



ENGINEERING DEPARTMENT
STANDARD SPECIFICATIONS AND DRAWINGS

Effective Date: March 6, 2014

CITY OF ATASCADERO
ENGINEERING DEPARTMENT

STANDARD SPECIFICATIONS
AND DRAWINGS



APPROVED BY THE CITY ENGINEER:

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CITY ENGINEER

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ADOPTED BY THE CITY COUNCIL
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CITY OF ATASCADERO
STANDARD SPECIFICATIONS & DRAWINGS

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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 Succulentus, 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 and the Central Coast Water Board's Post Construction Stormwater Management Requirements for Development Projects in the Central Coast Region (Post Construction Standards).

Section 5 requirements allow for alternative methods of analysis and solution of flood control drainage problems and provide for other methods for those situations which do not lend themselves to solution by the following criteria. Alternative methods shall be based upon accepted engineering principles and shall produce results which achieve the product intended by the following specifications. However, the Post Construction Drainage Standards shall be followed in accordance with these and the referenced Central Coast Water Board requirements. The City will consider alternative analyses and solutions, other than those specified below, but the Developer shall gain approval for the alternative analysis and solutions from the Central Coast Water Board prior to acceptance by the City Engineer

It is the general purpose of these drainage standards that waters generated by storms, springs, or other sources be contained on the area to be developed and 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, will reduce pollutant discharges to the maximum extent practicable, and will prevent stormwater discharges from causing or contributing to a violation of receiving water quality standards, on or offsite.

- B. Definitions for terms used in Section 5 are location in **Exhibit A.**

- C. 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 standard engineering practice.

The City's detention design standards contained herein are to be considered as the minimum allowable and alternates may be approved, provided such alternates are to a higher standard than those set forth. Exceptions to the detention design standards may be allowed by the Engineer when it can be determined that such exceptions are in the best interest of the City. Exceptions to the State's Post Construction

Requirements contained herein shall be approved by the Central Coast Regional Water Quality Control Board prior to City Engineer approval.

All drainage facilities designed and constructed in conformance with these standards shall be maintained in perpetuity by a legal entity with the ability to collect fees, dues, or payments to fund needed maintenance. This includes homeowner associations, benefit assessment districts, maintenance districts or associations, individual landowners, and commercial developments. The Developer shall complete arrangements for such an entity or some other approved method prior to filing of the Final or Parcel Map. In cases of pre-existing lots of record, the arrangements for such an entity shall be made prior to building permit issuance.

Each improvement shall be designed so as to not increase the rate of flow of water onto adjacent properties, pollutant discharge to receiving waters, and cause or contribute to a violation of a receiving water quality standard. Exceptions to the flood control drainage standards may be permitted by the Engineer if there are adequate downstream facilities or natural watercourses provided to handle the total flow without an 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 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.

D. Applicability. New and redevelopment projects will be subject to the requirements of Section 5, as follows:

1. Flood Damage Prevention and Storm Drainage: all projects must comply with requirements of Municipal Code Title 7 Public Works, Chapter 11 Flood Damage Prevention, et seq. and this chapter, as applicable. The downtown area is exempt from stormwater detention requirements, however, Post Construction Requirements still apply. Check with City staff to find out if your project site is exempt. Flood mitigation requirements apply throughout the City.
2. Post-Construction Stormwater Management: Projects subject to the Post-Construction Performance Requirements

include all new development or redevelopment projects that create and/or replace >2,500 square feet of impervious surface (collectively over the entire project site). See Section 5.09 for Post Construction Requirement applicability details.

Road projects (private and public) and practices that are also subject to the Post Construction Stormwater Management requirements include:

- a. Removing and replacing a paved surface resulting in the alteration of the original line and grade, hydraulic capacity or overall footprint of the road.
- b. Extending the road pavement edge, or paving gravel shoulders.
- c. Resurfacing by upgrading from dirt to asphalt, or concrete; upgrading from gravel to asphalt, or concrete; or upgrading from a bituminous surface treatment ("chip seal") to asphalt or concrete.

