



**ENGINEERING DEPARTMENT
STANDARD SPECIFICATIONS AND DRAWINGS**

**CITY OF ATASCADERO
ENGINEERING DEPARTMENT**

**STANDARD SPECIFICATIONS
AND DRAWINGS**



APPROVED BY THE CITY ENGINEER:

Gregory Luke 3-16-92

GREGORY LUKE DATE

CITY ENGINEER

R.C.E. 24873 EXP. 12/31/93

ADOPTED BY THE CITY COUNCIL

BY RESOLUTION NO. 26-92

03/10/92

DATE

CITY OF ATASCADERO
STANDARD SPECIFICATIONS & DRAWINGS

TABLE OF CONTENTS

		<u>PAGE NO.</u>
<u>SECTION 1</u>	GENERAL REQUIREMENTS	1
1.01	Purpose and Intent	1
1.02	Definitions	1
1.03	Permits and Licenses	2
1.04	Safety	3
1.05	Control of Materials	3
<u>SECTION 2</u>	PREPARATION OF PLANS	5
2.01	General	5
2.02	Design Alternatives	6
2.03	Standard Drawing Conventions and Details	6
2.04	Plan Details	8
<u>SECTION 3</u>	INSPECTION	10
3.01	Pre-Construction Conference	10
3.02	Inspection During Construction	10
3.03	Final Inspection	10
<u>SECTION 4</u>	ROADS	12
4.01	Classification of Roads	12
4.02	Geometrics and Profiles	12
4.03	Specifications for Material and Construction	13
4.04	Erosion Control	15
4.05	Traffic Warning Devices and Guardrails	16
4.06	Slope Grading	17
<u>SECTION 5</u>	STORM DRAINAGE	18
5.01	General	18
5.02	Alignment and Capacity	19
5.03	Easements	20
5.04	Flow Calculations and Requirements	21
5.05	Hydraulic Design Criteria	22
5.06	Drainage Structures	24

5.07	Materials and Construction	28
5.08	Structure Backfill	31
<u>SECTION 6</u>	SEWERAGE	
		34
6.01	General	34
6.02	Design Flow and Gradient	34
6.03	Location and Alignment	34
6.04	Depth and Size	35
6.05	Manholes	36
6.06	House Service Lines	36
6.07	Sewage Lift Stations, Force Mains and Treatment Plants	36
6.08	Kind of Pipe	37
6.09	Materials	37
6.10	Construction Requirements	39
<u>SECTION 7</u>	MISCELLANEOUS	
		49
7.01	Fencing	49
7.02	Utilities	49
7.03	Street Trees	49
INDEX TO DRAWINGS		50
STANDARD DRAWINGS		

SECTION 1 - GENERAL REQUIREMENTS

1.01 PURPOSE AND INTENT

The purpose of these Standard Specifications and Drawings is to provide minimum standards for the design, methods of construction, kinds and uses of materials, and the preparation of plans for construction, repair or alteration of streets, concrete structures, drainage and sewerage facilities within the City of Atascadero, where any portion of such improvement is to be offered to the City for operation and/or maintenance, where such improvement will ultimately serve five or more parcels, or where otherwise required. Any items which are not included in these Standard Specifications and Drawings shall be constructed in accordance with the State Specifications as defined below or as required and approved by the City of Atascadero Department of Public Works.

1.02 DEFINITIONS

A. In these Standard Specifications and Drawings or the State Specifications the intent and meaning of the terms that are used shall be as defined in Section 1 of the State Specifications except as herein below specifically noted, revised or added.

1. Contractor. Shall mean any person or persons, firm, partnership, corporation or combination thereof who has/have entered into a contract with any person, corporation, company, or the City of Atascadero, for the construction of any improvement or portion of any improvement within the City of Atascadero.
2. Developer. Shall mean the owner or his representative.
3. Consultant. Shall mean any person or persons, firm, partnership or corporation legally authorized to practice civil engineering in the State of California who prepares or submits improvement plans and specifications on behalf of a developer to the City of Atascadero.
4. City. Shall mean the City of Atascadero.
5. Department. Shall mean the City of Atascadero Department of Public Works.
6. Engineer. Shall mean the Public Works Director or City Engineer of the City of Atascadero acting either directly or through his authorized representatives.
7. State. When State Specifications are applicable, the word "State" as used in the State Specifications, shall mean City of Atascadero.

8. State Specifications. Shall mean the latest edition of Standard Specifications of the State of California, Department of Transportation.
9. Laboratory. Shall mean any testing agency or testing firm which has been licensed by the State of California to act in such capacity and meeting the requirements of the Engineer.
10. AASHTO. Shall mean the American Association of State Highway and Transportation Officials, the standards (or latest revision) thereof.
11. ASTM. Shall mean the American Society of Testing Materials, the standards (or latest revision) thereof.
12. UBC. Shall mean Uniform Building Code, latest edition.
13. AWWA. Shall mean the American Water Works Association, the standards (or latest revision) thereof.

