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CHAPTER 1: GENERAL PROVISIONS

1.1 GENERAL:

The purpose of these improvement standards is to establish minimum design standards for the construction of improvements in the public rights-of-way and residential development.

These Standards include the specifications and plates as contained herein. All work done in the area of the District that is subject to the approval of the District General Manager and/or are to be dedicated to the District for maintenance, shall conform to these Standards. Any variances and exceptions to these standards shall be reviewed and approved by the District Engineer.

In addition to these standards, the licensed Civil Engineer preparing the improvement plans is encouraged to use generally accepted engineering practices.

The District General Manager, or his/her appointee (Engineer), shall be the final authority on all questions which may arise as to the interpretation of these Standards. The Engineer's decision shall be final, and they shall have authority to enforce and make effective such decisions.

A copy of the latest version of Standards may be downloaded at the Copper Valley Community Service District web site: www.coppervalleycsd.org While there may be more than one version of the Standards available on the web site, the most recent version of Standards will be enforced by the District.

Work requiring plans prepared by a registered engineer such as public improvements for subdivisions, parcel maps, planned developments, building permits, etc. shall conform to these Standards.

Work not requiring plans prepared by a registered engineer shall conform to these Standards, and it shall be the responsibility of the developer to determine the requirements.

Work shall conform to Calaveras County's Grading Ordinance for permits and regulations for site grading.

1.2 DEFINITIONS:

The following definitions shall apply to these Standards:

Approved Plans: Improvement plans that have been reviewed and approved by the District and other agencies and signed by the Engineer.

Conditions and Specifications: Includes the Improvement Plans, the latest version of District Improvement Standards and References, all applicable laws, rules, regulations, ordinances, policies, resolutions, mitigation measures, development standards, zoning restrictions, and conditions of approval.

District: The Copper Valley Community Service District.

Design Engineer: A person, firm, or corporation legally registered to perform civil engineering in the State of California.

Developer: Subdivider, Developer, property owner, Utility, Registered Engineer or Contractor proposing to design work or do work in the District public rights-of-way or privately owned and maintained rights-of-way in which the District requires approval.

Engineer: District General Manager and/or authorized representative.

Engineer's Estimate: The list of estimated quantities of work items for the project and the estimated cost to perform the work. It shall be dated, signed and stamped by the Design Engineer and approved by the District.

Fire Chief: Chief of a fire protection district or Fire Warden.

Fire Inspector: The authorized representative of the Fire Chief assigned to inspect on-going construction projects in conformance to Federal, State, and Local fire codes.

Groundwater: Water that occurs beneath the land surface and fills the pore spaces of the alluvium, soil, or rock formation in which it is situated.

Groundwater Basin – An alluvial aquifer or a stacked series of alluvial aquifers with reasonably well-defined boundaries in a lateral direction and having a definable bottom.

Groundwater Elevation – The elevation to which water in a tightly cased well screened at a given location will rise. Other terms that may be used include groundwater level, hydraulic head, piezometric head, and potentiometric head.

Groundwater Surface – The highest elevation at which groundwater physically occurs in a given location in an aquifer (i.e., top of aquifer formation in a confined aquifer and the groundwater level or water table in an unconfined aquifer. Since groundwater elevation may vary by season, the 'seasonal high groundwater elevation' shall be used when determining the 10-foot minimum vertical separation distance between the basin bottom and the groundwater surface.

HDM: Highway Design Manual as published by Caltrans with CA amendments.

Inspector: Any person employed by the District under the authority of the Engineer to inspect on-going construction projects.

Laboratory: Any testing agency or testing firm which is acceptable to the Department.

Maintenance Period: The one-year period in which the developer shall maintain all improvements commencing on the date of the acceptance of improvements within the District right-of-way. This also applies to the applicants of other types of District's Encroachment Permits.

Plans: Improvement Plans prepared by the Developer for a specific project.

Record Drawings: An original set of plans showing the actual work as completed in the field, also known as "as-built" drawings, signed and stamped by the Registered Civil Engineer.

Special Provisions: Specific clauses setting forth conditions or requirements particular to the work and supplementary to the Standards as a part of the contract documents.

Specifications: Directions, provisions, and requirements contained in this manual. The specifications pertain to the method and manner of performing the work and the quality and quantity of materials involved.

Standards: These Improvement Standards of the District including the text and drawings contained in this manual.

State Standards: The current edition of the State of California Standard Specifications, the Standard Plans, the Highway Design Manual, the Manual of Uniform Traffic Control Devices, the California Manual of Uniform Traffic Control Devices, Construction Manual, and Materials Testing Manual.

Surveyor: A person, firm, corporation, partnership or agent thereof, legally licensed to perform land surveys in the State of California.

Utility: Public sewer, public storm drain, public water, irrigation districts, gas companies, power companies, water companies, telephone companies, television cable companies, community services districts, railroads and any company holding a franchise to occupy road right-of- way within the District.

1.3 PRIORITY OF WORK:

All **underground** utilities shall be constructed and accepted prior to surfacing of roads or rights-of-way. The Developer shall be responsible for planning, as necessary, with utility companies to ensure that the necessary underground utilities are constructed.

1.4 STAKING:

The Developer is responsible for providing all required construction staking. Additionally, a copy of the staking notes shall be submitted along with the as-builts.

1.5 INSPECTION:

The Inspector shall perform inspection of all work and materials furnished to ensure conformance with these Standards on the approved plans. The cost of all inspections shall be paid by the Developer.

The Developer shall request inspections a minimum of 48 hours in advance to permit scheduling of inspection by the Inspector.

All work not accepted by the Inspector shall be remedied, removed or replaced by the Developer. Any work done beyond that shown on the Plans approved by the Engineer may be ordered removed, by the Engineer or Inspector, at the Developer's expense.

Materials proposed for use and not specified herein shall be submitted for approval by the Engineer prior to ordering such material.

Underground work shall not be backfilled or covered until an inspection by the Inspector has been made and the work accepted. Any work that is backfilled or covered without inspection shall be uncovered, at Developer's expense, upon the request of the Inspector.

The Inspector shall always have access to the work and shall be furnished every reasonable facility for ascertaining that the work done, materials used, and workmanship performed are in accordance with the requirements and intentions of these Standards and the approved Plans and Specifications. Failure of the Inspector to note faulty material or workmanship during construction or on material submittals shall not relieve the Developer of the responsibility for correcting such

deficiencies at Developer's expense. The inspection of the work or materials shall not relieve the Developer of any obligations to fulfill the contract. Work or materials not meeting these Standards or approved Plans may be rejected.

Improvements that are to be relinquished to the District will be accepted for maintenance only after the Engineer receives written notice from all agencies (such as the sanitary sewer district, water district, fire district, irrigation district, environmental resources, planning, parks and recreations, and any other governmental agencies as may be required) stating that all pertinent work has been completed to their satisfaction and has been accepted for maintenance. The project will then be submitted to the Board for their approval.

1.6 CONCRETE:

Portland cement concrete, unless otherwise approved by the Engineer, shall be as defined in the State Standards. All mix design shall be approved by the Engineer prior to use.

1.7 DUST CONTROL:

Dust control shall be the responsibility of the Developer and shall be implemented in accordance with applicable federal, state, and local guidelines.

1.8 SURFACE RESTORATION:

Work in easement areas must be confined to the easement and the surface of the work area shall be restored to its original condition.

Written agreements must be made between the Developer and the property owners if work or equipment is outside the easement. The surface of the area outside the easement must be restored to the satisfaction of the property owner. Said agreements are the responsibility of the Developer.

In the case of paved areas, excavations, or trenches that leave less than six feet of existing surfacing, the remaining surface shall be removed, and the full section replaced in accordance with the design drawings and/or Standards.

Excavations in the shoulder area located within three feet of the edge of pavement shall be restored with a minimum of eight inches of aggregate base material.

Prior to paving, all uneven or loose edges shall be saw-cut in true and even lines parallel with the centerline of the work. See Section 3 for paving details.

1.9 CLEAN UP:

Developer/Contractor shall clean up the dirt and debris caused by the construction, including adjacent roads affected by his work. All sidewalks, curbs, approaches, crosswalks, existing and new drain inlets, lawns, etc., shall be kept free of excess dirt and rubbish and kept in a clean and neat condition. Public roads shall be cleaned daily, or as needed, with the minimum being once per day.

Before a final inspection of a project is requested, the following shall be completed:

- a. All the right-of-way, adjacent property, adjacent roads and alleys and all areas used by the Developer in connection with the project shall be cleared of all debris and excess material and left in a neat and presentable condition.
- b. All paved areas shall be free of dirt and dust.
- c. All concrete surfaces shall be free of excess concrete, paving materials, dirt and dust. All expansion joints shall be trimmed flush with the concrete.
- d. All old and new storm drain inlet bottoms and outlet pipes shall be free of all dirt and debris. Care shall be taken to keep sand and silt out of storm drains, catch basins, manholes or horizontal drains. Any storm drains, catch basins, manholes or horizontal drains affected by the work shall be cleaned by the Developer.
- e. All manhole bottoms shall be cleaned of all foreign matter and covers shall be raised to grade and have all excess asphalt removed.

The Developer shall not remove temporary warning, regulatory and guide signs prior to formal acceptance by the District. Such signs shall be removed as directed by the Engineer.

1.10 DESIGN EXCEPTIONS:

These Standards are intended to be minimum standards which apply to all new construction. Any design exceptions from these Standards are to be specifically approved in writing by the Engineer.