E. Exemptions: Projects that are not subject to the post construction requirements are limited to the following:

1. Road and Parking Lot maintenance:
 - a. Road surface repair including slurry sealing, fog sealing, and pothole and square cut patching.
 - b. Overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage.
 - c. Shoulder grading.
 - d. Cleaning, repairing, maintaining, reshaping, or re-grading drainage systems.
 - e. Crack sealing.
 - f. Resurfacing with in-kind material without expanding the road or parking lot.
 - g. Practices to maintain original line and grade, hydraulic capacity, and overall footprint of the road or parking lot.
 - h. Repair or reconstruction of the road because of slope failures, natural disasters, acts of God or other man-made disaster.
2. Sidewalk and bicycle path or lane projects, where no other impervious surfaces are created or replaced,

built to direct stormwater runoff to adjacent vegetated areas.

3. Trails and pathways, where no other impervious surfaces are replaced or created, and built to direct stormwater runoff to adjacent vegetated areas.
4. Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics.
5. Curb and gutter improvement or replacement projects that are not part of any additional creation or replacement of impervious surface area (e.g., sidewalks, roadway).
6. Second-story additions that do not increase the building footprint.
7. Raised (not built directly on the ground) decks, stairs, or walkways designed with spaces to allow for water drainage.
8. Photovoltaic systems installed on/over existing roof or other impervious surfaces, and panels located over pervious surfaces with well-maintained grass or vegetated groundcover, or panel arrays with a buffer strip at the most down gradient row of panels.
9. Temporary structures (in place for less than six months).
10. Electrical and utility vaults, sewer and water lift stations, backflows and other utility devices.
11. Projects that have received the first discretionary approval (by Planning Commission or City Council) of project design prior to March 6, 2014.
12. Above-ground fuel storage tanks and fuel farms with spill containment system.
13. Projects that are only subject to ministerial approval are exempt if they have received ministerial approvals prior to March 6, 2014.
14. Other Exemptions - The Developer may propose, to the Central Coast Water Board Executive Officer, a lesser application of these Post Construction Drainage Standards for projects with completed project applications dated prior to the Central Coast Water Board approval of the Post Construction Requirements (Approved July 12, 2013). The Developer must demonstrate that the application of the Post

Construction Requirements would pose financial infeasibility for the project. The Engineer will not grant any exemptions without prior approval from the Central Coast Water Board Executive Officer.

- F. Non-Stormwater Discharges: Non-stormwater discharges shall comply with the current version of the City's Stormwater Pollution Prevention Ordinance and all applicable State and Federal Laws and regulations. It is the Developers responsibility to comply with the aforementioned codes, laws and regulations.

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 curvature 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 FOR DETENTION FACILITIES

- 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 505¹)
1. Standard Drawing 505, Time of Concentration Nomograph.
 2. Standard Drawing 506, Coefficient of Runoff Table.
 3. Standard Drawing 507, Rainfall Intensity Curve
- B. 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.
- C. All building pads or first floor elevations shall be at least 1' above the 100 year storm flow elevation, or as required by the City's most current flood ordinance.
- D. 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.
- E. 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

¹ Or currently adopted Standard Engineering Drawing.

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.

F. 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.

G. 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 vinyl clad chain link fabric with tension wire shall be installed on each side of the right of way, 6" inside the right of way line or as approved by the Engineer. 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 11.0.

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:

<u>Material</u>	<u>n value</u>
Polyvinyl Chloride (PVC) pipe	0.009
High Density Polyethylene (HDPE) pipe	0.010
Concrete cast-in-place or	0.013

precast pipe	
Vitrified clay pipe	0.013
Corrugated Metal Pipe (C.M.P.)	0.019
with paved invert	
Corrugated Metal Pipe (C.M.P.)	0.024
plain unlined	
Open channel with gunite lining	0.018
Asphaltic concrete (smooth) road berms	0.015
Sack concrete rip rap	0.030
Grouted rock rip rap	0.030
Loose rock rip rap	0.035
Open channel with paved bottom	0.025
Earth channel	0.030

B. Closed Conduits. Shall be of either cast-in-place or precast reinforced concrete pipe, polyvinyl chloride pipe, high density polyethylene pipe or an approved equal.