1.03 PERMITS AND LICENSES

A. City Permits. Any Contractor and/or property owner wishing to do work under these standards and specifications shall obtain a permit or approved plans from the Department of Public Works prior to the start of construction. If such permit or approved plans has not been obtained, the work shall be stopped at the direction of the Engineer, who may cause the work already completed to be removed and the site restored to its original condition. Any Contractor performing work within the City right of way shall also obtain an encroachment permit, which may include requirements beyond those contained in these Specifications.

B. CAL/OSHA. Any contractor doing excavations of 5' or more in depth shall possess a current CAL/OSHA permit. A copy of such permit shall be presented to the department of Public Works prior to construction.

C. State License. Any Contractor performing work under these specifications shall possess an appropriate, valid state license to perform such work. The Contractor or his duly authorized representative must be available on the job site during the time when any work is in progress. If such is not the case, work shall be stopped at the direction of the Engineer.

D. Business License. A City of Atascadero business license must also be obtained by any Contractor or subcontractor performing work within the City of Atascadero.

1.04 SAFETY

A. General. All work shall be performed in accordance with the requirements of "Title 8" of the State of California Division of Industrial Safety.

B. Trench Excavation Safety Plan. Excavation for any trench 5' or more in depth shall not begin until the Contractor has received approval from the Engineer of the Contractor's detailed plan for worker protection. Such plans shall be submitted at least 5 days before the Contractor intends to begin excavation for the trench and shall show the details of the design of shoring, bracing, sloping or other provisions to be made for worker protection. No such plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders of the Division of Industrial Safety. If such plan varies from the shoring system standards established by the Construction Safety Orders, the plan shall be prepared and signed by an engineer who is registered as a Civil or Structural Engineer in the State of California.

The Contractor's attention is directed to the provisions of Section 6705 of the Labor Code concerning trench safety plans.

C. Warning Signs. All signs, signals, flares, barricades, flagmen, or other warning devices necessary for the protection and convenience of the public during the construction phase shall be furnished, installed and maintained by the Contractor in accordance with the latest edition of the State of California "Manual of Traffic Control". Signs and other traffic warning devices must be in accordance with the latest edition of the State of California "Manual of Warning Signs, Lights, and Devices For Use in Performance of Work Upon Highways".

D. Stockpiles and Trenches. Excavated material shall be piled in such a manner that it will not endanger the work and will offer minimum obstruction to traffic. Open trenches and waste piles shall be adequately barricaded. Trenches in or adjacent to roadways shall be backfilled at the close of each working day.

1.05 CONTROL OF MATERIALS

A. General. The Engineer may make such tests of any of the materials used in any work done under these specifications as he considers necessary. Samples of materials for testing shall be furnished to the Engineer without charge. In lieu of, or in addition to, tests by the Engineer, he may require properly executed certificates of compliance with these specifications from the manufacturer or fabricator of any materials used in any work done hereunder. Cost of all testing shall be paid for by person, firm or corporation making the improvement. Unless otherwise specified, all materials and construction methods shall conform to State Specifications.

B. Pipe. If pipe manufactured outside of the United States is to be furnished, all the tests required under these specifications shall be conducted within the continental limits of the United States by an established reputable firm operating in the testing of materials field. The testing firm shall submit a certificate that all the requirements of these specifications have been met.

C. Substitutions. Requests for substitution of materials or methods differing from those set forth herein will be considered by the Engineer provided the requestor makes any such requests in writing and furnishes complete descriptive information thereon to the Engineer (including any additional information the Engineer may request) as early in this process as possible but, in any event, by not later than the day on which the final improvement plans are submitted for final review by the Engineer. The Engineer will consider requests for emergency substitutions involving materials which suddenly become unavailable, provided requests for such emergency substitutions, including all data to show substitutions comply with specifications, are received at least 15 calendar days before date of use.

SECTION 2 - PREPARATION OF PLANS

2.01 GENERAL

A. Plans Required. Complete plans and specifications for all proposed streets, drainage facilities, sewer systems, industrial and commercial development and subdivisions, including any necessary dedications and easements, shall be submitted to the Engineer for approval and must receive the required approval prior to the beginning of construction of any such improvements. Where improvements are required as a condition of City approval of any development, including those where City acceptance of the public ways in said development is not intended nor imminent, improvement plans acceptable to the Engineer shall be submitted to assure the Department of Public Works that proper construction standards will be used, together with Performance Bonds and Labor and Materials Bonds as necessary to assure compliance.

B. Submittals. Two sets of plans, specifications and special provisions, together with 2 copies of all computations, estimates, test data, cross sections, and such other items as may be requested by the Engineer, shall be submitted to the Community Development Department for approval. Additional copies of plans shall be submitted as may be required by the Community Development Department. One copy of the plans showing desired revisions will be returned. At such time as necessary revisions are made, the original drawings will be submitted for approval. No construction will be authorized or plan approved until such time as the Engineer signifies his approval by his signature on the original drawings. The Consultant shall then submit two prints of the approved drawings to the Engineer.

Where the improvement plans submitted cover only a portion of the ultimate development, the plans submitted must be accompanied by the approved overall tentative plan, or a study plan if there is no approved overall tentative plan, showing topographic features of the ultimate development at an adequate scale to clearly show the proposed improvements.

