN	

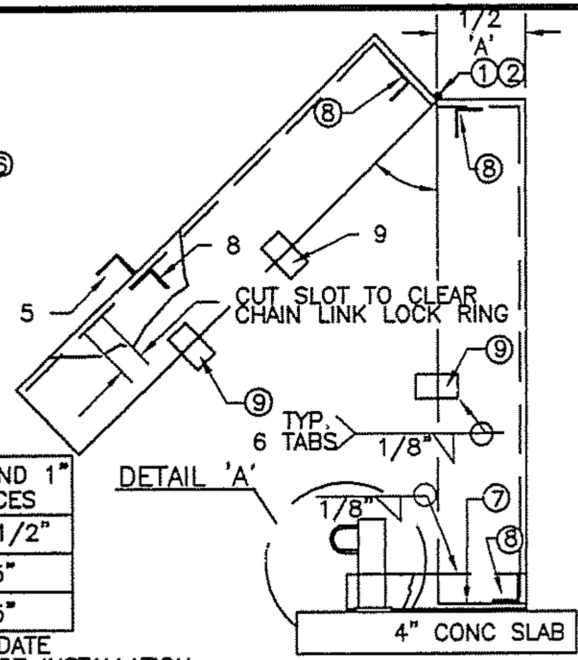
FIGURE W-10



TOP VIEW



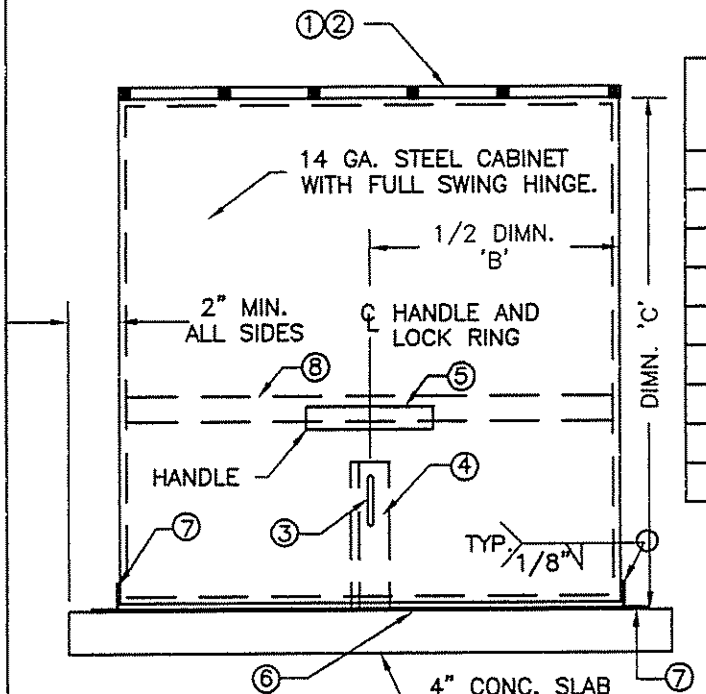
DETAIL 'A'



SIDE VIEW

DIMN.	1 1/2" AND 2" DEVICES	3/4" AND 1" DEVICES
A	20 1/2"	12 1/2"
B	32"	25"
C	25"	25"

* DIMN. MAY VARY TO ACCOMMODATE NONTYPICAL FIRE SERVICE DIVICE INSTALLATION



FRONT VIEW

MATERIALS LIST FOR BACK FLOW DEVICE ENCLOSURE

ITEM NO.	DESCRIPTION	LENGTH FOR 1 1/2" AND 2" DEVICES	LENGTH FOR 3/4" AND 1" DEVICES	QTY.
1	5/16" COLD ROLL HINGE PIN	32"	25"	1
2	1/4" PIPE HINGE	32"	25"	1
3	1/4" X 1 1/2" X 1 1/2" CHAIN LINK	N/A	N/A	1
4	1/4" X 1 1/2" X 1 1/2" ANGLE	5"	5"	1
5	1/8" X 1" X 1" ANGLE HANDLE	4"	4"	1
6	1/4" X 2" FLAT BAR	32 1/4"	25 1/4"	1
7	1/8" X 1 1/2" X 1 1/2" ANGLE	20 1/2"	12 1/2"	2
8	1/8" X 1 1/4" X 1 1/4" ANGLE BRACE	32"	25"	4
9	1/8" X 1" ALIGNMENT TABS	2"	2"	6

NOTES:

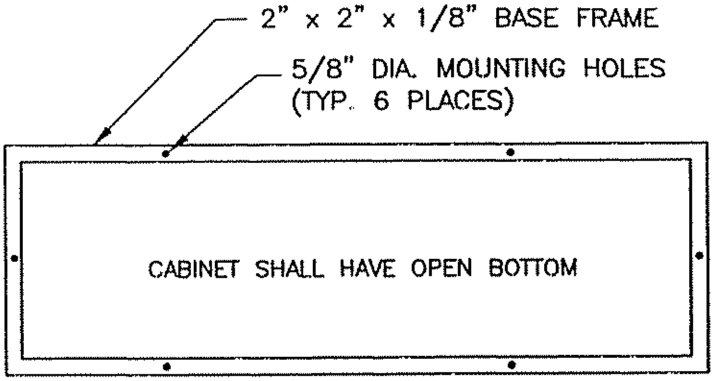
1. CABINET SHALL BE MOUNTED ON A 4" THICK CONC. SLAB WITH 3/8" x 4" "J" BOLTS (TYP. OF 6). SLAB TO EXTEND MIN. OF 2" BEYOND CABINET.
2. ALL PIPING PASSING THROUGH SLAB SHALL PASS THROUGH A PVC SLEEVE FOR THE FULL THICKNESS OF THE SLAB. THE SLEEVE SHALL HAVE A DIAMETER 1/2" LARGER THAN THAT OF THE PIPE.
3. CABINET SHALL BE PAINTED WITH OLIVE GREEN POWDER COAT PAINT.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •

MARK	DATE	REVISION	APPROVED BY: WILLIAM E. LYMAN
			William E. Lyman

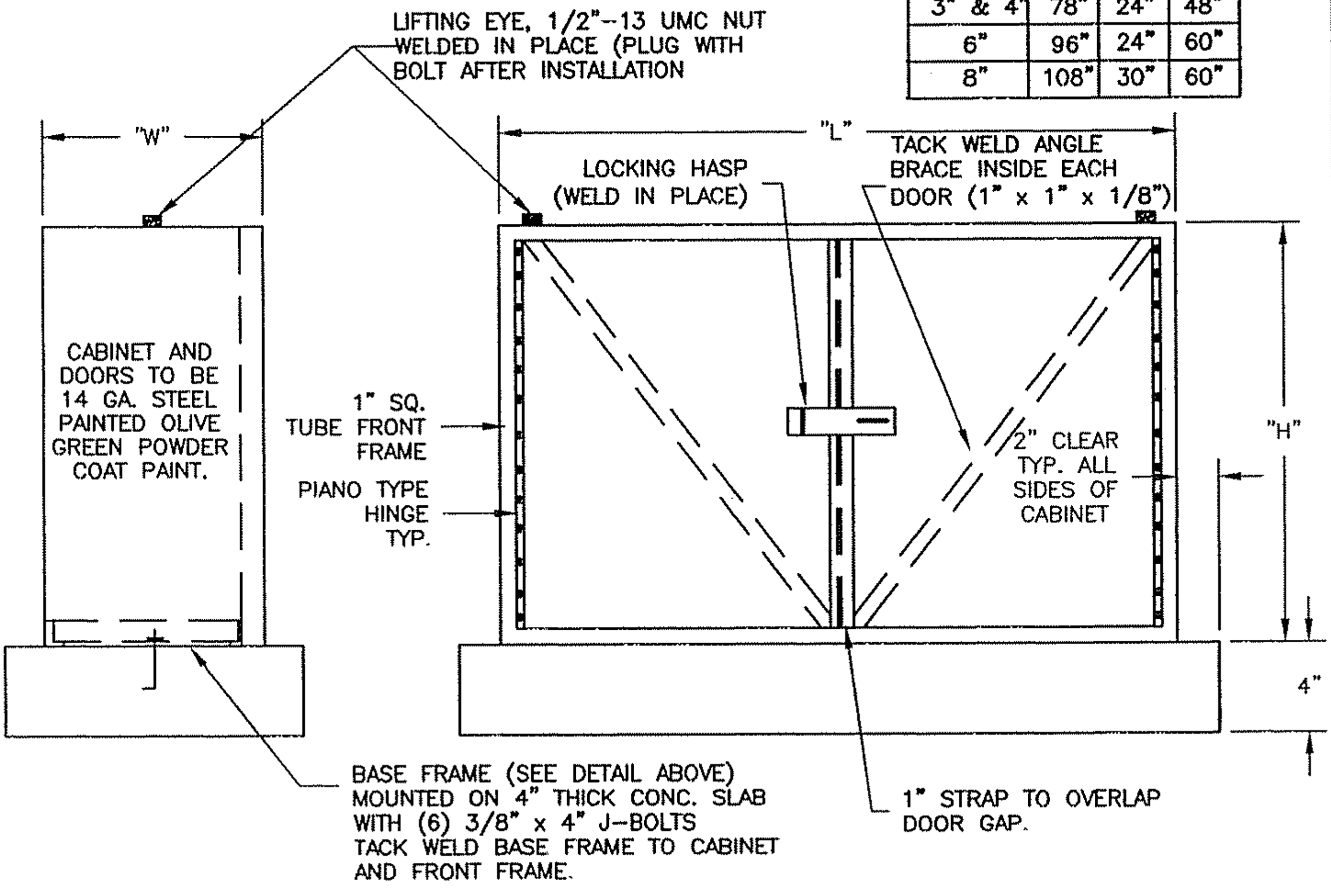
BACKFLOW DEVICE ENCLOSURE (3/4" THROUGH 2")