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 but are not limited to 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.
2. Manholes shall be located at junction points, changes in gradient and changes in conduit size. On curved pipes with radii of 200' to 400' manholes shall be placed at the BC or EC of the curve and on 300' maximum intervals along the curve. On curves with radii exceeding 400', manholes shall be placed at the BC or EC of the curve and on 400' maximum intervals along the curve for pipes 24" and less in diameter and 500' maximum intervals along the curve for pipes greater than 24" in diameter. Curves with radii less than 200' will be handled on an individual basis and approved by the Engineer.
3. Spacing of manholes or inlets, of such size as to be enterable for maintenance, shall not exceed 500' for drains 24" and smaller in diameter and 600' for pipes greater than 24" in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.
4. All manholes or junction boxes, entry to which does not fall in the gutter line, must have standard 24" diameter manhole covers. Those falling in the gutter line may use the standard grated manhole cover and

serve also as an inlet manhole.

B. Inlets.

1. Gutter inlets shall be in accordance with the types shown on Standard Drawings 502, or other approved special inlets. See State Standard Plan D72 for extended curb opening inlets.
2. Inlets shall be spaced so that gutter flow does not exceed a depth of 6" at the face of the curb for a 10-year storm and so that a 100-year storm will not cause any damage and can be contained within the right of way.
3. Grates shall be adequate for State of California HS-20 traffic loading, and shall conform to State Standard Plan D77A ,D77B, or most updated plan.
4. Rural standard inlets in accordance with Standard Drawings 503 and 504 may be used for rural designated roads subject to approval of the Engineer.
5. All inlets shall be marked with a "No Dumping - Drains To Creek" metal medallion per Standard Drawing 502 and 502, or at the direction of the City Engineer.

C. Junction Boxes.

1. Piped stormdrain systems shall have junctions at not more than 450-foot intervals.
2. Where standard manholes are not feasible for use as junction structures, junction boxes shall be constructed of Class "A" reinforced Portland Cement Concrete or fabricated from reinforced concrete pipe sections where size limitations permit. Design shall be as approved by the Engineer and shall conform to State Standards.
3. Minimum wall thickness for poured-in-place reinforced concrete junction boxes shall be 6".
4. The inside dimension of junction boxes shall be such as to provide a minimum of 3" clearance on the outside diameter of the largest outfall pipe.
5. All junction boxes shall have the standard 24" manhole cover (Southbay Foundry SBF 1900 manhole frame and cover or Alhambra Foundry Co. Ltd. A1254 manhole frame and cover, traffic or equal; cover shall include cast markings indicating "Storm Sewer").
6. In non-roadway areas having rural designations,

junction boxes shall generally be minimum 48-inch diameter manhole structures except as approved by the City Engineer.

D. Reinforced Concrete Box Culverts, CMP and Structural Plate Arch Culverts.

1. All materials, designs, and construction shall conform to the requirements of the State Specifications and State Standard Plans unless otherwise specified by the Engineer.

E. Headwalls, Wingwalls, Endwalls, Trash Racks and Railings.

1. All headwalls, wingwalls, and endwalls shall be constructed of "Minor Concrete" type of reinforced Portland Cement Concrete with no less than 550 lbs of cementitious material per cubic yard conforming to Section 90 of the State Specifications.
2. All headwalls, wingwalls and endwalls shall be considered individually and shall be, in general, designed in accordance with State Standards or approved by the Engineer.
3. Trash racks shall be provided where in the opinion of the Engineer they are necessary to prevent clogging of culverts and storm drains.
4. On plastic drains, preformed end sections may be utilized with the approval of the Engineer.
5. Steel plate beam guardrail or equal may be required by the Engineer at culverts, headwalls and box culverts and on steep side slopes. When so required, the railing shall be installed in accordance with State Standards and Specifications.