A print of the final map or parcel map shall be included with each set of subdivision improvement plans submitted.

C. Alterations and Exceptions; Design Responsibility. There shall be no alterations made to an approved set of plans unless such alterations are submitted to the Engineer for approval. Excepted from approval are any features of the plans that are contrary to, in conflict with or do not conform to any Federal or State law, City Ordinance or Resolution, or generally accepted engineering practice, in keeping with the standards of the profession, even though such errors, omissions or conflicts may have been overlooked in the review of the plans. Responsibility for the design of the improvements is the sole obligation of the Consultant. The City's approval of the Consultant's plans does not relieve the Consultant of this obligation.

The procedure for revising drawings shall be as follows:

1. The Consultant shall make proposed alterations to the original drawings and shall clearly indicate the extent and nature of the change.
2. The Consultant shall clearly indicate the revision by numerical reference in the revision block (per Section 2.03 F).
3. The Consultant's responsible registered civil engineer shall initial the revision.
4. When approved by the Engineer, the Engineer will initial the change on the original drawings. The Consultant shall then submit two sets of the revised drawings to the Engineer.

2.02 DESIGN ALTERNATIVES

A. Design alternatives may be approved by the Engineer where the proposed alternate provides the same level of service, approximately the same estimated maintenance costs, and is not adverse to public health, safety and welfare. This provision is intended to provide for some flexibility in designing streets with bike ways, pedestrian paths and bridle paths; when an area specific plan has been approved showing an alternate to the standard drawings or where appropriate in order to provide compatibility with adjacent areas or existing improvements.

2.03 STANDARD DRAWING CONVENTIONS AND DETAILS

A. Sheet Size, Material, Scale. Plans shall be drawn with ink on mylar (or equal) on 24" x 36" sheets with a 1" clear border. Minimum standard scales shall be: Horizontal of 1" = 40', Vertical of 1" = 4' or 10'; or Horizontal of 1" = 50', Vertical of 1" = 5' or 10'. Smaller scales (i.e. 1" = 100') may be used in appropriate circumstances if approved by the Engineer.

Adhesive applications or "stickyback" are acceptable if free of wrinkles or air pockets and resistant to chipping or smearing.

B. Lettering Sizes, Legibility. Minimum lettering sizes (upper and lower case) shall be as follows:

1. Hand Lettering - 0.125" with a minimum pen size of .35mm or a #0 "Rapidograph".
2. Machine Lettering - 0.08" with a minimum pen size of .30mm or a #00 "Rapidograph".

EXCEPTION: Standard Drawings may be reproduced on the plans at 100% original scale or larger (no reductions) as long as reproduction techniques produce a legible drawing.

All components of all plans shall be legible as determined by the Engineer.

C. Stationing and Orientation. Whenever feasible, stationing shall run left to right, with North oriented to the top or right of the drawing. Where existing City approved plans are available, new plans shall conform to existing stationing if possible.

D. Vicinity Map. A vicinity map shall be included on each set of plans.

E. Title Sheet. On improvement plans exceeding two sheets in the set, a separate title sheet shall be prepared. The index sheet shall include a vicinity map, an index of drawings, the Consultant's name, Professional Registration number and signature; the date, seal, and a block for the necessary approval of the Engineer.

F. Title Blocks. Each sheet of the set of drawings shall have an approved title block showing the sheet title, sheet number, total number of sheets, date, scale, and the Consultant's name, signature, seal, and Professional Registration number; and the name or number of the subdivision if appropriate. An approved revision block shall be included.

G. Right of Way. The boundaries of lots fronting on the street, right of way lines, drainage easements, utility easements, section lines and corners, land grant lines, and temporary construction easements both existing and proposed shall be on the plans. All right of way and easement lines shall be properly dimensioned.

H. Topography. All pertinent topographic features which may affect the design, construction, and operation of the improvement shall be shown on the plans, including but not limited to the following: street lines, sidewalks, curbs, shoulders, location and size of storm and sanitary sewer systems, high water and frequent inundation levels, water and gas lines, existing structures, fences, houses, trees (with drip lines) and other foliage, drainage ditches, utility poles, fire hydrants, and all other features of the area which may affect the design requirements. Contour lines at 1' intervals for slopes less than 10%, 2' for slopes 10% to 30%, or 5' for slopes greater than 30% shall be shown.

I. General Notes. All plans shall contain the City of Atascadero "Standard Notes for Improvement Plans" on file in the City Engineer's office.

2.04 PLAN DETAILS

A. Grading Plans. (On Separate Sheet)

1. Show typical sections between all adjacent lots and between subject property and adjoining properties.
2. Show existing contours (per Section 2.03 H) of the property and surrounding properties for 50' minimum.
3. Indicate pad and street elevations and typical lot section.
4. Show all existing site features including structures, trees, poles, etc.
5. Erosion control measures.

B. Composite Utility Plan. (On Separate Sheet)

1. Must be signed as approved by a representative of each utility.
2. Show all utilities, water, sewer, gas, telephone, electricity, cable TV, fire hydrants, and street lights. Show all utility services to each lot. Show all utility vaults, splice boxes, water meters, etc.