FIGURE W-11



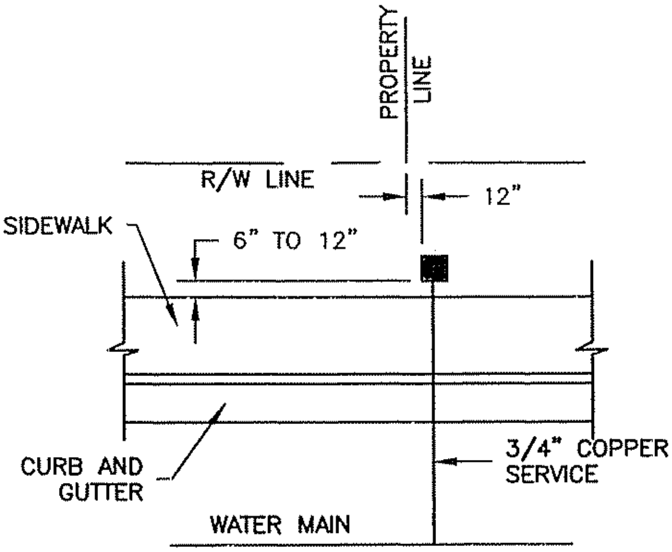
BOTTOM MOUNTING FRAME

CABINET DIMENSIONS			
UNIT SIZE	L	W	H
3" & 4"	78"	24"	48"
6"	96"	24"	60"
8"	108"	30"	60"

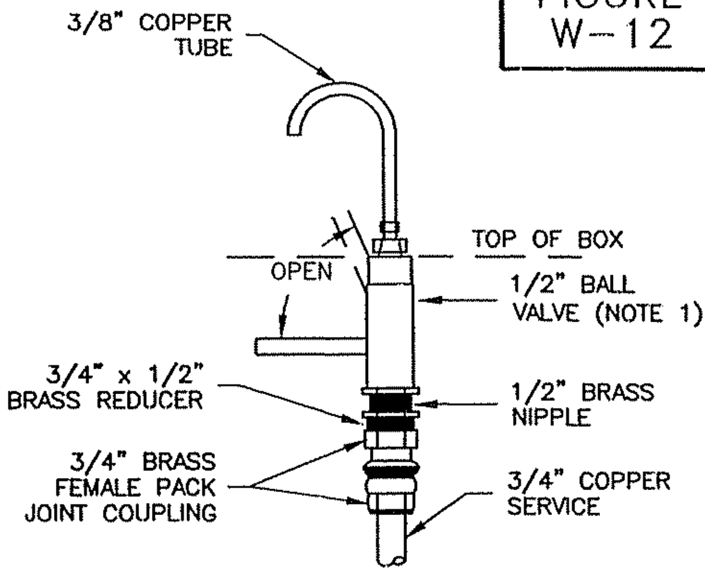


SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK / DATE / REVISION	APPROVED BY: William E. Lyman WILLIAM E. LYMAN	**BACKFLOW DEVICE ENCLOSURE (3" THROUGH 8")**

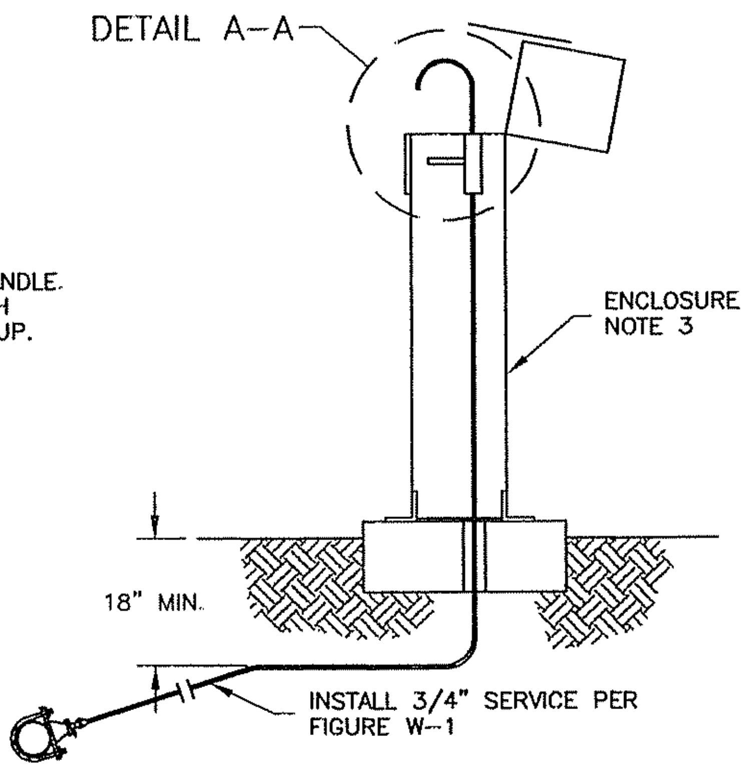
FIGURE W-12



LOCATION



DETAIL A-A



INSTALLATION DETAIL

NOTES:

1. BALL VALVE SHALL BE 1/2" APOLLO 600 W.O.G. (70-102-01), OR EQUAL, WITH HANDLE. TOP OF VALVE SHALL BE INSTALLED FLUSH WITH TOP OF BOX. HANDLE SHALL OPEN UP.
2. ALL PIPE FITTINGS TO BE BRASS.
3. FOR BACTERIOLOGICAL STATION ENCLOSURE AND CONCRETE PAD SEE FIGURE W-14.
4. ALL ABOVE GRADE PIPING SHALL BE WRAPPED WTIH ADEQUATE INSULATION TO PREVENT FREEZING. METHOD TO HAVE PRIOR APPROVAL OF THE COUNTY.

NOTICE:

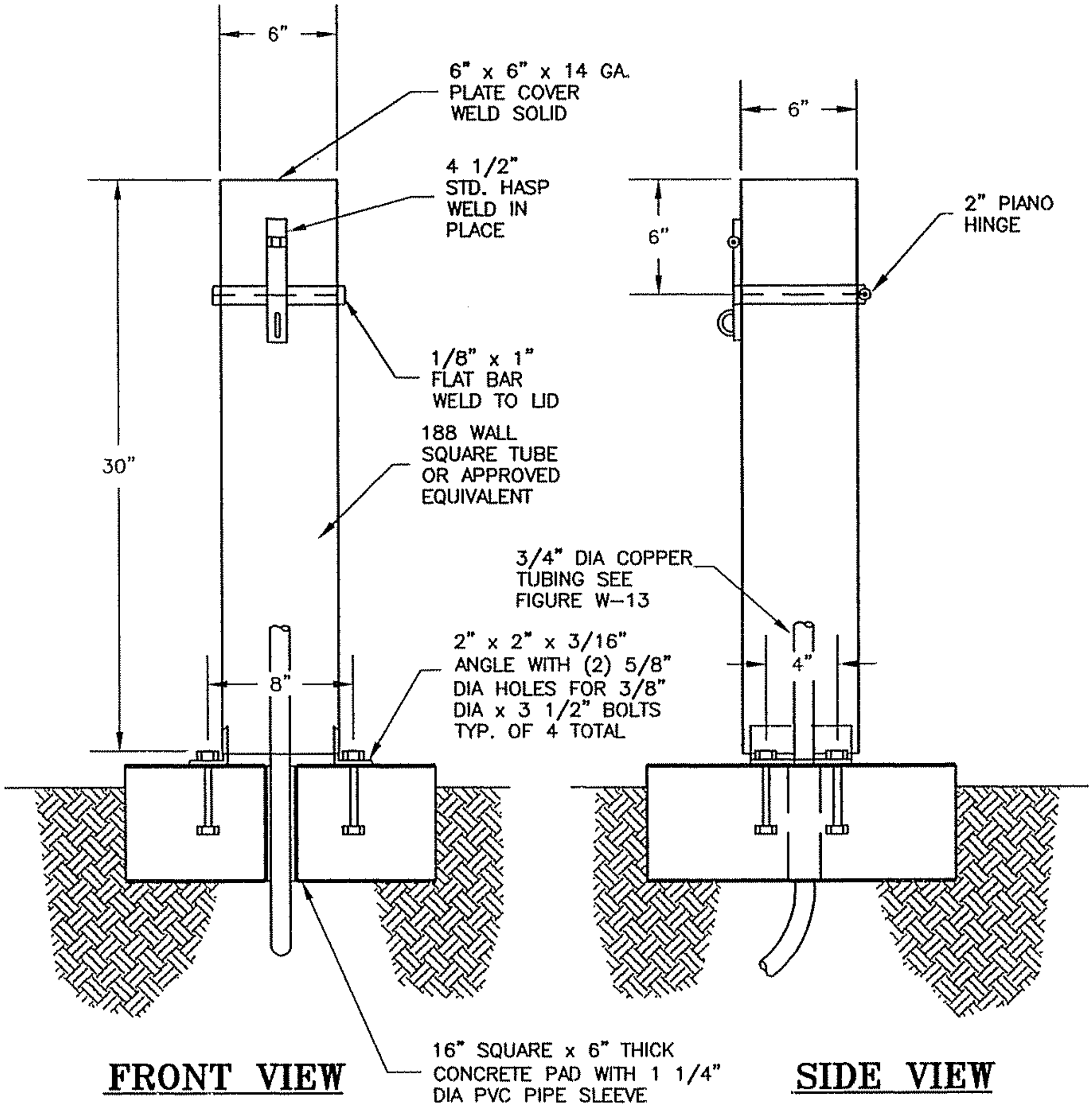
FIXED BACTERIOLOGICAL SAMPLING STATIONS ARE REQUIRED BY "CALIFORNIA WATERWORKS STANDARDS, TITLE 22." THE ESTABLISHMENT OF REPRESENTATIVE SAMPLE POINTS IS ESSENTIAL TO ASSURE THAT THE SAMPLING RESULTS FOUND ARE GIVING A TRUE INDICATION OF THE BACTERIOLOGICAL QUALITY OF THE WATER SUPPLIED THROUGHOUT THE DISTRIBUTION SYSTEM. BACTERIOLOGICAL SAMPLE STATIONS ARE REQUIRED AND SHALL BE INSTALLED IN NEW SUBDIVISIONS AT LOCATIONS AS DETERMINED BY THE COUNTY.

SCALE:	NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: William E. Lyman	BACTERIOLOGICAL SAMPLE STATION INSTALLATION
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE
W-13

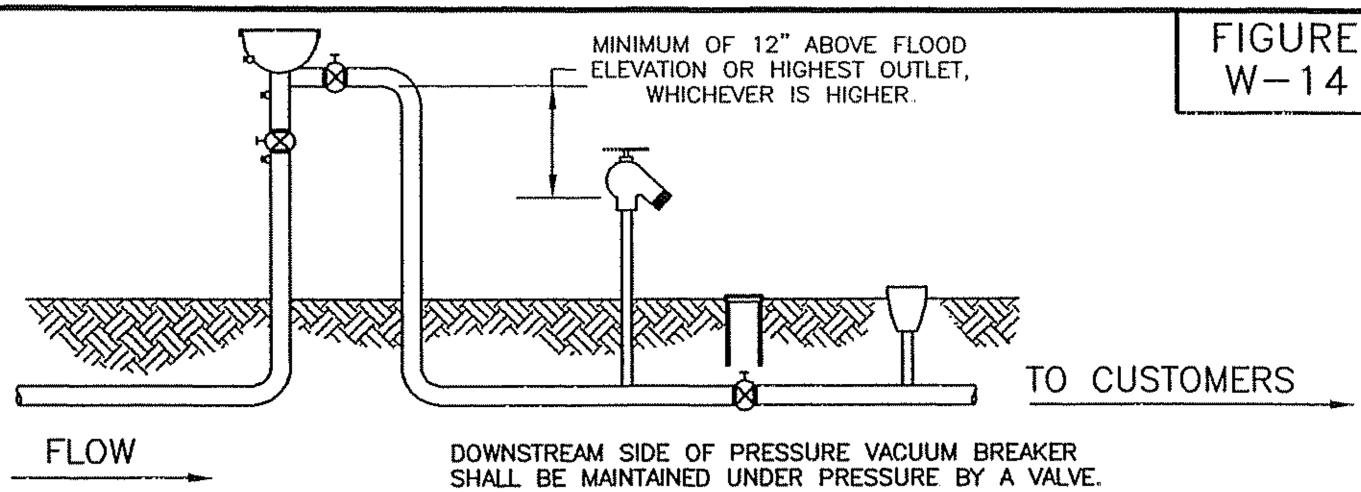
NOTES:

1. ALL EXPOSED STEEL SURFACES SHALL BE OLIVE GREEN POWDER COAT PAINT.
2. CONCRETE TO BE CLASS 500-C-2500
3. ALL BOLTS AND NUTS TO BE GALVANIZED.



SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK / DATE / REVISION	APPROVED BY: William E. Lyman WILLIAM E. LYMAN	BACTERIOLOGICAL SAMPLE STATION ENCLOSURE

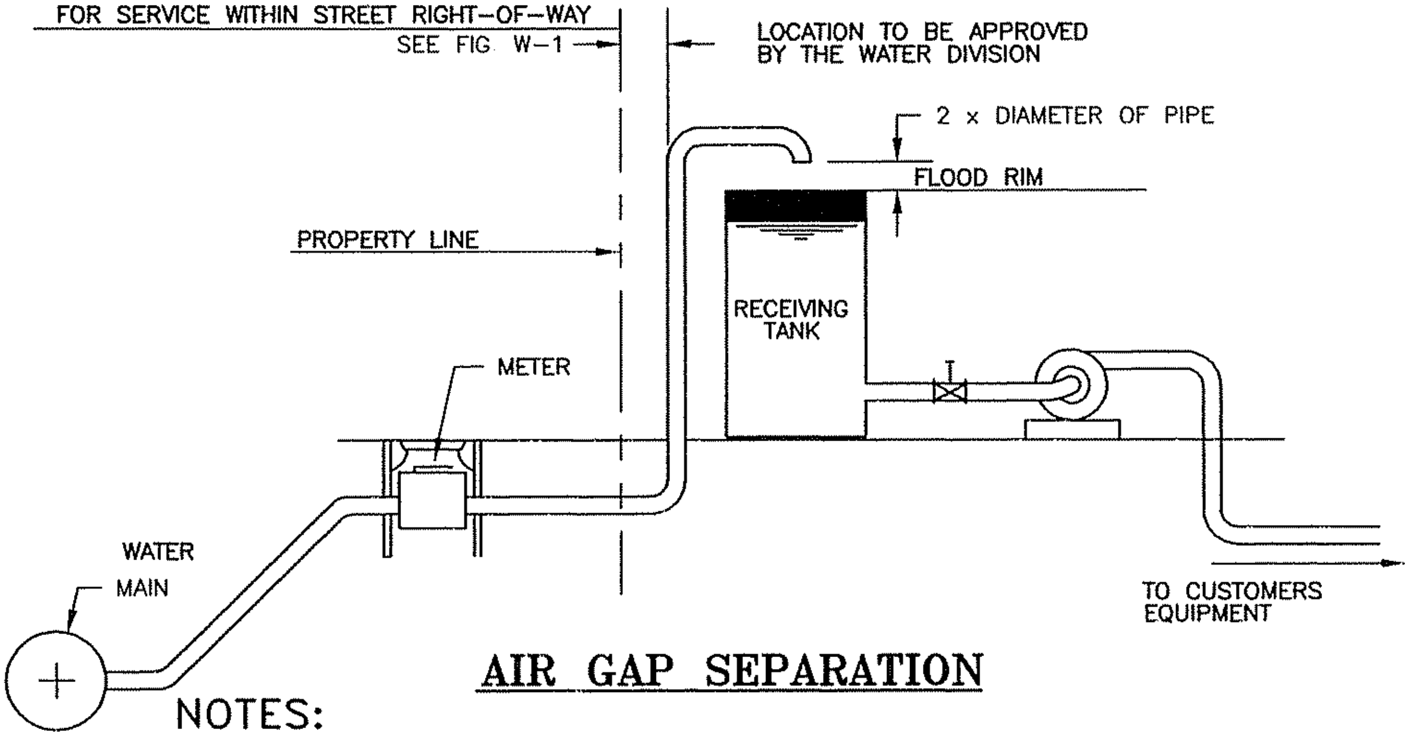
FIGURE W-14



DOWNSTREAM SIDE OF PRESSURE VACUUM BREAKER SHALL BE MAINTAINED UNDER PRESSURE BY A VALVE. THERE SHALL BE NO MEANS OF IMPOSING PRESSURE BY PUMP OR OTHER MEANS.