For in-fill construction projects, the Engineer may approve design exceptions, variations, and modifications from these Standards as necessary, due to conditions of, and the compatibility with, existing improvements adjacent to the construction.

1.11 GUARANTEE:

The Developer, Contractor, or utility shall inspect and repair all defects on his constructed improvements in the public right-of-way for a period of one year from the date the work is accepted as complete by the District.

1.12 MONUMENTS:

All existing road survey monuments within the area of construction shall be placed in monument wells and raised to grade or shall be surfaced with a minimum of three reference monuments established outside of the construction area. Except for "Government Corners", the monuments shall be 3/4-inch (inside diameter) x 24 inches in length and shall be galvanized iron pipe or approved equal.

- a. Road Monuments: Road survey monuments shall be 3/4 inch (inside diameter) by 24 inches long or approved equal. The Monument shall be tagged as per the requirements of the Land Surveyors Act. If set in a monument well, it shall be installed in conformance with the Road Monument Plate contained in these Standards. If surfaced, then a minimum of three fully referenced and monumented ties (azimuth and distance) shall be established for each monument and a corner record filed for each monument so set. It shall also be set as referenced in the Monument Guide Plate contained in these standards. Road monuments shall be set at each of the following locations:

- 1. Intersection of the road centerline;
- 2. Beginning and end of curves;
- 3. Any change of direction; and,
- 4. Any other points deemed necessary by the District Surveyor.

All work performed to meet these standards shall be constructed by Contractors holding a current valid license issued by the Contractors State License Board, Department of Professional and Vocational Standards, State of California. The Contractor must be licensed appropriately for the type of work to be performed.

1.13 FINANCIAL GUARANTEE:

The District shall require security for performance on projects without a Subdivision Improvement Agreement as follows:

Faithful Performance Security: Applicants shall provide the District with an acceptable irrevocable letter of credit, cash deposit, certificate of deposit, or other suitable financial guarantee acceptable to the District from a financial institution authorized to do business in the State of California, and such authorization shall be valid for one full year after the project is accepted by the District. The security shall be in the amount of 100% of the District approved engineer's estimate.

The purpose of the Faithful Performance Security is to provide protection to the District for any expenses it may incur as a result of:

- a. Failure by the Contractor to complete the installation.
- b. Necessary repairs caused by poor installation techniques.

- c. Necessary repairs caused by the installation of defective material.
- d. Failure by the Contractor to perform in accordance with the approved plans and specifications.
- e. Material liens against the District.

1.14 GUARANTEE OF WORKMANSHIP, MATERIALS AND EQUIPMENT:

The Applicant and/or Developer shall guarantee that the project installed by the Contractor be free from any and all defects in materials and workmanship for a period of one year after final acceptance by the District. This guarantee shall be based on the Design Engineer's approved construction cost estimate, or other amount determined by the District. The District may make any necessary repairs and charge the surety in the event the developer or contractor fails to correct the defects.

Contractors performing work for the applicant shall be competent with adequate manpower and equipment to accomplish the work in accordance with the approved plans and specifications and licensed in the State of California. A representative of the Applicant and the Contractor shall be present at the job site whenever work is being conducted by subcontractors.

CHAPTER 2: TEMPORARY TRAFFIC CONTROL AND SAFETY

2.1 GENERAL:

This Traffic Control and Safety Section is intended to establish general principles of safety and traffic control while in the performance of any work covered by these Standards.

No specification contained herein shall be deemed to create a legal standard of conduct or duty toward the public, nor shall it limit the District in the exercise of powers conferred by law in modifying the specification under special conditions.

The requirements of the latest edition of the State of California Department of Transportation, California Manual on Uniform Traffic Control Devices, herein referred to as the "CAMUTCD", shall take precedence over the requirements of this Safety Section.

2.2 TRAFFIC CONTROL:

The safe movement of traffic through construction areas depends upon communicating concise and proper information to the public by signs, channelizing devices, barricades, markings, lighting devices and control of traffic through work zones. All such devices necessary during construction shall be furnished by the Developer. The size, shape and color of such devices shall be as required by the CAMUTCD. No traffic control devices shall be altered or removed from the construction site without prior approval of the Engineer.

2.3 CONSTRUCTION SIGNS:

All signs shall conform to Chapter 2 (Signs) and Chapter 6 (Temporary Traffic Control Elements) of the latest edition of the CAMUTCD.

Signs used for night-time conditions shall be reflectorized or illuminated. The use of orange flags in conjunction with signs is permitted if they do not at any time interfere with a clear view of the sign face.

2.4 CHANNELIZING DEVICES:

The function of channelizing devices is to guide, and alert drivers of hazards created by construction or maintenance activities in or near the traveled way and to guide and direct drivers safely passed the hazards. Channelizing devices shall conform to Part 6 of the CAMUTCD.

Channelization devices should be uniformly positioned laterally and longitudinally relative to the line of traffic and they must be maintained in an erect position. Consideration must also be given to the necessity for stability against knock-down from wind or from the wash of passing traffic.

Channelization devices for night-time use shall be reflectorized to be visible from 500 feet under normal atmospheric conditions.

2.5 BARRICADES AND PORTABLE BARRIERS:

The function of barricades is to separate workers or motorists from objects or unusual situations created by construction or maintenance activities in or near the traveled way. All barricades shall conform to Part 6 of the CAMUTCD.

Barricades shall not be used unless they are needed to separate the motorist from objects of greater hazard than the barricades themselves. Barricades should never be used primarily for delineation but to help enhance safety. The use of non-standard types of barricades, such as drums, buckets, sandbags, etc., can be hazardous and their use is prohibited unless they are temporarily used for cushioning devices.

2.6 UNDERGROUND SERVICE ALERT (USA):

USA is a "One-call Notification Center" used for identifying underground facilities prior to digging. The Developer shall call USA at least 48 hours prior to the start of any excavation. Request for field meetings shall be included in the initial call to USA.

The Developer shall be responsible for the preservation of and any damage to, both private and public property in conformance with Section 7-1.11, Preservation of Property of the State Standards.

2.7 MAINTAINING VERTICAL AND HORIZONTAL CLEARANCES:

The Design Engineer shall ensure that their design complies with all vertical and horizontal clearance standards and are in conformance with the latest edition of the Highway Design Manual (HDM). Special attention shall be given to the vertical clearance remaining following any street overlays. Efforts should be made to avoid decreasing the existing vertical clearance whenever possible, and consideration should be given to the feasibility of increasing the vertical clearance even where it currently exceeds minimum standards. The engineering design analysis should also include consideration of other vertical clearances (existing and future) along the route, and available routing around any such reduced clearance structure. All projects, including new construction, shall meet the appropriate minimum clearance design standard for the type of facility, as shown in Index 309.2 of the HDM.

CHAPTER 3: ROADS

3.1 GENERAL:

Road improvements in the public right-of-way shall be designed in accordance to the latest edition of the Highway Design Manual (HDM) and minimum American Association of State Highway and Transportation Officials (AASHTO) standards. Road improvements in the public right-of-way shall be constructed by the Developer to conform to these Standards, and the latest edition of the Caltrans Standard Specifications and Standard Plans.

Only a Contractor with an appropriate license and required insurance may perform the work described herein. Any road improvement damaged by the Contractor shall be repaired by the Developer as required by the Engineer.

3.2 OTHER STANDARDS

While it is not possible to set rigid design standards for every possible design situation, design of roadway improvements shall adhere to sound engineering principles and good civil engineering practice. State of California Department of Transportation references entitled Highway Design Manual, CA MUTCD and AASHTO "A policy on Geometric Design of Highways and Streets" and Americans with Disabilities Act Accessibility Guidelines (ADAAG), and Calaveras County's Grading and Drainage Ordinance (Chapter 15.05) may be used for guidance for situations not covered by these Design Standards. In all cases, final approval of any design is left to the discretion of the Director.

3.3 SOILS REPORT REQUIRED

All public and private roadway designs shall be based on the results of a soils investigation performed by a Registered Geotechnical Engineer, or a Registered Civil Engineer with expertise in soils investigation. The report will address roadbed foundation conditions, grading considerations, slope stability (for slopes in excess of 2 horizontal to 1 vertical) and special conditions expected such as highly organic or soft soils or shallow bedrock which may affect design or construction. The report shall specifically determine the design resistance ("R") value of native materials at the proposed subgrade elevation to allow proper design of the roadbed structural section.

This requirement for a soils report may be waived by the Director if the project is in an area of consistent soil characteristics, and the County has knowledge from other sources of the soil characteristics, including the "R" value.

3.4 STRUCTURAL DESIGN:

The R-value design method contained in the State Standards shall be used as the basis to determine the structural section of the roads.

All roadway designs shall be based on the recommendations of the required soils report. The thickness of the structural section elements shall be determined from the Flexible Pavement Structural Pavement Design Guide for California Cities and Counties. A minimum asphalt concrete (A.C.) thickness of 0.20 foot shall be used on all streets.

The Traffic Index (TI) is based on a 20-year design life. The minimum TI used to determine the structural section for various roadbeds and intersections within the District shall be 5.0 minimum.

The Developer shall be responsible for obtaining soil R-value tests, specifically supervised by a registered engineer, in enough quantity to establish the quality of the soil and to provide a basis for the design of the structural section. R-value tests shall be taken at Developer's expense. In order to establish the design, R-value tests will be required at the road subgrade elevation. Exact locations and number of the R-value tests shall be as approved by the Engineer. The Developer shall stake the field test locations and shall provide an existing ground and finish grade elevation for each test location. The Developer shall provide the results of the R-value tests to the Engineer. The test results shall include a verification signed by a registered engineer that the R-value tests were taken at the depth and locations(s) as shown on the approved plan.