F. Drainage Pumps.

1. The use of drainage pumps shall be avoided whenever possible. They shall be used only with the approval of the Engineer.
2. If the use of a drainage pump is approved, the drainage system shall be so designed as to provide for gravity outfall during summer months and periods of low water stages. If a low state gravity outfall is impossible or impracticable, a pump of smaller capacity for low stage flow may be used provided approval is granted by the Engineer.
3. Drainage pumps shall be equipped with standby equipment

with alternating operation characteristics.

4. When specified by the Engineer, the outfall shall be equipped with floodgates of an approved design.
5. Pumping installations shall be so designed as to accommodate a design storm as specified by the Engineer.
6. Pumping stations shall be designed so that gravity flow does not flow through the pump pit.
7. Each pumping installation shall receive separate approval, including all machinery, electrical system, piping system, housing installation and other miscellaneous design features.

G. Detention Basins.

1. A detention basin is defined as any drainage facility which is used to retard the rate of flow storm run-off from a site by sizing the out flow pipe or channel so that the rate of flow from the property is not increased after development. The accumulating run-off from the development shall be stored in the detention basin until it drains away.
2. Volume of Storage. The required volume of storage shall be determined by the difference in the 2-year storm run-off of the undeveloped site and the 50-year storm run-off of the developed site. The outlet pipe or channel shall be sized for the 2-year storm peak run-off rate for the undeveloped site, at full capacity.
3. Method of Calculation. Detention basin storage volume shall be computed by the hydrograph method. Hydrographs shall be developed for the post development inflow (50-year storm) and the basin outflow (not to exceed 2-year pre-development storm). The outflow hydrograph shall be based on the final basin outlet design. Shortcut methods such as the rational formula method with constant outflow will not be accepted for final design.
4. Basin Design. Detention basin design shall conform to Standard Drawing 508. Basin outlet shall be designed to the approval of the Engineer.

The consultant shall evaluate the area downstream of the detention basin for: 1) ability to handle the 2-year outlet discharge; and 2) effects of basin overtopping. Downstream improvements or other mitigation measures may be required by the Engineer if

downstream capacity or improvements are inadequate.

5. Landscaping/Fencing Requirements for Basins

- a. All Deep basin (Slope < 5:1) facilities within the city limits must be provided with a 6' chain link fence, or alternative approved by the Engineer. Chain link fence shall be of the materials and construction as specified in 7.01 of this document.
- b. Shallow basins (slopes<5:1) are not required to be fenced unless specified by the Engineer.
- c. Shallow basins and all basins visible from a public way, trail or park shall be marked.

6. Right of Way

- a. The top of bank shall be located a minimum of 5' inside the right of way line or as dictated by set-back requirements. If a fence is required it shall be located 6" inside the right of way line except where setbacks are required as part of a conditional use permit. Fence shall conform to Section 7.01 of these Standard Specifications.
- b. Right of way required for drainage basins shall be dedicated to the City of Atascadero.

H. **Grading and Drainage**

1. Grading on site is to be done with the elimination of rough spots and ponding areas. Site soil is to be graded such that perimeter water drains away from protected areas.
2. Grading shall be done so that drainage will not be diverted onto adjacent properties.
3. Diversion of off-site storm water away from a Development will only be allowed so as to conform to any "Comprehensive Drainage Plan" which may be in place at the time the plans are approved by the City. Unless diversion of storm water is required to conform to a comprehensive drainage plan, off-site storm 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.

4. All graded areas shall be prepared and maintained to minimize erosion. This control may consist of effective planting or other erosion control best management practice.

5.07 MATERIALS AND CONSTRUCTION

- A. General. All material that is to become a permanent part of any storm drain or appurtenant structure, shall conform to the requirements for the particular materials as set forth in these specifications. The Contractor shall supply any and all certificates of compliance, certified test results or shall perform tests as required to assure the Engineer that the material being incorporated into the work has met the requirements as specified. Approval of the Engineer shall be required for use of material not listed in these standards.