NOTE:
ONLY ASSEMBLIES TESTED AND CERTIFIED BY AN ACCEPTABLE LABORATORY AND APPROVED FOR USE BY THE CALIFORNIA DEPARTMENT OF HEALTH SERVICES SHALL BE INSTALLED.

PRESSURE VACUUM BREAKER



AIR GAP SEPARATION

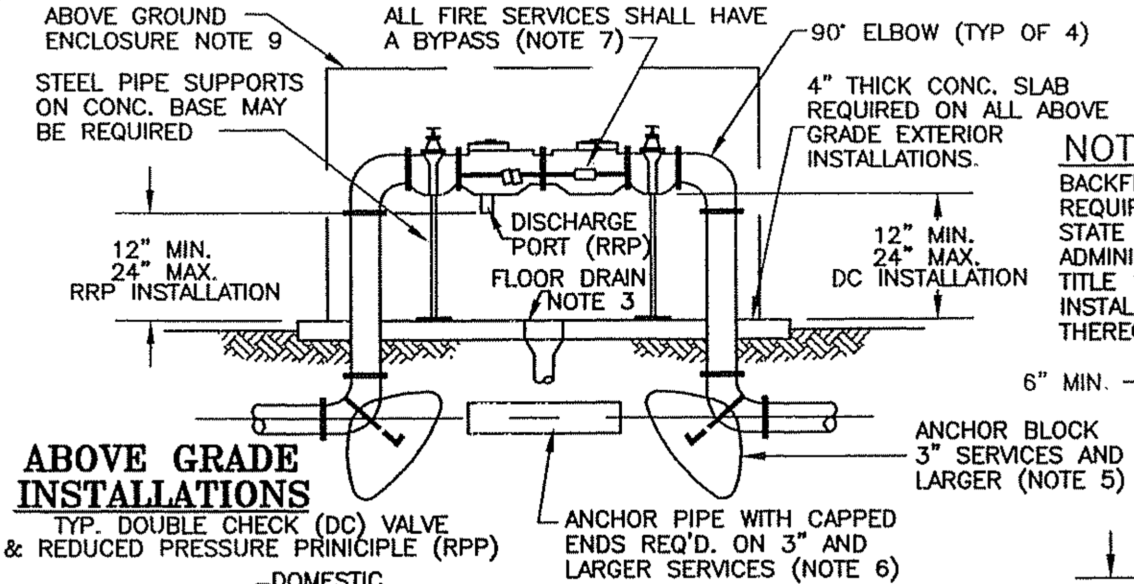
NOTES:

1. RECEIVING TANK SHALL BE LOCATED AS CLOSE TO PROPERTY AS PRACTICAL.
2. NO CONNECTIONS OR TEES SHALL BE ALLOWED IN SERVICE LINE BETWEEN METER AND RECEIVING TANK.
3. FOR INSTALLATION OF WATER SERVICE AND METER SEE FIGURE W-1

NOTE
BACKFLOW CONTROL DEVICES ARE REQUIRED UNDER STATE OF CALIFORNIA ADMINISTRATIVE CODE, TITLE 17, AND SHALL BE INSTALLED IN ACCORDANCE THEREOF.

SCALE: NTS	DATE: MAY 1996		SHASTA COUNTY SERVICE AREAS	
			APPROVED BY: William E. Lyman	AIR GAP SEPARATION
MARK	DATE	REVISION	WILLIAM E. LYMAN	

FIGURE W-15

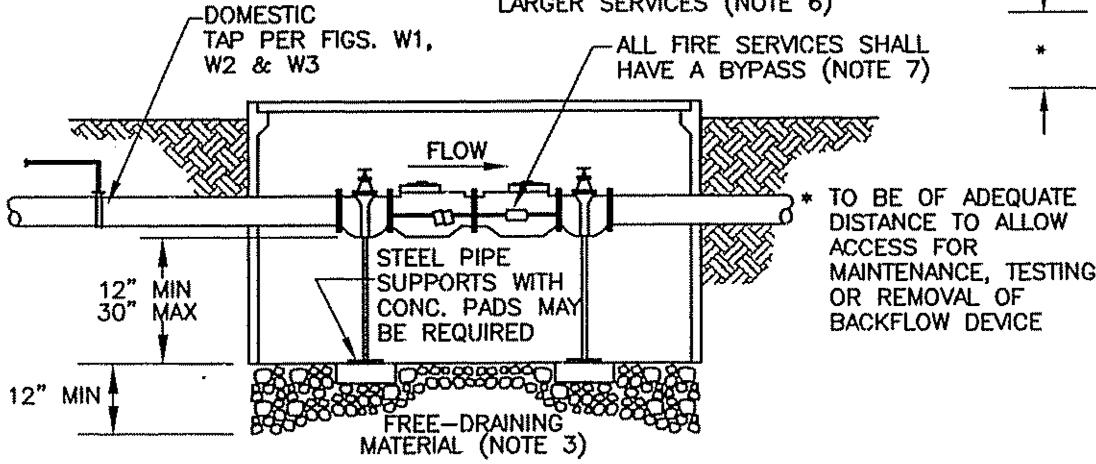


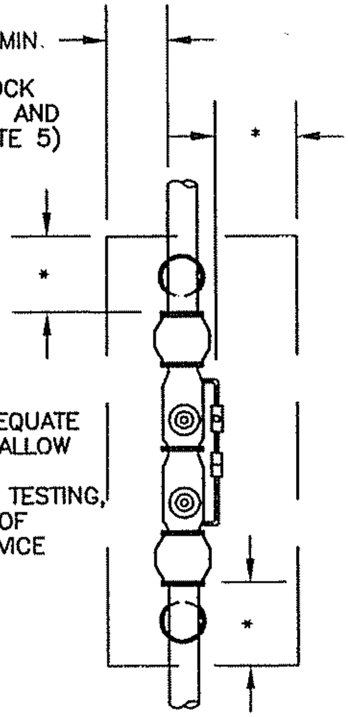
ABOVE GRADE INSTALLATIONS

TYP. DOUBLE CHECK (DC) VALVE & REDUCED PRESSURE PRINICIPLE (RPP)

NOTICE:

BACKFLOW DEVICES ARE REQUIRED UNDER THE STATE OF CALIFORNIA ADMINISTRATION CODE, TITLE 17, AND SHALL BE INSTALLED IN ACCORDANCE THEREOF.