3.5 CUL-DE-SAC STREETS:

Cul-de-sac streets may be allowed as follows:

1. Maximum Length

Cul-de-sac streets shall have a length not exceeding one thousand (1,000) feet and shall serve no more than twenty (20) lots. In agricultural zoning districts the maximum length shall not exceed one-half mile. In no case shall more than sixteen (16) dwelling units be served by a cul-de-sac street.

2. Turnaround

Cul-de-sac streets shall be terminated by an improved turnaround having a minimum right-of-way radius of 50 feet. Paved turnarounds shall be in accordance with the Calaveras Fire Road standards and these improvement standards.

3. Alternate Turnaround

Hammerheads, loops, offset bulbs and other geometric designs may only be used under special circumstances and only with the approval of the Director and shall be designed in accordance with the Calaveras County Fire Road standards and these improvement standards.

3.6 CLEARING AND GRUBBING:

All work shall be done in accordance with Section 16 "Clearing and Grubbing" of the State Standards.

3.7 EARTHWORK:

Earthwork shall be performed as set forth in Section 19 "Earthwork" of the State Standards.

Relative compaction shall be determined by California Test 231 utilizing the nuclear gauge. California Test 231 shall be modified to use 30-second or one-minute counts at the option of the Engineer. Five 30-second warm-up counts shall be used instead of ten one-minute counts for testing with 30-second counts.

Section "B" of California Test 231 shall be amended as follows:

"At the discretion of the Engineer, a guide plate measuring approximately 9-3/4 inches x 14 inches x 3/16 inch may be substituted for standard plate. Additionally, a sliding sleeve impact hammer which incorporates a 13/16-inch diameter pin and is manufactured specifically for use with a nuclear gauge and guide plate, may be used in lieu of standard driving pin."

The Developer shall obtain a disposal site for all the roadway excavation not used on the jobsite. The Developer shall obtain and file with the District a letter showing permission and conditions for use of the disposal site. The Developer shall control dust at the disposal site in conformance with San Joaquin Valley Air Pollution Control District regulations, and keep any roads used free of excess material.

3.8 AGGREGATE BASE:

The aggregate base material shall conform to the requirements of Section 26 "Aggregate Bases" of the State Standards for Class 2, 3/4-inch maximum combined grading.

3.9 ASPHALT CONCRETE:

The asphalt concrete shall conform to the requirements of Section 39 "Hot Mix Asphalt (HMA)" of the latest edition of the Caltrans State Standards and shall meet the following minimum design requirements:

- a. Hot Mix Asphalt shall be Type A.
- b. The maximum aggregate size for HMA mix design shall be based upon the minimum design thickness required for the roadway. Lift thickness shall be four

times the normal maximum aggregate size unless otherwise approved by the Engineer.

Example: Determine rock size for HMA mix design for a three inch HMA mix design overlay

$$\text{Thickness} = 4 \times \text{Rock Size}$$

$$\begin{aligned} \text{Rock Size} &= \text{Thickness} / 4 \\ &= 3/4 \text{ inch} \\ &= 3/4 \text{ inch - normal maximum aggregate} \end{aligned}$$

- c. The HMA Mix design requirements shall be in accordance to Section 39-1.03B and as approved by the Engineer.
- d. Method process shall be used for all tonnages unless otherwise approved by the Engineer. Material quality control and assurance testing shall be paid for by the Developer out of deposit for inspection and testing services.
- e. The asphalt grade shall be PG 64-10 in conformance with Section 92 of the State Standards, unless otherwise approved by the Engineer.
- g. The final surface course shall be paved in the number of passes approved by the Engineer starting from the curb and paving toward the centerline.
- h. Compacting equipment shall conform to the requirements of Section 39 of "Asphalt Concrete" of the State Standards. Vibratory rollers may be used as approved by the Engineer.
- i. The surface course shall be laid with a self-propelled paving machine.
- j. Left turn pockets, tapers, and returns shall be paved independently from the main line paving. Main line paving shall take precedence over any other portion of the roadway paving.

3.10 ASPHALT PAINT BINDER:

An asphalt paint binder shall be applied in conformance with Section 39 "Asphalt Concrete" of the State Standards to all existing vertical surfaces and construction joints prior to placing asphalt concrete.

3.11 SEAL COAT:

A seal coat complying with the requirements of Section 37 "Bituminous Seals" of the State Standards shall be applied to the finished surface of the asphalt concrete

for all new street construction and subdivisions at end of the warranty period and prior to final acceptance of improvements.

3.12 CURB, GUTTER AND SIDEWALK

- A. Curb, gutter and sidewalk in residential areas shall conform to Plate No. 3-D1
- B. Where sidewalks are not required, curb and gutters shall be poured monolithically with a 6-inch minimum top of curb width.
- C. Valley gutters are allowed only with the approval of the Director. The developer shall submit evidence that the intersection cannot reasonably be drained to an underground system before cross gutters will be considered.
- D. Curb ramps shall be constructed at all curb returns in residential and commercial areas and at such other locations with sidewalks as required by the Director and conform to ADAAG. Ramps shall conform to Caltrans Plate No. A88A.
- E. Sidewalk widths shall be measured from face of curb to back of walk. Minimum widths are shown on Plate No. 3-D5

Concrete curb and sidewalks shall conform to Section 73 "Concrete Curb and Sidewalks" of the State Standards. However, where concrete is to be placed on basement material, all soft or spongy material shall also be removed to a depth of not less than 1/2 feet below subgrade elevation for sidewalk and curb ramps.

All concrete surfaces shall have a light broom finish.

All earthwork shall conform to Section 19 "Earthwork" of the State Standards.

Weakened plane joints shall have a maximum interval of 10 feet. Weakened plane joint intervals for curbs shall match adjacent sidewalk. Depth of weakened plane joint shall be a minimum of 1 inch. Concrete shall be scored at equal intervals between weakened plane joints to approximate 5-foot squares.

All gutters shall be water tested under the supervision of the Inspector.

All sidewalks shall be placed adjacent to curb unless otherwise approved by the Engineer.

All sidewalks placed adjacent to drive over curb shall be 5-1/2 inches thick.

Sidewalk subgrade shall be compacted to not less than 95% relative compaction for a minimum depth of 12 inches. When removing curb, the asphalt shall be cut a minimum of 12 inches from the lip of curb, unless otherwise directed by the Engineer.

Sidewalks shall have a cross slope toward the curb face at no more than 2% cross slope and shall meet current ADA requirements, unless otherwise approved by Engineer.

When matching 6-inch vertical curb sections, the curb return shall also be 6-inch vertical curb.

Unless poured monolithic, all curbs shall be doweled to adjacent sidewalk with No. 4 rebar at intervals not exceeding 5 feet. The rebar shall extend 6 inches into the sidewalk and 3 inches into the curb.

Transitions between different types of curb and different widths of sidewalk shall be constructed as shown on plates 3-D2, 3-D3, 3-D7, 3-F2, and 3-F7. All curb transitions shall occur outside curb returns.

Traffic, parking and road name signs on District roads which require relocation because of the work will be relocated by the Developer at locations approved by the District. Utility poles which require relocation because of the work shall be relocated by the utility company owning the poles. The Developer shall be responsible for protecting the work against damage and ensuring the safety of the public.

3.13 DRIVEWAYS

- A. Driveway design shall conform to Plate Nos. 3-F1,3-F2, and 3-G1 and conform to ADAAG.
- B. Maximum driveway slope within the right-of-way shall be 10 percent except in unusual terrain and specifically approved by the Director.
- C. The minimum width for a single family residential and duplex driveway shall be 12 feet. Maximum residential driveway width shall be 25 feet. Maximum residential driveway width with vertical curb and gutter shall be 30 feet. The maximum width for a commercial driveway shall be 40 feet.
- D. A driveway transition shall be a minimum of 25 feet from the projected curb line or edge of pavement of any intersecting street and a minimum of 10 feet from the nearest curb return or edge of pavement radius in 25 mph zones. The driveway transitions shall clear all public facilities such as electroliers, traffic signal standards, utility poles, fire hydrants, etc., by a minimum of 3 feet. Any relocation of such facilities required to maintain such clearance shall be at the expense of the owner installing the driveway.
- E. A minimum of 4 feet of full height curb should be maintained between the transitions of adjoining driveways. A minimum of 2 feet of full height curb shall be maintained between property line and driveway transition.

3.14 DISABLED ACCESS CURB RAMPS:

Disabled access curb ramps shall be constructed at all intersections in conformance with the requirements of the ADA, California Title 24, and plates 3-D4A through 3-D5.

All new curb ramps installed in the District shall be constructed with 1 ft x 1 ft truncated domes tiles. Truncated domes may be omitted when ramp slope exceeds 6.67%. Truncated dome tiles shall be furnished and installed as detectable warnings on the curb ramps, as shown on Detail 3-D4B. The tiles shall be either the 'Vitrified Polymer Composite (VPC) Cast-In-Place Tiles' manufactured by Armor-Tile Tactile Systems (1-800-682-2525), 'E-Z Set Ceramic Composite Detectable Warning Panels' manufactured by Detectable Warning Systems (1-866-999-7452) or approved equal. The tiles used must be uniform for all the new curb ramps.