C. Street Design Plan. (On Separate Sheet)

1. Show existing and proposed centerline profile, all curb return profiles, all non symmetrical curb profiles.
2. Show all street dimensions and cross-sections. Add note: "Structural section of street shall be determined by the "traffic index" and the "R" value of the soil."
3. Plan view should include all curbs, gutters, cross-gutters, catch basins, etc. Limits of paving shall be clearly indicated. All existing topography, trees, poles, structures, etc., must be shown.
4. Show all survey monuments, street name signs and traffic signs.

D. Sewer, Water and Storm Drain Design.

1. Sewer, water and storm drain design shall be combined on a separate sheet(s) and shall not be combined with street design sheets.
2. Show plan and profile locations of all sewer mains and sewer laterals, water mains and services and fire hydrants, and storm drains and catch basins.

3. Show all manholes, gate valves, air releases, and blow-offs.
4. Show hydraulic grade line for all drainage facilities.

E. Details. The plans shall include a sheet(s) which shall show the following:

1. Typical street and road cross sections including curb, gutter and sidewalk.
2. Detail of all concrete structures.
3. Sections of drainage, sewer or water trench construction.
4. Miscellaneous details - street signs, monuments, etc.

NOTE: The Detail Sheet may be omitted on small projects when sufficient detailing is included on the design sheets, if approved by the Engineer.

F. Record Drawings. During the progress of the work, the Consultant shall maintain one set of prints of the improvement plans showing all constructed changes from the original design. Each change shall be approved by the Engineer before being made. Upon completion of the work, the Consultant shall revise the original tracings of the improvement plans to reflect all construction changes. The Consultant shall submit check prints of the Record Drawings to the Engineer for review. After any required revisions are made and the Engineer has approved the Drawings, the Consultant shall furnish the City with one reproducible mylar set of the completed Drawings.

SECTION 3 - INSPECTION

3.01 PRE-CONSTRUCTION CONFERENCE

A. After approval of plans and specifications and prior to commencing construction, the Developer or Consultant shall schedule a pre-construction conference. The conference should be attended by the Developer, Consultant, Engineer, Soils Engineer, and representatives from all utility companies affected by the project. The purpose of the conference shall be to define the inspection responsibilities for the project, to review the order of work and safety/traffic control requirements, and to clarify the intentions and details of the plans as needed.

3.02 INSPECTION DURING CONSTRUCTION

A. Inspection By Engineer. Each phase of any and all improvements constructed to these specifications must first be inspected and approved by the Engineer prior to the Contractor's proceeding with subsequent phases. Each phase shall be inspected as the Engineer considers necessary but in any case the Engineer shall make an inspection within two working days after receiving a request for inspection from the Contractor.

B. Inspection By Consultant. On improvement projects required as a condition for subdivisions (parcel maps or tracts) or precise plans, the Developer shall employ Consultant to provide construction inspection for the project. The Consultant shall provide ongoing inspection as frequently as the Consultant deems appropriate to satisfy the Consultant that construction has been completed in substantial conformance with the plans and specifications. The Consultant shall be responsible for coordination of soils and material testing for the project.

At the completion of construction and prior to the final inspection, the Consultant shall submit the following items to the Engineer:

1. Engineer's Improvement Certification
2. Soil Testing Reports
3. Material Compliance Reports
4. Record Drawings
5. Other documentation that may be required by the Engineer to determine satisfactory completion of the project.

3.03 FINAL INSPECTION

A. Upon completion of any improvements which are constructed under and in conformance with these specifications, and prior to requesting final inspection, the area shall be thoroughly cleaned of all rubbish, excess material and equipment, and all portions of the work shall be left in a neat and orderly condition satisfactory to the Engineer.

Within 5 days after receiving the request for final inspection, the Engineer or his authorized agent will inspect the work. The Developer or his representative will be notified in writing as to any particular defects or deficiencies to be remedied. The Developer or his representative shall proceed to correct any such defects or deficiencies in accordance with the approved land use, construction, or grading permit or subdivision performance agreement. At such time as the work has been completed, a second inspection shall be made by the Engineer within 48 hours after notification that reinspection is desired to determine if the previously mentioned defects have been repaired, altered and completed in accordance with these Specifications.

When the Developer has completed construction to the satisfaction of the Engineer, the Engineer will so notify the Developer and recommend acceptance of the project to the City Council.

SECTION 4 - ROADS

4.01 CLASSIFICATION OF ROADS

A. General. Road classifications are defined by the circulation element of the General Plan or, if unspecified, by the Engineer. Roads are classified as follows:

1. Rural Local. Serves residential suburban areas used primarily for access to abutting property.
2. Rural Collector. Used in residential suburban areas to join rural local roads and to provide circulation to urban areas. This standard will also generally be used for roads in new residential suburban subdivisions.
3. Hillside Local/Collector. The Hillside designation applies to rural local or rural collector roads, only, in areas where extreme topography and vegetation dictate the use of minimum road standards.
4. Local. For use in urban areas providing access to residential single and multiple family and commercial uses.
5. Collector. A Collector road is one which will be used primarily in urban areas to enable traffic to move to and from minor roads and arterial roads. The Collector designations shall also apply to industrial zonings.
6. Arterial. An arterial road is one which is used primarily for the purpose of carrying traffic between State Highways and/or which is needed to serve large volumes of traffic within an urban area.