* TO BE OF ADEQUATE DISTANCE TO ALLOW ACCESS FOR MAINTENANCE, TESTING, OR REMOVAL OF BACKFLOW DEVICE

BELOW GRADE INSTALLATIONS

TYP. DOUBLE CHECK VALVE (DC) ONLY

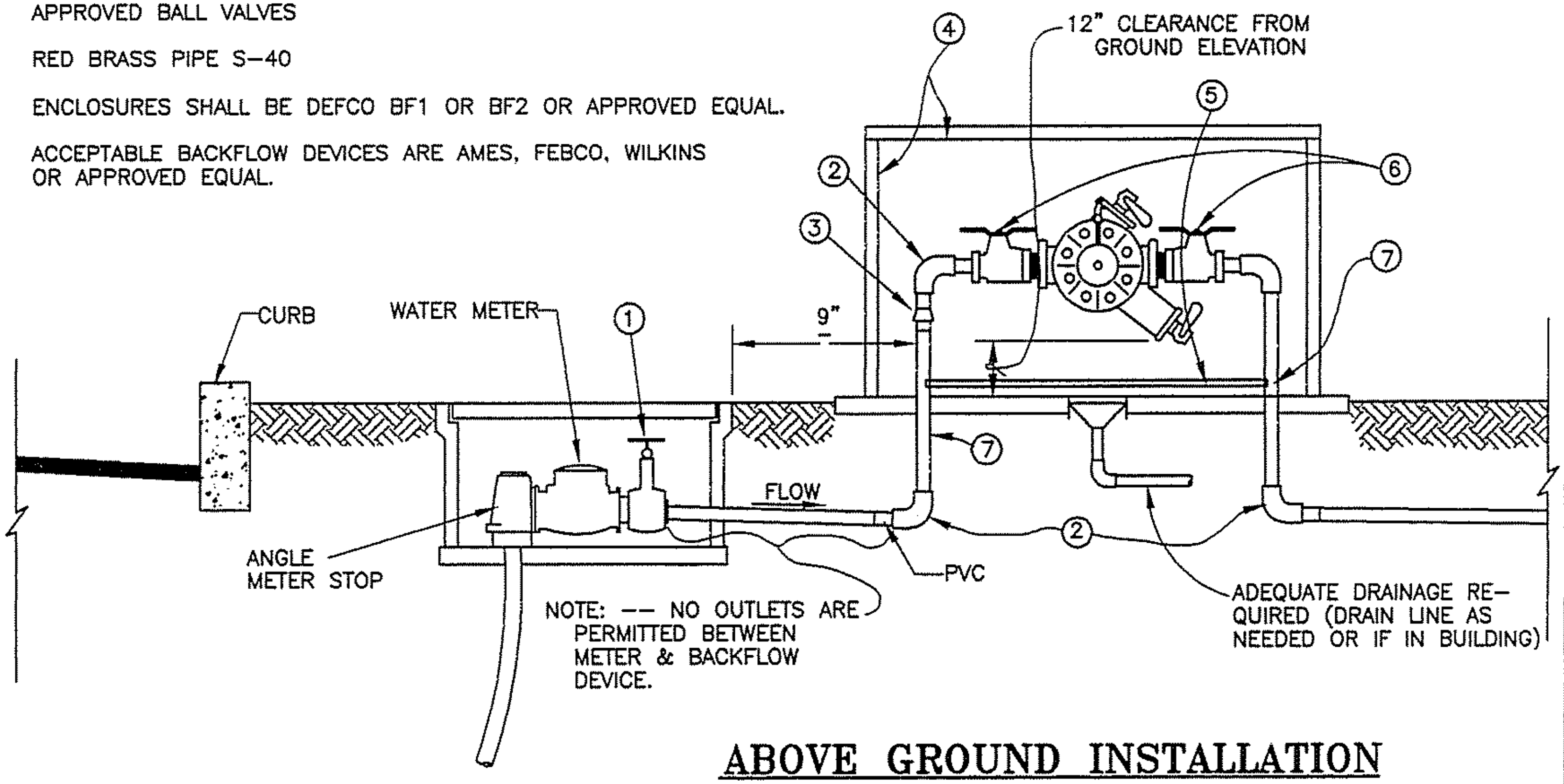
NOTE:

1. ALL CONSTRUCTION AND ALL MATERIALS USED SHALL BE IN ACCORDANCE WITH THE SHASTA COUNTY DEVELOPMENT STANDARDS AND THE SPECIFICATION FOR PUBLIC WORKS CONSTRUCTION. (GREEN BOOK - LATEST EDITION)
2. ALL ABOVE GROUND PIPING INSTALLATIONS, 3/4" THROUGH 2", SHALL BE COPPER OR BRASS AND ALL 3" AND LARGER SHALL BE DUCTILE IRON PIPE WITH FLANGED FITTINGS.
3. WHEN VALVES ARE INSTALLED WITHIN THE CONFINES OF A BUILDING (SPECIAL CASE), ENCLOSURE OR VAULT, ADEQUATE DRAINAGE SHALL BE PROVIDED.
4. A REDUCED PRESSURE PRINICIPLE DEVICE (RPP) MAY BE REQUIRED DEPENDING ON THE APPLICATION. RRP TO BE INSTALLED ABOVE GRADE ONLY.
5. ALL THRUST BLOCKS OR ANCHORS TO BE DESIGNED ON AN INDIVIDUAL BASIS. (SEE FIG. W-5)
6. APPLICANT SHALL HAVE THE OPTION OF DESIGNING AND CONSTRUCTING CONCRETE ANCHORS AS SHOWN OR PLACING A CONTINUOUS CONCRETE BLOCK BETWEEN ELBOWS. IF SOIL IS UNDISTURBED. CONTRACTOR MAY OMIT BRACE WITH PRIOR COUNTY APPROVAL.
7. BYPASS LINES ARE REQUIRED ON ALL FIRE SERVICES WHERE DOUBLE CHECK OF RPP VALVE IS INSTALLED. BYPASS SHALL HAVE A DETECTOR METER AND DOUBLE CHECK OR RRP VALVE. DOMESTIC TAPS ARE PERMITTED ON THE STREET SIDE OF THE BACKFLOW DEVICE ONLY. BACK FLOW DEVICE SHALL BE LOCATED WITHIN COUNTY RIGHT-OF-WAY.
8. ALL STEEL BACKFLOW DEVICES SHALL BE FUSION BONDED EPOXY COATED INTERNALLY AND EXTERNALLY.
9. ABOVE GRADE ENCLOSURE INSTALLATIONS PER FIG. W-11 & W-12.
10. VALVES LARGER THAN 8" SHALL HAVE INDIVIDUALLY DESIGNED VAULTS AND SHALL HAVE APPROVAL OF THE COUNTY PRIOR TO FABRICATION.
11. ALL ABOVE GRADE PIPING AND VALVES SHALL BE WRAPPED WITH ADEQUATE INSULLATION TO PREVENT FREEZING. METHOD SHALL HAVE PRIOR APPROVAL OF THE COUNTY.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: *William E. Lyman* WILLIAM E. LYMAN	**DOUBLE CHECK VALVE AND REDUCED PRESSURE PRINICIPLE DEVICES**
MARK / DATE	REVISION		

MATERIAL LIST

1. CUSTOMER SERVICE GATE VALVE.
2. 90° STD. ELBOW BRASS (S-40)
3. COUPLING MIP x COMP W/STAINLESS SET SCREW.
4. STEEL ENCLOSURE (SEE SPECIFICATIONS W-18 AND W-19).
5. REINFORCING BRACE PVC/GALVANIZED STEEL.
6. APPROVED BALL VALVES
7. RED BRASS PIPE S-40
8. ENCLOSURES SHALL BE DEFCO BF1 OR BF2 OR APPROVED EQUAL.
9. ACCEPTABLE BACKFLOW DEVICES ARE AMES, FEBCO, WILKINS OR APPROVED EQUAL.