Prior to actual construction, the Contractor shall construct on the project site, a test detectable warning surface using the selected truncated dome tile for the project and shall be of a size not less than 36" x full width of ramp. The test surface shall be constructed to the satisfaction of the Engineer, before the selected tile and installation procedure will be accepted for the project.

The truncated dome tiles shall comply with the following specifications:

- a. Dome Alignment: Square grid pattern in the predominant direction of travel.
- b. Dome Size - Base diameter of 0.9" (22.9 mm) minimum to 0.92" (23.4 mm) maximum, a top diameter of 0.45" (11.4mm) minimum and 0.47" (11.9mm) maximum and a height of 0.18" (4.6mm) minimum and 0.22" (5.6mm) max.
- c. Dome Spacing - Center-to-center spacing of 2.3" (58 mm) minimum and 2.4" (61 mm) maximum, and a base-to-base spacing of 0.65" (16.5 mm) minimum, measured between the most adjacent domes on square grid. Dome Spacing Exception: Where installed in a radial pattern, truncated domes shall have a center-to-center spacing of 1.6" (41mm) minimum to 2.4" (61mm) maximum.
- d. Color: The tiles shall be provided in manufacturer specified yellow color Fed # 33538 of FED-STD-595 (per Table 4cf Std 595b of CA Title 24 1121b.3.8(a) and 1133b.8.5; ADA 4.29.2). The tiles shall be uniform in color for the entirety of the project.
- e. Tile Size and Location: The truncated dome tiles shall extend 36 inches in the direction of travel and the full width of the curb ramp as shown on the plans. The edge of the detectable warning surface nearest the back of curb line shall be 6 inches (150 mm) minimum and 8 inches (205 mm) maximum from the back of curb line.

- f. Installation: The truncated dome tiles shall be installed per the manufacturer's written recommendations. The tiles shall be flush with the surrounding surface of the curb ramp. The tiles shall be installed with precision, such that along with maintaining the slope of the curb ramp, the concrete surface surrounding the detectable warning area shall have the exact surface finish as if the truncated dome tiles were not installed. The ramp surface shall not have any concrete bulges or deposits associated with the installation of the tiles.
- g. Submittal: The Contractor shall submit a certificate of compliance for the truncated dome tiles, conforming to ADA requirements, strength requirements and warranty. The Contractor shall submit a certification from the tile manufacturer, certifying that the Contractor or the Contractor's subcontractor that will install the tile is qualified for installation, and who has successfully completed tile installations similar in material, design, and extent to that indicated for the project.
- h. Testing: The finished concrete shall be in conformance with the tolerances as stated in Section 40-1.135 of the State Standards and attain minimum 28-day strength of 3000 psi. Core testing of substandard concrete will not be permitted.
- i. Existing areas: In existing areas where domes need to be added, a glue down and anchored option may be used if the existing ramp meets all current ADA ramp guidelines with the approval of the City Engineer.

3.15 TRENCH CUT POLICY:

GENERAL REQUIREMENTS

1. Resurfacing requirements specified in this policy are in addition to the trench resurfacing requirements specified by Standard Drawing No. 3-H1, 3-H2, 3-H4 and 3-H5.
2. For the purpose of this policy, "Surfacing Age" is defined as the age of the most recently completed roadway surfacing, including construction, reconstruction, or major overlay.
3. Where the application of seal coats is required, a Type II Slurry Seal will be used in accordance with State Standard Specifications, Section 37-2.
4. The permittee must post a one-year maintenance bond or cash deposit, in an amount specified by the District.
5. All pavement markings destroyed or obliterated must be replaced in kind by the permittee. Typical pavement markings include, but are not limited to, lane

lines, centerlines, stop and stop ahead legends, limit lines, raised pavement markers, and miscellaneous delineators.

6. The permittee is responsible for Survey Monuments disturbed by trenching and is required to file a corner record and to reestablish them using a Licensed Land Surveyor after the trench restoration is completed.

TRENCHING and BACKFILLING

Where trenching is allowed, the following shall apply:

a. **Trenching:**

Trenching across existing District roadways requires prior approval from the Department. All requests for this approval shall be in writing.

All trenching shall conform to the Occupational Safety and Health Administration (OSHA) safety requirements and in accordance with the Trench Construction Safety Orders issued by the Division of Industrial Safety of the Department of Industrial Relations of the State of California.

When groundwater or unstable soil conditions are encountered in excavations, trenches shall be excavated below the subgrade. Aggregate base or other suitable materials shall be placed to provide a firm and stable base for the proposed pipe installation.

All trenching operations shall have adequate provision for the protection of the traveling public on all roads affected by the work.

Excess native excavated material and broken pavement shall become the property of the Contractor and shall be disposed of outside of the District right of way. The exact location will be determined by the Contractor and will be approved by the Inspector.

Where a trench crosses a roadway, the excavation and backfilling shall be completed prior to the end of the working day. In the event an excavation cannot be backfilled prior to the end of the working day, suitable bridging shall be provided to safely carry vehicular traffic over the excavation.

All work of excavating and backfilling in a public street shall be performed as quickly as possible. Not more than 600 linear feet of trench shall be opened ahead of any pipeline or conduit installation taking place in a street or alley except upon written permission of the Inspector. Excavations or trenches for cast-in-place concrete pipe may remain for a period not to exceed 7 days providing said

excavations or trenches are adequately barricaded and access is provided for abutting property owners and at all street intersections.

At the end of each working day, if a vertical difference of 0.15 foot or more exists between the elevation of the existing pavement and the elevation of any excavation within 5 feet of the traveled way, then suitable engineered material as approved by the Engineer shall be placed and compacted against the vertical cuts adjacent to the traveled way.

The patch surface shall not deviate from the finished grade by more than 0.02 foot in elevation. The edges of the patch shall be straight.

If a longitudinal trench excavation damages or destroys more than 50% of the traffic lane width at any point in either lane, that entire lane, together with any part of the trench lying outside the lane, shall receive a 0.12 foot thick minimum finished course asphalt concrete overlay for at least the entire length of the trench, in addition to the full structural section otherwise required. The length of the overlaid areas as required shall be determined by the Engineer. If a longitudinal trench within a traffic lane has an edge 3 feet or less from the edge of that lane, then replace the structural section to the original edge of the lane.

The Contractor shall perform all excavations necessary or required to construct all manholes and all pipelines as specified by the Engineer and as approved on the plans. Excavation shall include the removal of all materials whatever nature encountered. Excavation shall be by open trench unless otherwise specified, following neat, parallel lines equal- distance from the centerline. The maximum width of the trench at the level of the spring line of the pipe to be laid therein shall not exceed the width of the outside diameter of the barrel of the pipe plus a minimum of 10 inches. Such width shall be kept as small as practical while providing enough working space for joining the pipe and placing the backfill material. Any damage occurring to the saw cut after the cut has taken place will be corrected to the satisfaction of the Inspector at the Contractor's expense.

b. **Backfill:**

Where trenching is allowed the following shall apply: After the pipe has been properly laid and inspected, backfill material shall be placed around the pipe at a minimum depth of 12 inches above the top of the pipe and shall be thoroughly compacted to final density of at least 95% maximum density. This shall be done in such a manner as to not injure or disturb the pipe.

All excavation within the existing street roadbed shall be backfilled and compacted until the relative compaction is not less 95 percent. Backfill

material shall be placed in layers not to exceed 8 inches in depth and moistened as necessary before compaction. Each layer shall be thoroughly tamped, rolled or otherwise compacted and brought to grade. Backfill in trenches between the back of the curb and property lines shall be thoroughly consolidated to a final density of at least 90 percent of maximum density. Compaction of backfill material by ponding, jetting, or flooding will not be permitted without the prior approval of the Engineer or District Inspector. Field density may be determined by California Test 231 method.

LOCAL ROADS

- 1) Surfacing Age Under Three (3) years: No pavement cuts allowed. Exceptions may be approved District General Manager.
- 2) Surfacing Age Three (3) to Five (5) Years:

Longitudinal cuts are permitted. A seal coat is required for that half of the roadway containing the trench. (See Standard Drawing No. 3-H2.

Cross-cutting is allowed at a minimum interval of 150 feet. At each cross-cut location a minimum of ten (10) feet on each side of trench shall be planed and either resurfaced with one (1) inch asphalt concrete or a slurry seal for that half of the roadway. (See Standard Drawing No. 3-H2.

3.16 SAW CUTTING EXISTING PAVED STREETS:

When placing asphalt concrete adjacent to existing paved streets, the pavement at the edge of the existing structural section shall be vertically cut in a neat straight line by sawing. This shall be done to the limits shown on the plans and as directed by the Engineer.

Sawing shall be done with an approved saw capable of cutting a minimum of 3 inches in depth. It is the Contractor's responsibility to provide a clean, smooth, vertical surface for the depth of the proposed structural section. The sawing shall be done to the exact lines snapped with a chalk line.

Any damage occurring to the saw cut after the cut has taken place will be corrected to the satisfaction of the Engineer at the Contractor's expense.

A crack seal of asphaltic emulsion shall be applied in accordance with the requirements of Section 37 of the Caltrans Specifications along all saw cut edges.

3.17 PROFILE STANDARDS:

A. Minimum Grades

The minimum flow line grade for gutters shall be 0.25 percent. These restrictions do not refer to centerline grades of vertical curves. Gutter elevations on vertical curves shall be adjusted to meet a 0.25 percent minimum grade. Where matching existing conditions minimum grades may be reduced only with the approval of the Director.