4.02 GEOMETRICS AND PROFILES

A. General. Standards for design speed and horizontal and vertical geometry are defined in Standard Drawings 409 for Rural Roads and 410 for Urban Roads. Stopping sight distances for horizontal and vertical curves shall be designed based on these Standards.

B. Cross Gradients. The minimum cross slope shall be 1%. The maximum shall be 5%. Wherever feasible a 2% cross grade shall be used.

C. Vertical Curves. Vertical profile curves are required at all grade breaks of 1% or more. The minimum vertical curve length shall be 50'.

D. Intersections.

1. When two streets intersect, neither street shall have a grade greater than 3% for a minimum distance of 40' measured from the curb line of the intersected street, except in unusually rough terrain.
2. Intersecting streets shall join within 10° of perpendicular.
3. Minimum curb radius shall be 30'. Minimum property line radius shall be 20'.

E. Cross Gutters. No Cross Gutters will be allowed on Collector Streets or Arterial Roads unless no other provision can be made for adequate drainage.

F. Pavement Widening. Pavement sections on rural local and rural collector roads (including hillside sections) shall be widened on the inside of horizontal curves as follows:

Radius	Extra Width
100' or less	4'
101'-150'	3'
151'-200'	2'

G. Right of Way. Right of Way requirements shall be as specified in the Standard Drawings.

H. Pavement Transitions. Transitions for pavement widening fronting a project shall be provided with a minimum taper of 5:1. Longer transitions may be required by the Engineer. Adequate delineation of transition areas shall be provided.

4.03 SPECIFICATIONS FOR MATERIAL AND CONSTRUCTION

A. General. All materials furnished and methods of performing any proposed work shall conform to and be done in accordance with the applicable portions of these Standard Specifications and Drawings, or if the method and materials are not completely set forth therein, the provisions of the State Specifications shall apply. Where a California Test Method is specified, it shall mean the one currently in use by the State.

B. Structural Section. The required structural section for an improvement shall be based on "R" value (State Stabilometer Method) testing utilizing the T.I. (Traffic Index) established for the road by the Engineer. The Developer shall be responsible for providing the testing and calculations. Calculations shall include the safety factor defined in the State Highway Design Manual.

C. Basement Soil.

1. Resistance factor "R" tests shall be made by the

developer as required by the Engineer. The location of the tests within the area shall be selected so that an average "R" value may be determined for the entire development area.

2. Relative compaction tests shall be made by Developer as required by the Engineer on subgrade material and material placed within the street areas of the development as specified by the Engineer. Said tests will be made prior to placing the next layer of material. Unless otherwise stipulated, the upper 12" of the subgrade shall be compacted to 95% relative compaction and 90% below 12".
3. A prime coat of MC-250 (MC-70 if approved) per Sections 36-1 and 93 of the State Specifications shall be applied on all roadbeds where the profile grade is 10% or steeper.

D. Class II Aggregate Base. Class II Aggregate Base shall conform to Section 26 of the State Specifications.

E. Class III Aggregate Sub Base. The percentage composition by weight of aggregate base shall conform to the following grading when determined by Test Method No. Calif. 202:

<u>Sieve Sizes</u>	<u>Percentage Passing</u>
1 1/2" - - - - -	100
No.4 - - - - -	40-60
No.200 - - - - -	0-15

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

<u>Test</u>	<u>Test Method No. Calif.</u>	<u>Requirements</u>
Resistance (R-value)*	301	70
Sand Equivalent	217	25
Durability	229	25

*The R-value requirement may be waived provided the aggregate base has sand equivalent of 30 or more.

The work of furnishing, spreading and compacting the aggregate base shall be done in accordance with these specifications and Section 26 of the State Specifications. Minimum compaction of base material shall be 95%.

F. Asphalt Concrete. Shall conform to the requirements for Type B Asphalt Concrete AR 8000 as specified in Section 39 of the State Specifications utilizing the 3/4" maximum aggregate, or 1/2" maximum aggregate if specified by the Engineer. When required by the Engineer, a Fog Seal shall be applied to the completed surface and shall comply and be applied in accordance with Section 37-1 of the State Specifications.

G. Compliance Certificates. The owner or developer shall provide certificate statements from the supplier of aggregate base and asphalt concrete materials certifying compliance with these specifications.

H. Survey Monuments. Survey monuments shall be provided at the following locations within an improvement:

- (1) Centerline of streets at intersections with other streets (Standard Drawing No. 426).
- (2) At the beginning and end of curves on the street centerline (Standard Drawing No. 426).
- (3) At all exterior subdivision corners or curve points of a Tract Map, a pipe at least 24" long and 1 1/2" minimum diameter shall be used.
- (4) Lot corners in a subdivision or parcel map exterior corners and parcel corners shall be monumented with 5/8" rebar 24" long or better.