ABOVE GROUND INSTALLATION

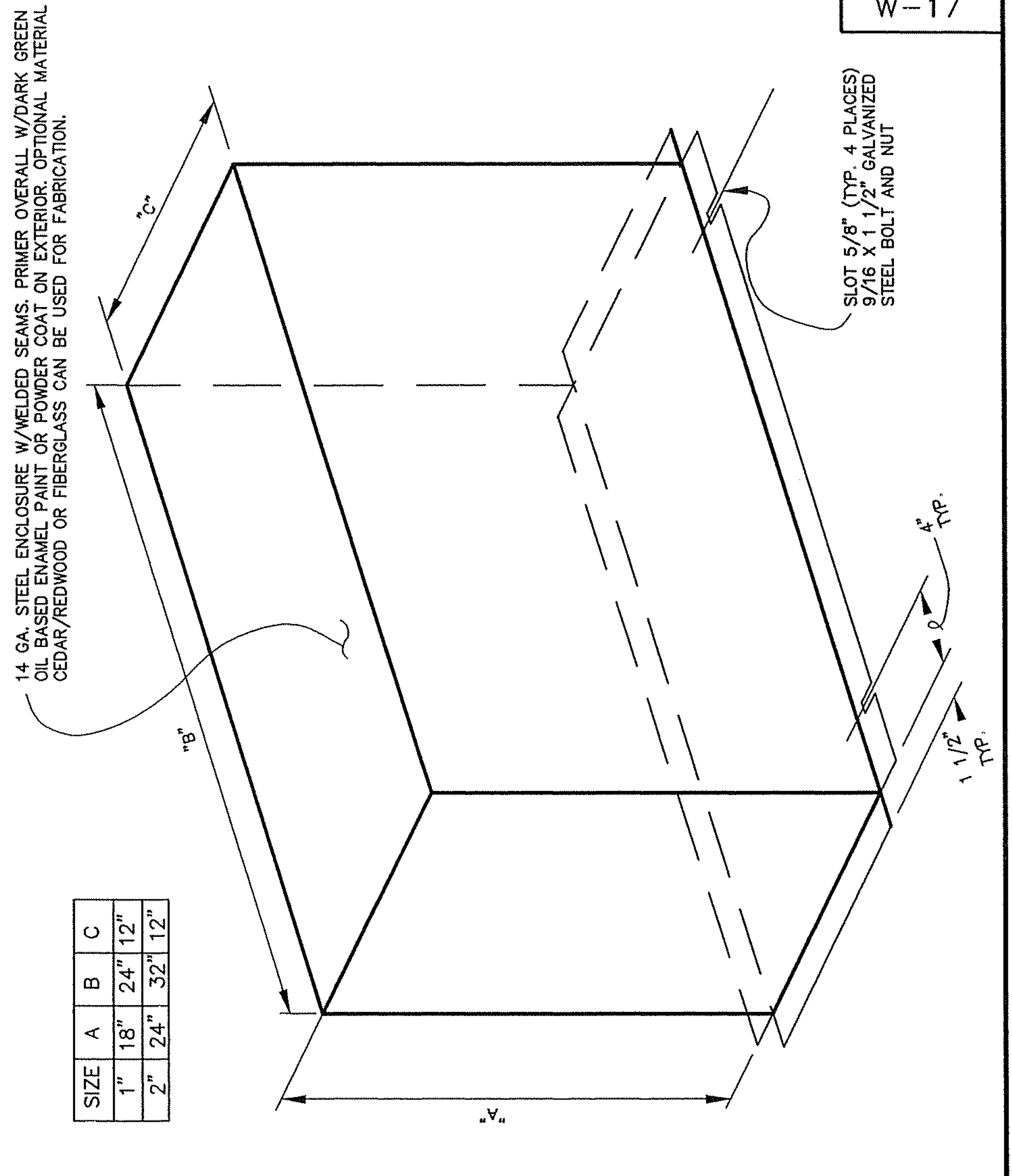
NTS

FIGURE W-16

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK	DATE	REVISION
APPROVED BY: WILLIAM E. LYMAN		

REDUCED PRESSURE PRINICIPLE DEVICES (3/4" - 2")

FIGURE W-17



SIZE	A	B	C
1"	18"	24"	12"
2"	24"	32"	12"

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •

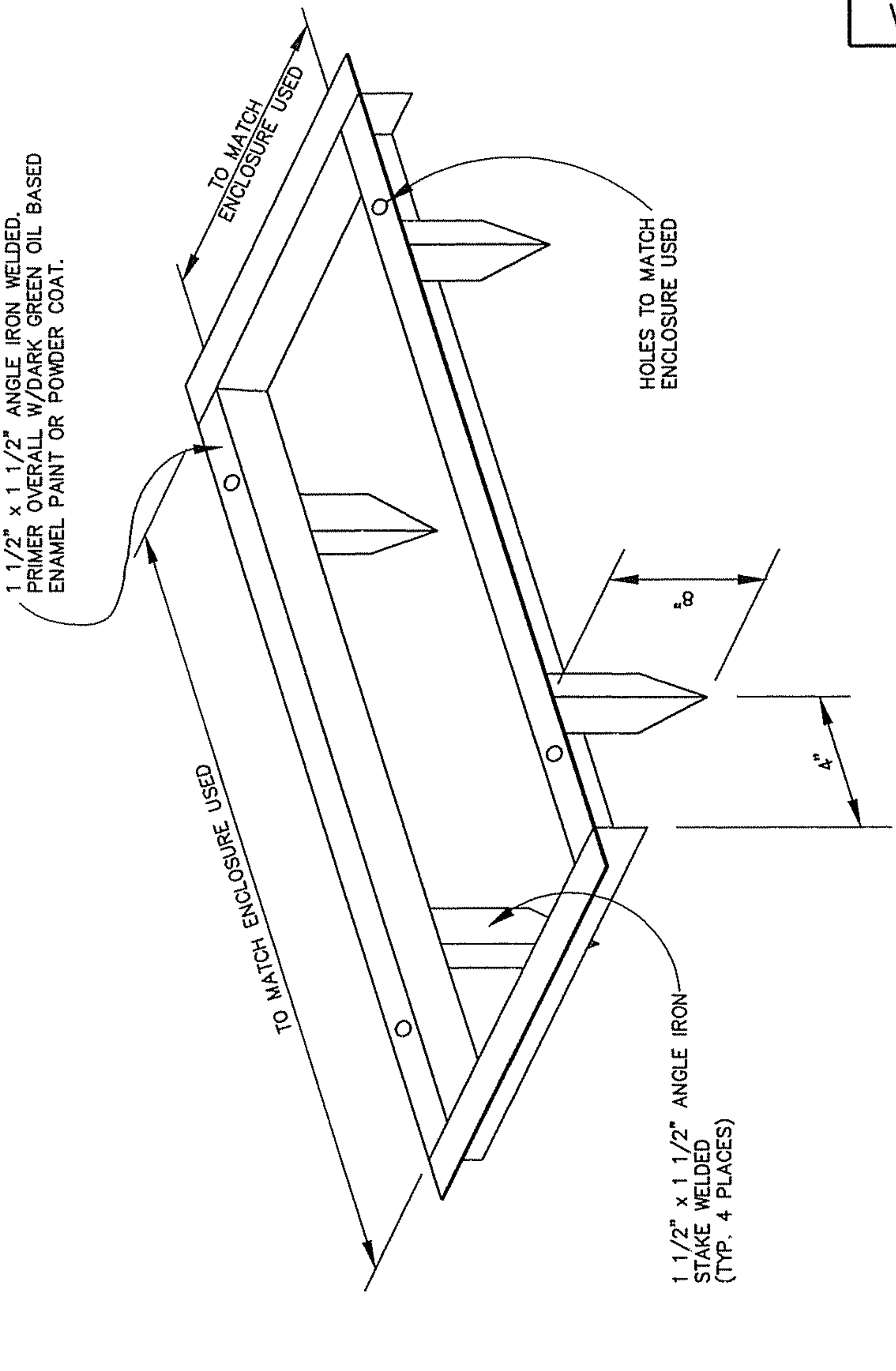
APPROVED BY:

WILLIAM E. LYMAN

MARK | DATE | REVISION

STEEL ENCLOSURE FOR 3/4" –2" REDUCED PRESSURE PRINCIPLE DEVICE

FIGURE W-18



SCALE: NTS		DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
			APPROVED BY: WILLIAM E. LYMAN	**ENCLOSURE SUBFRAME FOR 3/4" – 2" REDUCED PRESSURE PRINICIPLE DEVICE**
MARK	DATE	REVISION		

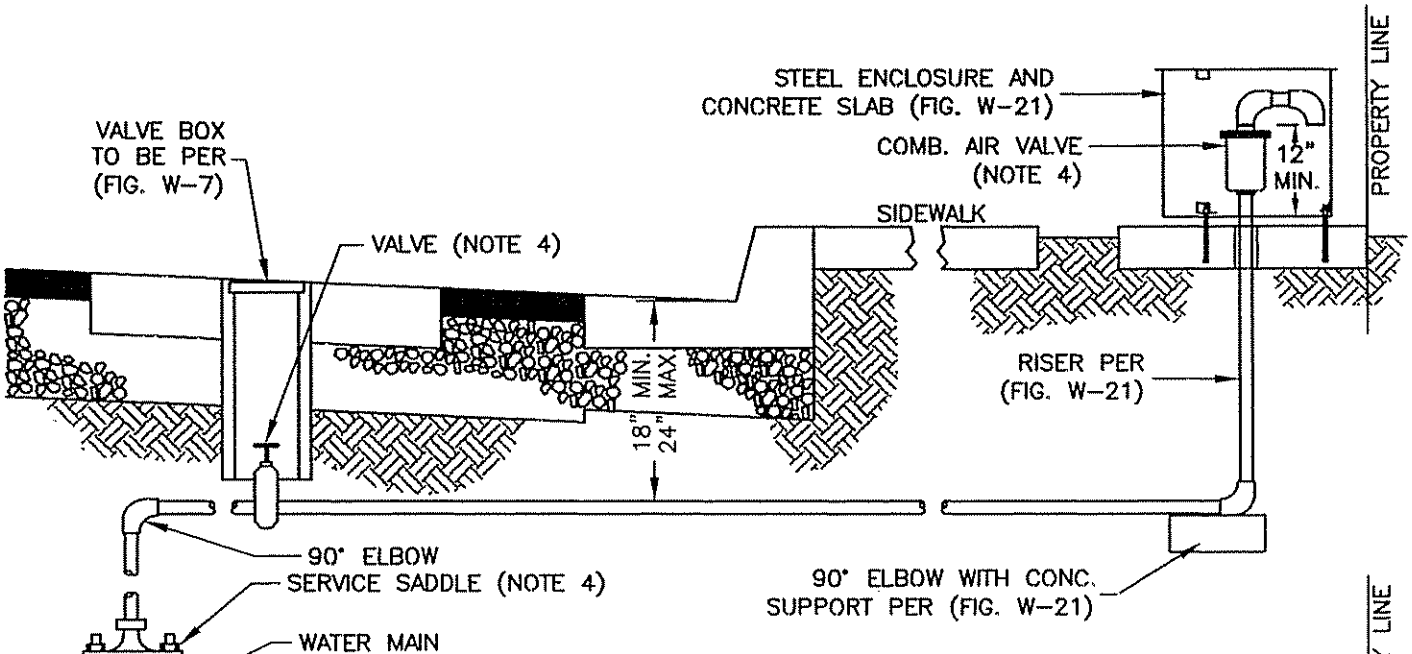
FIGURE W-19

NOTES:

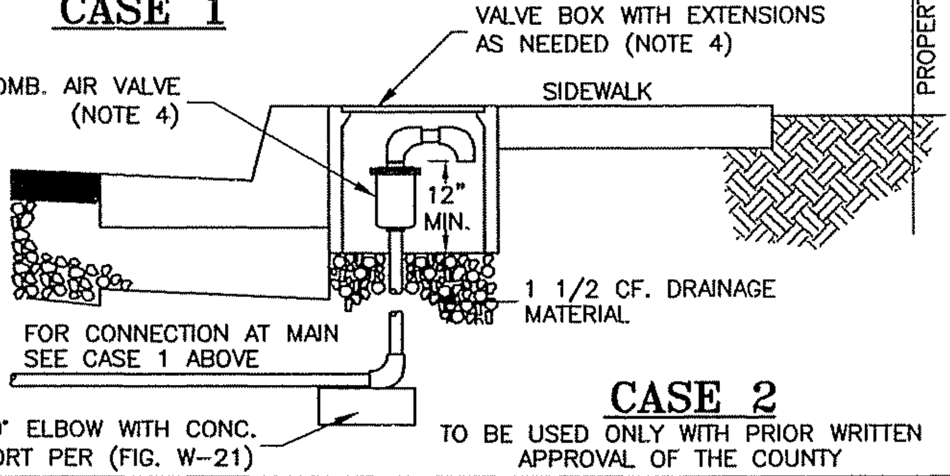
1. CALIFORNIA WATERWORKS STANDARDS, TITLE 22, FOR AIR AND VACUUM RELIEF VALVES STATES THE FOLLOWING:

   (A) VENT OPENINGS FOR AIR AND VACUUM RELIEF AND AIR RELEASE VALVES SHALL BE
      (1) EXTENDED AT LEAST (1) ONE FOOT (0.3m) ABOVE GRADE AND ABOVE MAXIMUM RECORDED HIGH WATER LEVEL. (CASE 1)
      (2) DOWNWARD FACING AND SCREENED.

   (B) WHERE THE REQUIREMENTS OF (A)(1) CANNOT BE PRACTICABLY MET, VENT OPENINGS MAY BE LOCATED IN A SUBSURFACE CHAMBER OR PIT (CASE 2) UNDER THE FOLLOWING CONDITIONS:
      (1) PIT IS ADEQUATELY DRAINED. (METHOD TO BE APPROVED BY THE COUNTY).
      (2) THE PIT DRAIN IS NOT CONNECTED BY PIPE OR OTHER CLOSED CONDUIT TO A SEWER OR STORM DRAIN WITHOUT AN AIR SEPARATION.
2. PIPE AND FITTINGS PER THESE CSA STANDARDS.
3. IN THE CASE OF PRESSURE (HOT) TAP, A CORPORATION STOP SHALL BE INSTALLED.
4. ALL VALVES, VALVE BOXES, COMBINATION AIR VALVES, CORPORATION STOPS, AND SADDLES SHALL BE PER THESE CSA STANDARDS.
5. THE MINIMUM ACCEPTABLE SIZE COMBINATION AIR VALVE SHALL BE 2 INCH. SIZE OF CAV SHALL BE ENGINEERED TO MANUFACTURERS SPECIFICATIONS.



CASE 1



CASE 2

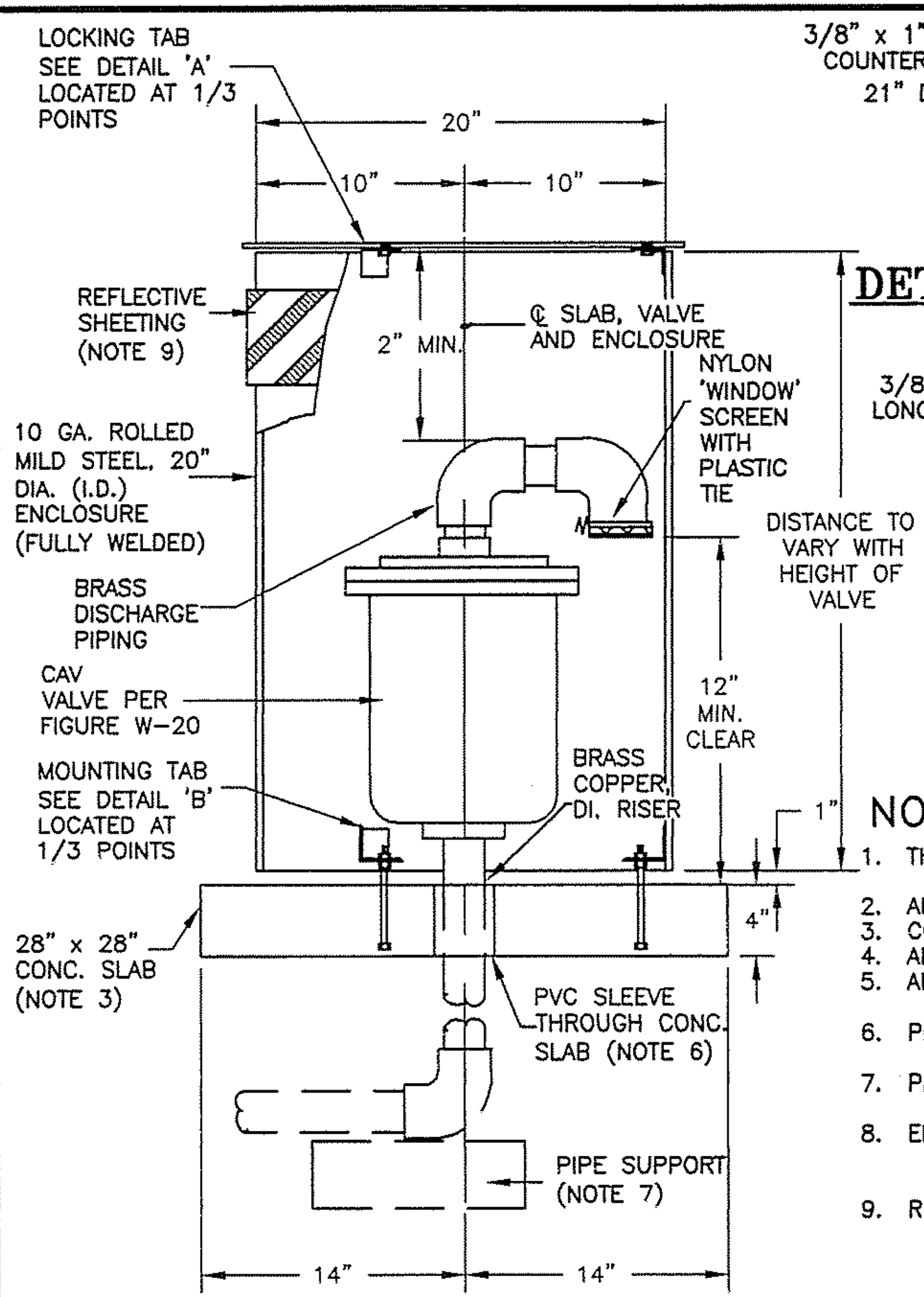
TO BE USED ONLY WITH PRIOR WRITTEN APPROVAL OF THE COUNTY

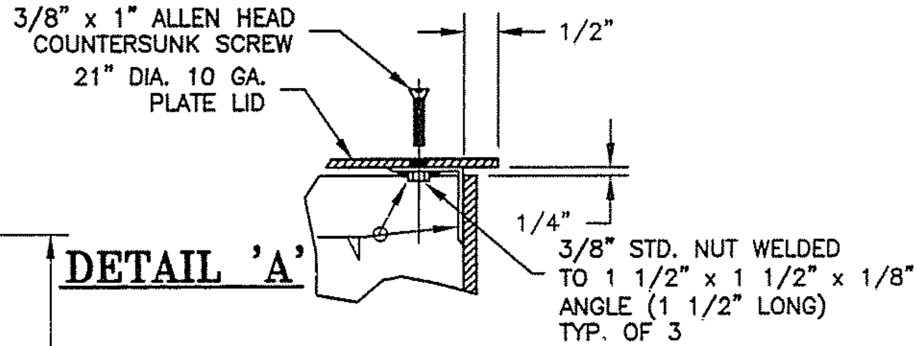
NOTICE:

COMBINATION AIR VALVE (CAV) SHALL BE INSTALLED ON ALL PIPELINE HIGH POINTS AND IN CHANGE IN GRADE WHERE AIR POCKETS MAY ACCUMULATE. A CAV SHALL BE INSTALLED ON HIGH POINTS AND AT INTERVALS OF 1500 TO 2000 FT ON LONG RUNS LACKING A CLEARLY DEFINED HIGH POINT.