B. Cross Slopes

The standard cross slope shall be 2 percent. For street widening projects, the minimum cross slope shall be 1 percent, the maximum cross slope shall be 5 percent, with a 3 percent differential between the widening and existing pavement. Cross slope of a street widening project shall match the cross slope of the existing pavement within the above limits, whenever possible.

C. Vertical Curves

1. Required

Vertical curves shall be required whenever the algebraic difference of grades is 1 percent or greater for local streets and 0.5 percent or greater for collectors, arterials and expressways.

2. Minimum Length

The minimum length of vertical curves shall be determined by consideration of passing and stopping distance requirements, sight distance, drainage control and aesthetic appearance. Minimum length of vertical curves shall be as specified in the latest edition of the State of California, Department of Transportation Highway Design Manual.

D. Sight Distance

Sight distances shall be as specified in the latest edition of the State of California, Department of Transportation Highway Design Manual.

E. Intersections

When two streets intersect, the lesser classification street approach shall not have a slope over 3 percent for a minimum distance of 50 feet back from the curb line of the intersecting street. The typical crown profile of the higher classification street shall be maintained through the intersection with the lesser street meeting the crown slope at the projected edge of the outside travel lane. The crown slope may be reduced to 1.0 percent in the intersection if necessary, to provide drainage.

3.18 SIGNAGE:

A. Barricades

Barricades shall be required at the end of the paved section (or traveled way for non-paved street) of all terminating streets. Barricades shall comply with County Standard Drawing No. R-25. Cul-de-sac streets shall use Type "B" barricades only where there are no curb, gutter and sidewalk. All other street terminators shall use Type "A" barricades.

B. Street Sign Locations

Street names and street name sign locations shall be shown on plans submitted for approval. Sign details shall be as shown on County Standard Drawing No. R-26. Street name signs shall be located as follows:

1. "Tee" Intersections

One street name sign shall be located on the near right-hand corner of the non-through street approach of a "Tee" intersection or at head on position of the Tee. Signs shall be visible to traffic from all sides.

2. Four-Way Intersections

A minimum of one street name sign is required at each intersection. Signs shall be visible to traffic from all sides.

3. Non-Symmetrical Intersections

For non-symmetrical intersections, or for expressways, major arterials and freeways, street sign location shall be at a location(s) visible to all traffic entering the intersection as approved by the Director.

3.19 STRIPING and MARKING:

Design of pavement striping and marker placement shall be in accordance with Caltrans Standard Plans, subject to the approval of the Director and shall conform to the latest edition of the CA MUTCD.

CHAPTER 4: STORM DRAINAGE

4.1 GENERAL:

All drainage facilities constructed in and maintained by the District shall be designed in accordance with accepted engineering principles and shall conform to these minimum design standards.

Residential, commercial and industrial developments shall have surface drainage disposal accommodated in one or more of the following prioritized ways:

- a. **On-Site Drainage**
New development projects (residential, commercial, and industrial properties) and re-development projects shall contain all storm drainage on-site unless the methods listed below are available and approved for use by the District prior to submittal of the drainage plan.
- b. **Positive Drainage**
Positive drainage is a gravity flow storm drainage collection and discharge system into a river, stream, creek, irrigation facility, municipal storm drain system, or other waterway.
- c. **Off-Site Retention/Detention Facility**
Drainage retention and/or detention facilities may be used when positive drainage is not available. Adequate capacity in the off-site drainage facilities must be available.
- d. **Rock Well/French Drain**
A rock well or french drain may be used only when above methods 4.1.b and 4.1.c are not feasible. Rock wells are typically not a standard design option due to groundwater quality impact concerns. Approval from the Calaveras County Department of Environmental Resources for the use of rock wells shall be obtained prior to submittal of the drainage plan.

4.2 STANDARD OF DESIGN:

The District will accept for maintenance two (2) different types of basins: retention (infiltration) and detention basins.

A retention basin is a basin with no outlet facilities for terminal drainage. A retention basin can store the required storm water runoff volume and can empty through percolation and evaporation over a specified time.

A detention basin is a basin which has the capacity to temporarily store storm water runoff and has outlet facilities capable of emptying the basin within a specified time into a terminal drain, typically through pumping or gravity flow.

The following minimum design requirements shall be met for storm water facilities constructed in the District:

1. All storm drainage retention facilities within the District shall be designed using a 100-year, 24-hour storm. A retention basin facility shall be designed to empty the design storm within 48 hours by outlet facilities providing positive drainage or through percolation & evaporation. If percolation method is used, the percolation rates shall be based on a minimum of two (2) soils test conducted at the design depth of the retention basin. Retention basins shall be designed in accordance to Section 4.4 of this Chapter.
2. All storm drainage detention facilities within the District shall be designed using a 100-year, 24-hour storm. The volume of the basin shall be determined with no allowance for percolation. A detention basin shall be designed to empty a 100-year, 24-hours storm event within 48 hours by outlet facilities providing positive drainage or through pumping. If pumping is used, pump design calculations shall be submitted in accordance to Section 4.12 of this Chapter. Detention basins shall be designed in accordance to Section 4.5 of this Chapter.
3. All conveyance drainage facilities (such as pipes, culverts, channels) shall be designed for a 10-year, 24-hour storm or greater. Storm drain pipelines and conveyance facilities shall be designed in accordance to Section 4.8 and Section 4.9 of this Chapter.
4. All drainage facilities shall be designed to provide for public safety and there shall be no increased inundation of any building or roadway surface. All drainage facilities that are part of a Master Planned community shall comply with the Master Plan for that community.
5. All proposed storm drainage facilities shall include provisions for future upstream development. This would entail indicating on plans a storm drainpipe stub five feet beyond the development for pipe depths less than six feet and an additional one foot per foot of depth over six feet. All developments connecting to a pipe network discharging to the municipal storm drainage system or directly to a creek, river, or stream shall obtain the necessary regulatory discharge permits and shall not exceed the predevelopment storm release rates.
6. No development shall discharge at a rate which exceeds the capacity of any portion of the existing downstream system. Calculations for storm drainage design within a development as well as calculations for runoff generated by upstream areas within the contributing watershed shall be submitted to the Engineer for approval.

7. The diversion of natural drainage will be allowed only within the limits of a proposed improvement. All-natural drainage must replicate the site's pre-development natural drainage density and patten and leave the improved area at its original horizontal and vertical alignment unless a special agreement, approved by the Engineer, has been executed with adjoining property owners.
8. Design storm methods shall be according to the Rational Method for design areas less than or equal to 200 acres. Storm runoff calculations for areas larger than 200 acres shall be computed using more advanced storm drain design methods (i.e. Unit Hydrograph Method as defined by the United States Army Corps of Engineers, Technical Release 55 (TR-55), HydroFlow, StormCADD, etc).

4.3 DESIGN CALCULATIONS & DOCUMENTATION:

Design calculations shall be presented at the time plans for storm drainage facilities are submitted for approval. Drainage calculations shall be done on standard form Figure 4.J, or a spreadsheet reproducing this information. Reports generated from software programs designed for hydrology output such as StormCAD will also be acceptable.

Submittal of drainage calculations shall include the following minimum items:

a. Pipe Sizing and Conveyance Calculations:

The standard design form as shown in Figure 4.J shall be used and shall show the following information:

1. Drainage area (in acres)
2. Time of concentration (in minutes)
3. Runoff coefficient for each area
4. Flow rate to each structure (in cubic feet per second)
5. Flow rate in each pipe (in cubic feet per second)
6. Flow velocity in each pipe (in feet per second)
7. Pipe diameter of each pipe segment (in feet)
8. Pipe length of each pipe segment (in feet)
9. Pipe slope of each pipe segment (in feet/feet)
10. Invert elevation of each pipe segment at structure (in feet)
11. Rim elevation of each storm drain manhole (in feet)
12. Hydraulic and energy grade line elevation (HGL & EGL) in feet.
13. Freeboard depth (measured from basin high water to lowest catch basin inlet grate elevation - shall be a minimum of 0.50 feet).
14. Depth and width of flow in gutters (in feet)
15. Depth of flow in open channels (in feet)
16. List of any assumptions, charts, tables, references, and list of method used.

b. Drainage Map:

A drainage map shall be provided that shows all lines and inlet point, drainage areas contributing to each inlet point, and designations for the items listed in Section 4.3.a above.

A plan, preferably at 1" = 100' scale, showing proposed street system, existing and proposed drainage system, tributary sub-areas (including offsite drainage), the magnitude and direction (indicated by arrows) of flow in each pipe and flow to each structure contributed by its tributary area. All flow rates shall be measured in cubic feet per second (cfs).

c. Topographic Map:

A map showing the relationship between the proposed development and the remainder of the watershed, including acreage of all sub-areas shall be provided.

d. Hydrologic and Hydraulic Analysis:

An analysis showing the results of the storm drainage system based on a 10-year, 24-hour design storm while assuming that the basin or storage facility is holding the 100-year, 24-hour design storage volume.

The analysis shall include hydrologic and hydraulic calculations, assumptions, charts, tables, references, and the design methodology used.

e. Storm Water Storage Calculations:

Design calculations for the proposed drainage detention/retention facilities shall be submitted for review and approval by the Engineer.

Storm drainage retention and detention facilities shall have the capacity to hold the total runoff from a 100-year, 24-hour frequency storm.