Any original Atascadero Colony subdivision or street monuments within a project shall be replaced (and properly recorded) as follows:

- (1) Street centerline monuments shall be reconstructed per Standard Drawing No. 426.
- (2) Right of Way or property line monuments shall be reset with a 1 1/2" iron pipe 24" long set in a 6" diameter by 12" deep concrete footing.
- (3) Subdivision maps shall provide adequate ties to original monuments to enable their retracement.

4.04 EROSION CONTROL

A. Drainage Installations. Erosion control for all drainage devices, ditches, pipe inlets and outlets, energy dissipators and other appurtenant facilities shall be designed by a registered Civil Engineer in accordance with Cal Trans Standards, ITS "Street and Highway Drainage", or other accepted standards as approved by the Engineer.

B. Slope Planting. All cut and fill slopes steeper than 4:1 in excess of 2' high shall be hydroseeded with the following hydroseed mixture, unless a landscape plan is submitted for approval:

STANDARD HYDROSEED MIX

2 lb/ac California Poppy, 95% pure, 75% germination

4 lb/ac Lupen Suculentus, 99% pure, 75% germination
8 lb/ac Atriplex Semibaccata, 95% pure, 75% germination
12 lb/ac Festuca Megalura, 85% pure, 80% germination
3 lb/ac Nemophila Menziesii, 95% pure, 75% germination
2000 lb/ac wood fibre
120 lb/ac ecology control M-Binder

C. Erosion Control Plan. If any construction is proposed between October 1 and April 1, an erosion control plan addressing interim erosion control measures to be used during the construction shall be submitted when required by the Engineer.

4.05 TRAFFIC WARNING DEVICES AND GUARDRAILS

A. Temporary Signing. All signs, signals, flares, barricades, or other warning devices necessary for the protection and convenience of the public during the construction phase and prior to final acceptance by the City shall be furnished, installed, and maintained by the Contractor. Signs and other traffic warning devices must be in accordance with the latest edition of the State of California "Manual of Warning Signs, Lights, and Devices for Use In Performance of Work Upon Highways".

B. Temporary Barricades. Where improvements only cover a portion of the ultimate improvement and where an improved street is proposed to be extended in the future, the improvements shall include a temporary type barricade at the end of surfacing of such a street to serve as a warning to the public. The barricade shall be constructed, erected, painted, and signed. (See Standard Drawing 428).

C. Permanent Signing and Striping. Permanent signing, delineation, and striping shall be installed as required by the Engineer.

D. Guardrails. Guardrails shall be installed as required by the Engineer. They shall be designed in accordance with State Specifications unless an alternate design is approved by the Engineer.

E. Warning Devices - Minimum Standard Rural Roads. Where the Engineer has approved the use of minimum standards for rural roads (per Standard Drawing 409), additional warning and traffic control devices shall be required as necessary to mitigate the use of the standard. This shall include:

1. Special signage for minimum vertical and horizontal curves.
2. Signage for driveways with minimum sight distance.
3. Signage for reduced design speed areas.

4. Signage for steep grades.
5. Pavement marking, signage, delineation, berms, berm painting and/or guard rails as needed to mitigate distance to lateral obstruction such as trees.

4.06 SLOPE GRADING

A. All slope grading and drainage control shall conform to current UBC requirements. Cut slopes shall not exceed 2:1, fill slopes shall not exceed 2:1. Steeper slopes may be approved by the Engineer if substantiated by a slope stability analysis prepared by a qualified Soils Engineer or Engineering Geologist.

SECTION 5 - STORM DRAINAGE

5.01 GENERAL

A. Purpose. These specifications are intended to meet the requirements of the National Flood Insurance Program.

While it is intended to permit alternative methods of analysis and solution of drainage problems and to provide for other methods for those situations which do not lend themselves to solution by the following criteria, such alternative methods shall be based upon accepted engineering principles and shall produce results which achieve the product intended by the following specifications.

It is the general purpose of these standards that waters generated by storms, springs, or other sources be contained on the area to be developed or carried through a system of waterways and conduits and disposed of in such a manner that adjacent improvements, existing or projected, will be free from flood hazard. Flood hazard is defined as potential damage by water having sufficient depth or velocity to damage improvements or to deposit or scour soil other than within channels.

B. Design Criteria. These standards are intended to provide general and some detailed design criteria. Most design details are left to the responsibility of the Consultant and may be handled by following good engineering practice.

The design standards contained herein are minimal and alternates may be approved, provided such alternates are to a higher standard than those set forth. Exceptions to these standards may be allowed by the Engineer when it can be determined that such exceptions are in the best interest of the City.

All drainage facilities other than those within the road right of way shall be maintained by an entity with taxing powers if possible. The Developer shall complete arrangements for such an entity or some other approved method prior to filing of the Final or Parcel Map.

Each improvement shall be designed so as to not increase the rate of flow of water onto adjacent properties. An exception to this may be permitted by the Engineer if there are adequate downstream facilities or natural watercourses provided to handle the total flow without adverse affect on other properties. In this event, the Developer may be required to participate in the cost of said facilities, and/or obtain easements or other rights as needed.