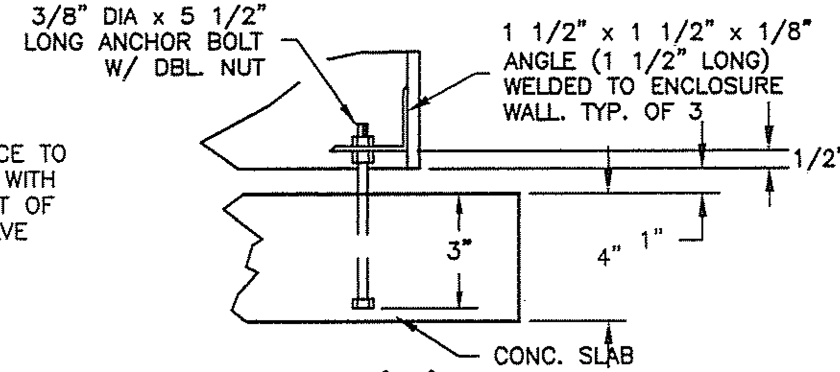
SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •	
		APPROVED BY: WILLIAM E. LYMAN	COMBINATION AIR VALVE (CAV) AIR AND VACUUM – AIR RELEASE
MARK / DATE	REVISION		

FIGURE W-20





DETAIL 'A'



DETAIL 'B'

NOTES:

1. THIS STANDARD DRAWING TO BE USED IN CONJUNCTION WITH FIGURE W-20 OR AS SPECIFIED BY THE ENGINEER.
2. ALL SERVICES PER THESE CSA STANDARDS
3. CONCRETE TO BE CLASS 500-C-2500
4. ALL BOLTS, NUTS, ETC. TO BE GALVANIZED.
5. ALL METAL SURFACES, NOT GALVANIZED TO BE PAINTED WITH OLIVE GREEN POWDER COAT PAINT.
6. PLACE P.V.C. PIPE SLEEVE THROUGH SLAB. PIPE TO BE 1/2" LARGER THAN RISER.
7. PROVIDE CONCRETE SUPPORT OF ADEQUATE SIZE TO SUPPORT WEIGHT OF AIR VALVE.
8. ENCLOSURE DESIGN FOR 2", 3" & 4" VALVES. FOR 6" OR 8" VALVES, ENCLOSURE MUST BE ENLARGED TO ACCOMODATE LARGER VALVES.
9. REFLECTIVE SHEETING SHALL BE INSTALLED AT TOP OF EXTERIOR SIDEWALL. WRAP SHEETING 360° AROUND ENCLOSURE. REFLECTIVE SHEETING SHALL BE 3M SCOTCHLITE (HIGH INTENSITY) NO. 3820 4"(384L) OR APPROVED EQUAL.
10. ALL ABOVE GRADE PIPING AND CAV SHALL BE WRAPPED WITH ADEQUATE PIPE INSULATION TO PREVENT FREEZING. METHOD TO HAVE PRIOR APPROVAL OF THE COUNTY.

SCALE: NTS	DATE: JUNE 1996	• SHASTA COUNTY SERVICE AREAS •
MARK	DATE	REVISION
APPROVED BY: WILLIAM E. LYMAN		

COMBINATION AIR VALVE (CAV)
ENCLOSURE DETAIL

GENERAL PROCEDURES FOR
FORMATION OF A
COUNTY SERVICE AREA (CSA)
FOR EXISTING FACILITIES

1. Proponents submit a petition to the Board of Supervisors requesting formation of the CSA, identifying its boundaries and describing the service to be provided. (Petition must include signatures of more than 10% of the registered voters I the area to be served.)

2. The Board of Supervisors refers to the request to the Department of Public Works for processing.

3. For existing systems, proponents shall submit a report prepared by an engineering firm experienced in the design, operation and maintenance of the type of system being requested for annexation, which includes a comprehensive analysis of the system with respect to the following:

   A. An operational analysis of the facilities regarding the current and future usage demands; i.e. flows, pressure treatment facilities, and storage capacity, including improvement cost required to meet those demands, if necessary.

   B. An analysis of the current status of the facility regarding all federal, state and local standards and regulations including costs to bring the facility up to those standards, if necessary.

   C. An analysis of probable major maintenance and capital improvement costs which will be required in the next 10 years.

   D. A report of the current valuation of the infrastructure, including a discussion of all permits, rights of way, water rights, easements, debts, fees, existing contracts and other legal or regulatory requirements which exist or will be required to operate the system.

   E. A financial plan which will insure the fiscal integrity of the system for the next 10 years. Said plan to include all capital improvements, maintenance, monitoring, regulatory fees, and administration costs, etc. necessary for the County to operate the system.

4. Proponents shall submit with the report a deposit in an amount, as determined by the Department of Public Works, sufficient to cover the cost of analysis and review of the report by the County or its consultant.

5. Once determined to be feasible, an application is made to the Local Agency Formation Commission (LAFCO). The Department of Public Works staff prepares CEQA documents and LAFCO becomes the Lead Agency. Proponents of the CSA must pay all LAFCO processing fees at this time.

6. LAFCO conducts a public hearing and a decision approving, conditionally approving, or disapproving the proposal is made by LAFCO.

7. If the proposal is approved, the Department of Public Works staff prepares a resolution of intention for the formation of the CSA for submission to the Board of Supervisors. This resolution will set the date for a public hearing at which time the Board of Supervisors will consider the formation of the CSA.

8. At the public hearing the Board of Supervisors may adopt a resolution ordering formation of the CSA, unless protests are received by more than 50% of the registered voters or owners of property valued at more than 50% of the value of all the property in the proposed CSA.

9. If the Board of Supervisors orders the formation of the CSA, LAFCO files a Certificate of Completion in the County Recorder's office and submits copies of the recorded documents to the State Board of Equalization. Fees for the Board of Equalization are paid by the proponents.

10. Following formation of the CSA, the Department of Public Works staff is assigned responsibility for managing the affairs of the newly formed district.

GENERAL PROCEDURES FOR
FORMATION OF A
COUNTY SERVICE AREA (CSA)
FOR A DEVELOPMENT PROJECT

1. When an application for a subdivision or other development project is submitted to the Department of Resource Management's Planning Division, and the project involves a community water system, sewage disposal system or other service which is likely to require a county service area for operation and maintenance, the proponent shall submit with the application a separate deposit in an amount, as determined by the Department of Public Works, sufficient to cover the cost of analysis and review of the proposed system by the County or its consultant.

2. Proponents shall submit a report prepared by an engineering firm experienced in the design, operation and maintenance of the type of system proposed, which includes a comprehensive analysis of the system with respect to the following:

   A. An analysis of probable major maintenance and capital improvement costs which will be required in the next 10 years.

   B. A discussion of all permits, right of ways, water rights, easements debts, fees, existing contracts and other legal or regulatory requirements which exist or will be required to operate the system.

   C. A financial plan which will insure the fiscal integrity of the system for the next years. Said plan to include all capital improvements, maintenance, monitoring, regulatory fees, and administration costs, etc. necessary for the County to operate the system.

3. The Department of Public Works staff will collect background data, financial details and comments from affected agencies.

4. Once the tentative map has been approved, an application is made to the Local Agency Formation Commission (LAFCO). The Department of Public Works staff prepares CEQA documents and becomes the Lead Agency. Proponents of the CSA must pay all LAFCO processing fees at this time.

5. LAFCO conducts a public hearing and a decision approving, conditionally approving, or disapproving the proposal is made by LAFCO.

6. If the proposal is approved, the Department of Public Works staff prepares a resolution of intention for the formation of the CSA for submission to the Board of Supervisors. This resolution will set the date for a public hearing at which time the Board of Supervisors will consider the formation of the CSA. This hearing will normally be held concurrently with approval of the final map or final approval of the development.

7. At the public hearing the Board of Supervisors may adopt a resolution ordering formation of the CSA, unless protests are received by more than 50% of the registered voters or owners of property valued at more than 50% of the value of all the property in the proposed CSA.

8. If the Board of Supervisors orders the formation of the CSA, LAFCO files a Certificate of Completion in the County Recorder's office and submits copies of the recorded documents to the State Board of Equalization. Fees for the Board of Equalization are paid by the proponents.

9. Following formation of the CSA, the Department of Public Works staff is assigned responsibility for managing the affairs of the newly formed district.