The volume shall be determined with no allowance for percolation or outlet facilities using the following basic formula:

$$V = CAR_{(100\text{-yr, 24-hour})} / 12$$

Where: V = Storm water storage volume (measured in acre-feet) C = Coefficient of Runoff (see Table 4-1 for coefficients) A = Drainage watershed area (measured in acres)

Where: $R_{(100\text{-year, 24-hour})} = 2.88'' \times (M.A.P./10.9)$

The mean annual precipitation (M.A.P.) is expressed in inches of rainfall and can be extrapolated from Plate 4-B.

f. Storm Water Dewatering/Pump/Percolation Calculations:

Design calculations for the proposed drainage dewatering, percolation, and/or pumping facilities shall be submitted for review and approval by the Engineer.

Design calculations for dewatering the proposed drainage facilities shall be based on dewatering the 100-year, 24-hour frequency storm within 48 hours.

g. Post-Construction & Storm Water Quality Treatment Calculations

The District is required by State and Federal regulations to develop programs to control the discharge of pollutants to the municipal storm drain system. As a result, all new development and redevelopment projects that are considered regulated, will be subject to requirements designed to protect storm water quality. These new regulations will now require expanded plan checks and reviews for storm water treatment design, source control measures, post- development standards, and Low Impact Development (LID) measures for projects deemed to be regulated.

To determine if your project is regulated and requires post development standard measures (such as site design, source control measures, LID, and/or volumetric & flow-based treatment control measures), refer to the Post Construction Program Flow Chart located on Exhibit 4-1 in Section 4.18 of this Chapter.

All drainage projects shall be designed in accordance to the latest edition of the NPDES Municipal Separate Storm Sewer System (MS4) Phase II permit as it relates to storm water quality and treatment design requirements for regulated projects.

Information regarding these requirements can be found at www.waterboards.ca.gov

h. Erosion and Sediment Control Plan:

The Erosion and Sediment Control Plan shall be submitted for all development projects that involve grading and drainage. The plan shall include a vicinity map showing the location of the site in relationship to the surrounding area's water courses, water bodies, and other significant geographic features; a site survey; suitable contours for the existing and proposed topography, area drainage, proposed construction and sequencing; proposed drainage channels; proposed erosion and sediment controls; dewatering controls where applicable; soil stabilization measures

where applicable; maintenance controls; appropriate site specific BMPs; rationale for the selection of the BMPs; a list of all applicable permits; and any other information deemed necessary by the Engineer. Before the District can issue a grading permit, the project proponent must submit evidence to the District that all necessary permits have been obtained.

Any person performing land-disturbing activities at construction sites greater than or equal to one acre within a municipal separate sewer system area may submit to the Engineer the Storm Water Pollution Prevention Plan (SWPPP) used to comply with the State of California's General Permit for Discharges of Storm Water Associated with Construction Activity in lieu of an Erosion and Sediment Control Plan.

i. Groundwater Separation:

A minimum separation of ten (10) feet measured from the deepest portion of a drainage facility to the water table surface elevation shall be provided. The developer shall be responsible for providing a boring log prepared by a Geotechnical Engineer, to determine that there is 10 feet minimum separation between the bottom of the proposed drainage facility and the local groundwater table.

If design restrictions do not provide a ten (10) foot minimum separation from the basin bottom to average high ground water elevation, the Developer shall obtain prior written approval and authorization from the District prior to construction.

j. Soil's Report and Percolation Test Results:

A comprehensive soils report shall be prepared for the proposed project. A licensed geotechnical engineer experienced in soil work shall prepare, stamp, and sign the report. It shall include R-values taken at the site with a map showing the locations and depths of the test samples. Additionally, it shall include percolation testing results, high ground water elevations, stripping and grading recommendations, determination if expansive soil is present, and structural pavement sections for access & maintenance roads based on various traffic index (T.I.) values.

Soil percolation testing shall be conducted for all drainage basins, rock wells, horizontal wells, and other drainage facilities. The soils tests shall identify the infiltration rates and the surface area needed to fulfill the requirements for emptying a 100-year, 24-hour storm event within 48 hours. The actual design infiltration rates must be based on a minimum of two infiltration tests performed by a Geotechnical Engineer. The percolation tests shall be conducted at the actual drainage site location and at the design elevation of the drainage facility.

Clean water is typically used when conducting percolation tests. However, oil residue, silt, leaves, and other deleterious material will likely be included in the actual storm water. Variations in soil conditions within the drainage system will also likely affect percolation characteristics. Based on these variables, a minimum factor of safety of 2 must be applied to the percolation rate. Additional design safety factors shall be based on the recommendations of the Geotechnical Engineer and soil's report.

A minimum of two soil borings must be made to the depth of the project site's water table elevation or a minimum of 60 feet, the shallower of the two.

4.4 RETENTION BASINS:

Drainage retention facilities shall be designed in conformance with the guidelines contained in this Chapter and, as a minimum, shall comply with the criteria described below.

Compliance with these standards does not relieve the designer, owner or developer of the responsibility to apply sound professional judgment to protect the health, safety and welfare of the general public. Special site conditions and environmental constraints and considerations may require a greater level of protection than otherwise required under these standards.

Prior to final acceptance of improvements, storm drain facilities being maintained shall include, but not be limited to storm drain basins, pipelines, manholes, catch basins, and maintenance of post-development best management practice (BMP) measures.

a. Storage Volume V:

Retention basins shall be designed to store the entire volume of a 100-year frequency, 24-hour duration storm ($R=2.88''$) and shall be capable of infiltrating, thus not requiring any pumping. The required storage volume for retention basins shall be determined using the volume equation $V = CAR/12$ as described in Section 4.3.e. Infiltration rates can vary significantly, depending on the soil types encountered at various depths. For this reason, percolation tests shall be submitted along with the volume sizing calculations in accordance to Section 4.3.j.

b. Elevation:

Drainage retention facilities shall be designed so that a hydraulic grade line (HGL) extended from the drainage retention facility's highest water surface elevation (Z) shall be at least six (6) inches below all tributary drainage inlets at their respective locations.

The HGL at a given point shall be calculated using the following formula:

$$\text{Hydraulic Grade Line} = \text{HGL} = Z + H_f$$

Where:

HGL = Hydraulic grade line elevation at a particular point measured in feet.

Z = The top of pipe elevation at the point of discharge or the high-water surface elevation of a drainage basin measured in feet.

H_f = Head loss due to friction loss from a pipe measured in feet. The friction loss shall be calculated using the following formula:

$$H_f = (3.022) (v)^{1.85} (L) / (C)^{1.85} (D)^{1.85}$$

Where:

v = Velocity of water in pipe (in feet per second and assuming the pipe is flowing full)

L = Length of pipe (measured in feet)

D = Inside diameter of pipe (measured in feet) C = Design coefficient based on pipe material (per Table 4.2).

c. Dewatering:

The volume of a retention basin must be designed to empty a 100-year, 24-hour storm event within 48 hours by outlet facilities that provides positive drainage or through percolation. If percolation is used, the percolation rate shall not be assumed. The percolation rate shall be based on the results of a soil's report investigation performed by a licensed Geotechnical Engineer. Percolation soil testing shall be done in accordance to Section 4.4.j of this Chapter.

Silt buildup in retention basins can severely restrict percolation through the basin sides and bottom. Vegetation growing within the basins can help reduce the sealing effect of silt buildup. The construction of horizontal drains in the bottom of the basin can be used to help increase the percolation capacity of the basin and help reduce the effect of silt. If vegetation will not be planted within the basin, the percolation rate may need to be further reduced and an aggressive schedule of disking of the slopes and bottom shall be planned to maintain the proper functioning of the drainage basin.

d. Infiltration Trench:

The infiltration trench shall be excavated to a depth such that 10 feet of sand strata is exposed to the sidewalls of the trench. The required soils test shall identify this depth. The preferred location of the infiltration trench shall be at the top of slope of basin walls.

The width of the trench shall be a minimum of 24-inches. The trench shall be lined with a 4-oz. woven filter fabric with 6-inch of overhang to wrap up the rock. Engineer rock 3-inch to 6-inch in size shall be used to backfill the trench.

The trench shall initially be filled to the surface, with the fabric overlapping the rock. An additional pile of rock 4 feet wide by 3 feet high shall be placed over this trench in the low basin. The trench floor shall be constructed a minimum of 10 feet above the highest recorded level of groundwater.

e. Maintenance Access Roadway:

A maintenance access roadway shall be provided from the top of the basin facility to the lowest lying portion of the basin to allow access for maintenance vehicles and facilitate periodic removal of sediments and other maintenance functions. Limited maintenance access roadway maybe considered on a site-specific basis.

Requirements for maintenance access may include, but not be limited to the following:

1. A minimum access roadway width of 12 feet.
2. A maximum access roadway grade of 10%.
3. A minimum turning radii of 30 feet for maintenance vehicles.
4. A turn around area for maintenance vehicles.
5. Access roads shall be constructed with a minimum of 3 inches thick asphalt concrete over 4-inch aggregate base or 5.5-inch of concrete.

4.5 DETENTION BASINS:

The volume of the detention basin shall be large enough to hold a 100-year, 24-hour frequency storm. The required storage volume for detention basins shall be determined using the equation $V = CAR/12$ as described in Section 4.3.e.