Unless an individual project required diversion of water to conform to a comprehensive drainage plan, water shall be received and discharged at the locations which existed prior to

development and as nearly as possible in the manner which existed prior to development. Should diversion be required, sufficient work shall be done upstream and/or downstream to provide all affected properties at least the same level of flood protection as existed prior to the diversion.

5.02 ALIGNMENT AND CAPACITY

A. Capacity. Special provisions shall be made by the Consultant within the drainage system to insure that the inlet flow line elevations and the capacity of the drainage system is such that it may be extended to serve and to properly handle the entire drainage basin at the time of ultimate development. This is to include the entire upstream portion and the portion of the basin outside the development, regardless of existing conditions.

B. Alignment. The diversion of natural drainage will be allowed only within the limits of the proposed improvement. All natural drainage must leave the improved area at its original horizontal and vertical alignment and with approximately the same discharge velocity as existed prior to development unless a special agreement indemnifying and approved by the City has been executed with the adjoining property owners.

The general location for storm drainage lines shall be as shown in the Standard Drawings.

Other general requirements for storm drains are as follows:

1. Storm drainage lines are to be parallel with the centerline of streets unless impracticable. The designer should avoid meandering, offsetting, and unnecessary angular changes (none to exceed 90°). Horizontal curvative is acceptable if within manufacturer's specifications.
2. Provide junctions between converging lines in such a manner as will minimize losses and utilize available velocity head, and locate the centerlines of the inlet and outlet soffits so that they will be approximately in the same plane and be as nearly as possible parallel to the resultant vector of the converging lines.
3. The vertical alignment shall be so designed to eliminate any ponding within the drainage system, other than where sump pumps are provided. Vertical curvative is not allowable.
4. Existing open ditches, paved channels, and swale flows shall be maintained as nearly as possible in their existing alignment.

5.03 EASEMENTS

A. General. Drainage facilities must be located in a public street, road or lane, or within a public drainage easement. Necessary dedication for lines to be constructed on private property must be completed before the improvement will be approved for construction.

Where a minor improvement of a drainage facility falls on adjacent property, written permission from the adjacent property owners for such construction and a copy of the approval of the adjacent owners shall be submitted to the Engineer prior to approval of the improvement plans. Agreements between property owners shall hold the City harmless from any damage claim arising from said agreement.

Drainage easements shall be used for drainage purposes exclusively and shall not be combined with easements required for other public utility purposes unless it can be shown to the Engineer that dual use of said easement will not be conflicting.

For natural waterways a drainage easement or right of way when required shall be provided which includes the entire waterway area plus freeboard. Prior to final approval, the easement shall be staked by the Developer's Consultant and reviewed by the Engineer. In the case of a natural waterway having banks with side slopes steeper than two horizontal to one vertical, the right of way may be required to be increased to provide width for not less than 2 to 1 slopes from the existing toe of bank, plus a 10' wide buffer strip. Additional right of way will also be required where unstable ground conditions exist.

B. Easements for Closed Conduits. Easements for closed conduits shall meet the following requirements:

1. Minimum width of 15' with pipe at one-third point, on north or west. Whenever possible, rights of way for closed conduits shall be adjacent to property lines and outside of areas where structures are planned. Easements along property lines should be contained within a single lot and not straddle a lot line.
2. On pipes of 24" diameter and greater, or trenches exceeding 5' in depth, the easement shall have additional width to provide ample working space as required by the Engineer.
3. Provide access and working space rights.

C. Easements For Open Channels. Easements for open channels shall be a minimum of 15' in width and have sufficient width to contain the open channel with side slopes. Additional width for service access shall be as required by the Engineer. All channels having a top width in excess of 50' shall have a 15' service road on each side of the channel.

5.04 FLOW CALCULATIONS AND REQUIREMENTS

A. General. The solution of hydraulic design problems commonly encountered for areas not to exceed 200 acres may be made by the rational method using the material listed below: (See Standard Drawings 505 through 507)

1. Rainfall intensity-duration curve
2. Time of Concentration chart, and
3. Table of Runoff Coefficients.

For special design problems or drainage areas in excess of 200 acres not susceptible to solution by the above mentioned references, the design engineer shall provide such reference, treatise, model study report, or prototype test as is necessary to confirm his hydraulic design. Improvements in natural water courses will not normally be approved unless the capacity of the improved waterway is at least that of the natural waterway.

All building pads or first floor elevations shall be at least 1' above the 100 year storm flow elevation.

B. Gutter Flow. Design depth of flow in gutters shall not exceed the top of a 6" curb for the 10 year flow. Where the discharge gutter capacity is exceeded, a storm drain or other facilities shall be provided to convey the excess flows. The 100 year flow shall be contained within the right of way.

Drainage shall be designed to accommodate ultimate development of up-stream areas.

C. Hydraulic Gradients. The hydraulic grade line for closed conduits shall be a minimum of 0.50' below the elevation of inlet grates and manhole covers of all structures (25 year storm). Headwaters for cross culverts shall not be less than 1' below road centerline for a 25 year storm.

Open channels shall be designed to convey the 10 year flow with freeboard, the 25 year flow without freeboard and provide for safe conveyance of the 100 year flow.