The following minimum design criteria shall be followed for constructing detention basins:

- a. The Water Quality Volume, typically 1/2 inch (the 'first flush') shall be detained a minimum of 48 hours prior to pumping. The Developer shall obtain District and irrigation district approvals prior to pumping into the district's irrigation canal.
- b. The maximum depth of basin shall be 20 feet and basin bottom floor elevation shall be at least 10 feet above the existing water table. Ground water separation requirements shall be in accordance to Section 4.3.e of this Chapter. The basin floor shall be graded to direct the water to the inlet/outlet area where either gravity discharge or pumping will take place.
- c. The high-water elevation in the detention basin shall be 6 inches below the lowest catch basin and/or gutter flow line elevation. The hydraulic grade line (HGL) elevation shall be determined in accordance to Section 4.4.b of this Chapter.
- d. All outlet designs shall incorporate preventative measures for trash accumulation and erosion at the outfall structure.

4.6 PEAK FLOW RATE:

The peak flow rate shall be used to size pipes and culverts and shall be determined using the following rational formula:

$$Q = CIA$$

Where: Q = Peak rate of flow measured in cubic feet per second (cfs).

C = Coefficient of runoff; Values between 0.0 and 1.0 which are to be extrapolated from Table 4.1

A = The total tributary area, expressed in acres, that will contribute runoff to the drainage system, regardless of the limits of the development under construction

I = The average intensity of rainfall measured in inches per hour for a duration equal to the time of concentration (T_c) using the following formula:

$$I = \frac{I_m \times M.A.P.}{10.9}$$

Where:

I_m = Average intensity of rainfall measured in inches per hour for the Modesto rainfall gauging station. Coefficient is extrapolated from Plate 4-A using the calculated time of concentration (T_c).

M.A.P. = The mean annual precipitation, expressed in inches, for the design area in question. Coefficient is extrapolated from Plate 4-B.

T_c = The time of concentration, expressed in minutes, or the sum of the overland flow and conduit flow times. Table 4-3 provides minimum travel times to be used.

4.7 **CONVEYANCE CAPACITY:**

The Manning equation shall be used to determine the capacity and friction losses of open channels and enclosed gravity conduits:

$$Q = VA = 1.486/n R^{2/3} S^{1/2} A$$

Where:

- Q = Flow rate measured in cubic feet per second (cfs);
- A = Cross sectional area of the flow measured in square feet (sf); V = Flow velocity measured in feet per second (fps);
- R = Hydraulic radius measured in feet (ft);
- S = Slope of the hydraulic gradient measure in feet per foot (ft/ft);
- n = Manning coefficient.

Values of the Manning coefficient for various pipes and open channels are given in the Table 4.4.

4.8 **PIPELINES:**

The 10-year, 24-hour design storm used to design the conveyance drainage facilities shall not surcharge any conduit unless written approval is granted by the Engineer. Storm drainpipe shall be as shown on the plates contained in these Standards, and conform to the following minimum requirements:

- a. **Material:** The type of pipe used, and it's intended use must conform to accepted engineering practice and must be approved by the Engineer.

The class of pipe to be used shall be clearly shown on the improvement plans and specified in the special provisions, if any. All pipes constructed in roadways must be traffic rated.

All pipe material shall conform to the following minimum standards outlined below:

1. Reinforced Concrete Pipe (RCP): Reinforced concrete pipe shall conform to the requirements as outlined in Section 65 of the State Standards. The use of rubber gasket joints will be required unless specified otherwise by the Engineer.
2. High Density Polyethylene Ribbed Pipe (HDPE): High Density Polyethylene Ribbed Pipe shall conform to the requirements of Section 64 of the State Standards. HDPE pipe shall be bell and spigot only with polyisoprene rubber gasket meeting or exceeding ASTM F-477 requirements. HDPE pipe shall have a smooth interior wall.

3. Pump Station Force Mains: Galvanized Steel/Welded Steel Pipe or Class 235 DR-18 (originally classified as Class 150) or Class 305 DR-14 (originally Class 200) shall be used as determined by the design engineer. Galvanized steel pipe shall conform to ASTM Designation A53/A 53M, Grade B.

All nominal pipe size designations shall be standard weight. Threaded fittings shall be galvanized malleable iron or steel. Welded steel pipe shall conform to the requirements in Section 70-3.01 of the State Standards, "Welded Steel Pipe Drainage Facilities".

- b. Size: All storm drain mains, trunk lines, cross culverts, or any other type of gravity flow storm drainage pipe, excluding catch basin laterals, shall be no less than 18 inches in diameter.

Catch basin laterals shall be no less than 12 inches in diameter.

1. Pipe curvature between manholes shall not exceed manufactures' recommendations.
2. Pipes shall not decrease in size going down stream.
3. Match pipe crowns when pipe sizes change (unless otherwise approved by the Engineer).
4. At intersection of pipes, the downstream pipe shall have a crown elevation which is less than or equal to the crowns of all upstream connecting pipes.
5. All pipes shall be smooth walled.

- c. Minimum Cover: Pipe alignment shall be designed to allow for a minimum cover of thirty (30) inches as measured from the natural ground or bottom portion of the structural pavement section to the outside top of pipe. If the minimum cover cannot be obtained due to design constraints, the pipe shall either be encased in concrete or provided with a concrete cover as approved by the Engineer.

- d. Velocity: Pipes (for calculation purposes) shall be flowing full. Minimum velocity shall be a velocity sufficient to maintain a clean pipe generally not less than two feet per second. For pump discharge lines, the velocity shall not exceed ten feet per second. Velocities in unlined open channels shall not exceed those values shown in Table 4.5 or the soils engineer's recommendation.

- e. Installation: The pipe shall be laid in conformity with the prescribed lines and grades.

The design engineer shall field verify the depth and alignment of existing storm drain lines prior to design. If the existing storm drain line depth, alignment and size is not as shown on the as-built improvement plans, the contractor shall notify the Design Engineer and make appropriate corrections before proceeding.

All adjustment of pipe to line grade shall be made by scraping away or filling in and tamping under the body of the pipe and not by blocking or wedging. All pipe sections shall be laid with bell end upstream and shall be laid upstream (from the lowest point to the highest point) and from structure to structure. Grade stakes shall be provided at 50-foot minimum intervals.

When directed by the Engineer or establishing grade stakes along small radius curves, stakes shall be provided at 25-foot minimum intervals. Each stake shall be used in establishing the grade for the pipe.

Every precaution shall be taken to protect the pipe against the entrance of foreign material before the pipe is placed in the trench.

At the close of the day's operations, the last section of pipe shall be plugged, capped or otherwise tightly closed to prevent entry of any foreign matter, animal, or small children.

- f. Alignment: Storm drainage pipe shall be parallel with the centerline of the street whenever possible. Pipe curvature shall not exceed manufacturer's recommendation. When appropriate, pipe shall be deflected before each curb inlet such that it enters in the center of the inlet.
- g. Backwater: All outlets shall take into account any backwater condition in the receiving channel.

4.9 MANHOLES:

Storm drain manholes shall be constructed as shown on Plates 4-F1 and 4-F2 or alternatively, pre-cast manholes, as approved by the Engineer.

1. Manholes shall not be constructed within a gutter.
2. Manholes shall be placed at junction points, changes in gradient, and changes in pipe size. On curved pipes with radii of 200 feet to 400 feet, manholes shall be placed at the beginning of the curve (BC) and at the ending of the curve (EC) and on 300-foot maximum intervals along the curve. On curves with a radius exceeding 400 feet, manholes shall be placed at the BC and EC of the curve and on 400-foot maximum intervals along the curve for pipes 24 inches and less in diameter and 500-foot intervals along the curve for pipes greater than 24 inches in diameter. Manhole locations on curves with radii less than 200 feet will be specified on an individual basis.
3. Spacing of manholes shall not exceed 500 feet unless approved by the Engineer. Whenever possible spacing of manholes shall be equal.
4. Manhole covers shall be constructed as shown on plate 4-F3.

5. A 48" diameter barrel may be used for pipe up to 36" diameter, a 60" diameter barrel for pipe up to 54" diameter and a 72" diameter barrel for pipe up to a 60" diameter.
6. A custom designed box structure for pipe over 60" in diameter shall be approved by the Engineer. Concrete shall be furnished, mixed, placed and cured in accordance with Caltrans Standards & Specifications and shall be 4,000 psi with 1" maximum aggregate size.

4.10 CATCH BASIN:

Catch basins shall be as shown in the plates of these Standards. Catch basins shall not be allowed to drain into or through other catch basins without the approval of the Engineer.

- a. The maximum total lineal feet of road right-of-way that may discharge into a catch basin is five hundred (500) feet. However, in no case shall the width of water flowing in the gutter from a 100-year, 24-hour design storm event be allowed to encroach into the traveled way of the nearest traffic lane.
- b. Metal parts of all catch basin grates and frames shall be hot dipped galvanized after manufacture.
- c. Catch basins shall be designed and spaced such that they intercept and fully contain the 10-year, 24-hour design storm event.
- d. A drain inlet must be placed at all gutter sag points. Inlets shall not be allowed within street crosswalks, handicap ramps, or driveways.
- e. For gutter slopes in excess of 5%, the length of catch basin grates shall be designed in accordance with the most recent Urban Drainage and Design Manual from the Federal Highway Administration (FHWA).
This manual can be found at the FHWA website at www.fhwa.dot.gov
- f. All storm drain catch basins and drain inlets shall be labeled with the District's approved storm water quality message markers prior to acceptance by the District ("Only Rain Down the Drain" markers).

4.11 EXCAVATION AND BACKFILL:

Excavation and backfill shall be as per plates 3-H1 and 3-H2. If a situation arises that is not covered, then the excavation and backfill shall be per State Standards.