D. Ultimate Development. In computing runoff in a partial development, adequate provisions must be made for the drainage of the overall improvement, including possible commercial areas.

E. Fencing Requirements For Channels.

1. Constructed channels with side slopes 5 to 1 or flatter need not be fenced.
2. Natural channels need not be fenced, except where special hazards exist.
3. For constructed channels, (not excepted from fencing) a 5' high chain link fabric with tension wire shall be

installed on each side of the right of way, 6" inside the right of way line. At all road intersections fencing shall prevent public access to channel or culvert, and 14' wide chain link drive gates shall be provided at all points of access to maintenance ways, or to channels not requiring maintenance ways.

4. For minor channels with depths less than 3' and for localized areas steeper than 5 to 1 on other channels, the Engineer may allow the fence requirement to be waived.
5. Fencing shall be constructed per Section 7.01.

5.05 HYDRAULIC DESIGN CRITERIA

A. Flow Computations. All flow computations shall be in accordance with the following:

1. Manning's Formula shall be used to compute capacities of all open and closed conduits.
2. The "n" values to be used in Manning's Formula shall conform to the following:

a. Polyvinyl Chloride (PVC) pipe	0.009
b. High Density Polyethylene (HDPE) pipe	0.010
c. Concrete cast-in-place or precast pipe	0.013
d. Vitrified clay pipe	0.013
e. Corrugated Metal Pipe (C.M.P.) with paved invert	0.019
f. Corrugated Metal Pipe (C.M.P.) plain unlined	0.024
g. Open channel with gunite lining	0.018
h. Asphaltic concrete (smooth) road berms	0.015
i. Sack concrete rip rap	0.030
j. Grouted rock rip rap	0.030
k. Loose rock rip rap	0.035
l. Open channel with paved bottom	0.025
m. Earth channel	0.030

B. Closed Conduits. Shall be of either cast-in-place or precast reinforced concrete pipe, corrugated metal pipe, polyvinyl chloride pipe, high density polyethylene pipe or an approved equal. Corrugated metal pipe shall only be used for rural standard roads or downdrains.

1. Minimum pipe diameter allowable on any storm drain shall be 18", except that 15" diameter pipe may be used for culverts of not over 20' in length. A lesser size may be used for down drains on fill slopes if approved by the Engineer.

2. Minimum design velocity in closed conduits shall be 2 f.p.s. when conduit is flowing to capacity and should not exceed 15 f.p.s.
3. Any drainage facility whose capacity is equal to or less than a 30" pipe shall normally be carried in a closed conduit in all subdivisions of an average lot size of less than 1 acre.
4. Closed conduits shall be designed to convey the 10 year flow with gravity flow, the 25 year flow with head, and provide safe conveyance for the 100 year overflow.

C. Cover Requirements. Cover requirements shall be as shown in the California Department of Transportation Highway Design Manual, Chapter 850, "Physical Standards", or as approved by the Engineer.

At locations where the general minimum cover requirements cannot feasibly be obtained, the conduit shall be either encased in concrete or provided with a concrete cover or protected by other methods as approved by the Engineer for each individual circumstance.

D. Open Channels.

1. Open channels may be natural watercourses, earthen channels, or channels lined with the materials listed below, provided that the selected lining material is approved by the Engineer for the particular channel reach:
 - a. Low-growing grass, which will form a thick, dense sod. The proposed grass mixture is to be submitted to and approved by the Engineer.
 - b. Rock slope protection facing class, Method B Placement, per Section 72-2 of the State Specifications.
 - c. Concreted-rock slope protection facing class, Method B Placement per Section 72.5 of the State Specifications.
 - d. Sacked concrete slope protection.
 - e. Concrete slope paving.
 - f. Air-blown mortar.
2. Minimum velocity for channels flowing full, with freeboard, shall be 2' per second.

3. Maximum velocity shall be as follows:
 - a. Earth channels not to exceed velocity that would cause erosion (maximum 5' per second).
 - b. Lined channels not to exceed 10' per second or as approved by the Engineer.
4. Freeboard of at least 1' or 0.2 of the specific energy (whichever is greater) shall be provided at 10 year design capacity for all channels. Where linings are required, they shall extend to the full height of freeboard.
5. For natural waterways, the design flow may be allowed in the natural overflow area if a drainage easement is provided, which will include the overflow area, and freeboard as specified above exists between the water surface and adjacent ground.
6. Drainage facilities shall be so constructed and areas adjacent to channels so graded that side drainage will enter in a manner which will prevent erosion within the rights of way. This will often require constructed side inlets and collector ditches to carry side flow to inlets.

E. Design Computations. The design computation for drainage shall include the following information:

1. Drainage area in acres, time of concentration, rainfall intensity and runoff coefficient.
2. Design flow to each structure.
3. Design flow to each pipe.
4. Flow line elevation of each pipe and structure.
5. Top of structure elevation.
6. Water surface elevation at each structure.
7. Hydraulic gradient.
8. Pipe, size, length and gradient.

5.06 DRAINAGE STRUCTURES

A. Manholes.

1. Standard precast concrete manholes shall be used wherever feasible. When cases arise where special manholes or junction boxes are required, the design shall be approved by the Engineer.