4.12 TESTING:

Testing for proper compaction and for control of the concrete shall be as directed and observed by the Engineer. Testing shall be performed by the Developer unless otherwise directed by the Engineer. Certificates of Compliance, weigh master tags or other standard design data may be required by the Engineer in lieu of testing for proper concrete design. The cost of all testing shall be at the Developer expense.

4.13 INSPECTION:

All work shall be inspected by the Engineer prior to backfilling. After compaction has been completed all new lines shall be inspected with closed circuit television. The visual inspection method will be at the discretion of the Engineer.

If closed circuit television is used, the Developer shall give the Engineer at least two working days notice prior to televising the work. All dirt and other debris shall be cleaned from the pipeline and manholes, trenches shall be compacted, and manhole rims raised to grade. Infiltration, leaks and deficiencies shall be corrected prior to inspection. The suitability of the system for televising shall be at the discretion of the Engineer. The Engineer shall be present during the televising of the work.

The tape (in DVD or digital MPEG format) and tape logs shall be provided to the Engineer after the system has been televised.

The Developer shall repair all substandard work to the Engineer's satisfaction.

4.14 STORM DRAIN EASEMENTS:

Publicly owned drainage conduits and channels will not be allowed on private property unless they lie within a dedicated public easement. Where minor improvement of a drainage channel falls on adjacent property, such as daylighting a ditch profile, written permission from the adjacent property owner(s) for such construction shall be required. A copy of the document which grants said approval shall be submitted to the Engineer prior to the approval of the improvement plans.

Easements for closed conduits shall meet both of the following width criteria:

- a. Minimum width of any easement for a closed conduit shall be 16-ft.
- b. All easements for closed conduits shall have a minimum width in feet equal to the required trench width according to the standard detail for trench backfill plus 2 additional feet of width for every foot of depth of the pipe as measured from the bottom of the pipe to finished grade. All conduits shall be centered within their easements.

- c. Drainage easements for open channels shall have sufficient width to contain the open channel and a 12-foot wide service road. The toe of a bank shall not be within 5 feet of an easement boundary. Easement boundary lines shall, at changes of alignment, have a radius sufficient enough to provide turning room for vehicles operating on the service road.

4.15 MISCELLANEOUS ITEMS

- a. Culvert Design:

Cross culvert conduits and box structures shall be designed to pass the peak flow from the 10-year, 24-hour design storm without damage to the roadway in accordance with normally accepted engineering practice based on good judgment and experience in design, construction, and maintenance. Culvert capacity may be determined on the basis of inlet and outlet control in accordance with generally accepted engineering practice.

- b. Inlets:

Storm inlets shall be sized to handle the peak design flow and in accordance with the manufacturer's recommendation. Inlets shall be spaced such that gutter flow does not spill over the curb or have a width that encroaches into the nearest traveled way. Inlets shall not connect to other inlets.

- c. Service Connections:

Storm service connections shall meet the following minimum conditions unless otherwise approved by the Engineer:

1. Private on-site development shall not drain into the public right-of-way without prior approval from the Engineer and the right-of-way has gravity storm drainpipes with sufficient capacity to handle additional runoff. Under no circumstances can development tie into existing off-site rock wells.
2. Service connections include lines from drain inlets in the public right-of-way, private lines from drain inlets on private property, and private lines from roof drains of private buildings.
3. Service lines from drain inlets and roof drains on private property shall be connected to an on-site catch basin or junction structure before entering the public right-of-way. Tie-ins are restricted to catch basins, junction boxes or manholes.

4.16 **CULVERT OUTFALL STRUCTURES**

a. Headwalls

All headwalls, wingwalls, and endwalls shall be considered individually and shall be, in general, designed in accordance with the Standards and Specifications of the California Department of Transportation and the requirements of the District.

Trash racks shall be provided where, in the opinion of the District Engineer, they are necessary to prevent clogging of culverts and storm drains or eliminate hazards. Trash racks shall conform to the requirements of the District. Temporary trash racks will be allowed where pipe will be extended in the near future.

b. Flared End Sections

On cross culvert drains, flared-end sections shall be used where required by the District Engineer. Guardrails may be required by the District Engineer at culverts, headwalls, and box culverts and on steep side slopes. When so required, the railing shall be installed in accordance with the requirements of the current edition of the California Building Code or State of California, Department of Transportation.

Pipe used as cross culverts to open ditches may be corrugated steel or reinforced concrete. The District Engineer may specify which type shall be used in any instance. All pipe shall conform to the Standard Specifications.

c. Energy Dissipators

Energy Dissipators shall be considered individually and shall be, in general, designed in accordance with the Standards and Specifications of the California Department of Transportation and the requirements of the District.

During high intensity rainfall events the stormwater velocity at outlets can become high enough to produce scouring at these outfalls. A energy dissipator can act as a flow transition structure to absorb the initial impact of flow and help to reduce the speed of the flow to a non-erosive velocity.

Typical locations where energy dissipators are needed occur in large water sheds with steep slopes producing large volume of runoff at high velocities. When this runoff is directed to open ditches that drain to associated cross-drains spilling into open ditches with average to high slopes, energy dissipators would be highly recommended to significantly reduce scouring and erosion of the drainage ditch slopes downstream.

Methods of energy dissipators can be large rock (rip-rap) and broken concrete. See examples shown in detail drawing 4-G4.

CHAPTER 5: UTILITIES

5.1 WATER and SEWER

The procedures and minimum guidelines for the planning, design, and construction of water and/or wastewater systems shall follow the “Water and Wastewater Design and Construction Standards” of Calaveras County Water District.

The Standards apply to existing water and/or wastewater systems being expanded, modified, upgraded, and rehabilitated as well as to the construction of new facilities. The District may require criteria that exceed these minimum standards based on project-specific conditions. Wherever there are differences between these Standards and other local, regional, County, State, or Federal regulations, the most stringent or highest requirement shall govern and be approved by the District Engineer.

In addition to these Standards, environmental mitigations and permit requirements of various governing bodies are to be incorporated into the construction plans.

These Standards are intended for pipes, whether water or wastewater, up to, and including, 12 inches in diameter. Pipelines greater than 12-inches in diameter shall be designed as directed by the District’s Engineering department. The District or a District-designated engineer shall design Master Plan facilities. All units of measurement used in these Standards are United States standard measure.

The District is responsible for the approval of plans and installation inspection of all water and wastewater systems constructed within the District’s service areas. The District’s service area includes the area of Copper Valley Community Service District.

Service lines, whether water or wastewater, from the main line to two (2) feet from the building foundation shall be inspected by the District, including, but not limited to, the water meter, backflow prevention device, and cleanout. Repairs to the service line from the meter, or property-line sewer cleanout, to the building are the responsibility of the property owner.

CHAPTER 6: GRADING, DRAINAGE, AND OTHER EARTHWORK ACTIVITIES

6.1 GENERAL

The District shall abide to all regulations stated in the Calaveras County's Grading and Drainage Ordinance. The purpose of this ordinance is to regulate grading, drainage, and other earthwork activities within the unincorporated areas of Calaveras County to preserve and safeguard public welfare, life, health, and property.

In addition to ensure that the intended use of a graded site is consistent with the Calaveras County general plan (including adopted Community Plans), the County's Storm Water Management Plan, California Fire Safe Standards, and local ordinances, including the county zoning ordinance, the county road ordinance, and applicable building codes.

Erosion and sedimentation control measures need to be implemented to protect water quality and to reduce the discharge of pollutants into county storm water drainage systems to the maximum extent practicable using best management practices.

The Developer is responsible for compliance with Title 15, Chapter 15.05 (Grading and Drainage Ordinance) of Calaveras County. Failure to obtain the required permit coverage or to comply with the requirements of the required permits could result in significant daily fines or penalties.

The minimum standards provided in the SWPPP do not relieve the Developer from liability of storm water pollution discharged caused by construction activities. The Developer shall implement best management practices regardless of project size in accordance to all relevant rules, regulations, and laws of the governing agency.

6.2 STORMWATER BEST MANAGEMENT PRACTICES (BMPs)

The California Stormwater Quality Association (CASQA) "Stormwater Best Management Practice Handbook for Construction" contains guidelines for the preparation of a SWPPP. The CASQA Handbook may be viewed online at www.casqa.org/resources/bmp-handbooks

The District has adopted the Best Management Practices (BMPs) listed in the current edition of the California Stormwater Quality Association (CASQA) "Stormwater Best Management Practice Handbook for Construction". Developers, Contractors and Design Engineers are encouraged to use this publication in

developing appropriate pollution control measures for individual construction projects.

The Developer shall implement and maintain, as a minimum, the following stormwater quality BMP practices:

- a. The Developer shall perform routine inspection and maintenance of BMPs. The Developer is solely responsible for preparing and maintaining inspection and monitoring records.
- b. The Developer shall immediately correct or replace any ineffective BMP. If the measures taken by the Developer are inadequate to effectively control water pollution, the Developer may need to revise the operations and water pollution control program.
- c. Ineffective BMP may restrict the construction work from being performed until the water pollution control measures are made adequate. Continued noncompliance may result in a Notice of Violation (NOV) and/or suspension of the work indefinitely. The Engineer reserves the right to take corrective action as needed to correct any noncompliance issues at the Developer's sole expense.
- d. Contractors (or other responsible party) shall conduct regular inspections and maintenance of stormwater BMPs on the construction site. Active construction sites may be visited at any time by District inspection staff.
- e. It shall be the responsibility of the owner and the permittee to ensure that erosion does not occur from any activity during or after project construction. Additional measures, beyond those specified, may be required as deemed necessary to control accelerated erosion.