All pipe or conduits shall be of the size, material and strength as shown on the plans. All pipe and fittings shall be marked or stamped with the trade brand name of the manufacturer, and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied. Supporting strength of conduits as installed to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of the Marston formula.

- B. Reinforced Concrete Pipe. Reinforced Concrete Pipe shall be constructed of Class 2 Portland Cement Concrete conforming to Section 65 of the State Specifications.

1. Excavation for pipe shall conform to Section 6.11 B of these specifications except that where tongue and groove pipe is utilized excavation need only be to 1" below the outside diameter of the pipe in uniform material and 3" below the outside of the pipe in rocky material.

2. Laying of reinforced concrete pipe: Section 65-2.03D of the State Specifications.

3. Jointing: Section 65-2.03D of the State Specifications.

4. Trench backfill: Section 6.11 G of these Specifications and Standard Drawing 702.

- C. Cast-in-Place Concrete Pipe. Shall be constructed of Class 2 Portland Cement Concrete conforming to Section 65 of the State Specifications. The construction method shall conform

to the method specified for reinforced concrete pipe.

- D. Corrugated Metal Pipe (CMP). Shall conform to the material and construction methods of Section 66 of the State Specifications. Attention is directed to the backfill requirements of Section 6.11G of these Specifications, except that pea gravel or other suitable gravel material may be utilized for bedding and backfill.

NOTE: CMP pipes may only be utilized with prior approval by the Engineer.

- E. Polyvinyl Chloride Pipe (PVC). PVC pipe up to 15" in diameter shall conform at least to ASTM standard D3034/SDR35. PVC pipe from 18 to 48" diameter shall conform to ASTM standards and AASHTO standard 304. Excavation and backfill shall conform to Sections 6.11 B and 6.11G of these Specifications.

- F. High Density Polyethylene Pipe (HDPE). HDPE shall conform to Section 6.09 E of these Specifications. Excavation and backfill shall conform to Sections 6.11 B and 6.11 G of these Specifications.

- G. Concrete Structures. Shall be in accordance with these Standards and Specifications and in addition they shall conform to the requirements of Section 51 of the State Specifications. Backfill shall conform to Section 5.08 of these Specifications.

- H. Reinforcement. Shall conform to the requirements of Section 52 of the State Specifications.

- I. Portland Cement Concrete. Drainage Pipes shall be constructed of Class 2 Portland Cement Concrete. Curbs, gutters, sidewalks, and other drainage facilities shall be constructed of Minor Concrete type. All P.C.C. shall conform to Section 90 of the State specifications.

- J. Gunite Lined Channels. Shall be placed as required by these Standards and Specifications, and shall be reinforced with steel wire mesh and conform to the materials and methods as follows:

1. Channel Preparation - The channel shall be trimmed to the line and grade and cross section as shown on the plans within the following limitations:

Allowable deviation from profile 0.05'; allowable deviation of slope and line 0.15' in any 10' length section of channel.

Care shall be taken to prevent excavating below ditch grade line or beyond the slope lines. Any deviation in

excess of the specified tolerance may not be backfilled with earth, but shall be corrected by the placement of additional gunite materials. The channel shall be clean, damp and free from any rubbish or trash or free flowing or standing water prior to initiating guniting operations.

2. Placing of Material - Channel lining shall consist of a mixture of Portland Cement and sand, mixed dry, passed through a flexible hose, hydrated at the nozzle and deposited upon a dampened subgrade by air pressure. The final ditch lining shall not be less than 3" in thickness and shall conform to the dimensions shown on the plans. The pneumatic pressure at the gage shall remain uniform at the following pressures:

- a. For hose length up to 100' - 45 psi.
- b. Where the length of hose exceeds 100' the pressure shall be increased 5 psi for each additional 50' of hose.

3. Weep Holes - Shall be provided at intervals of 10' midway between contraction joints. The holes shall be backed by a minimum of 1 cubic foot of concrete aggregate wrapped in geotextile fabric to insure proper operation of the weep hole. The aggregate shall extend at least 0.5' above the weep hole.

All weep holes shall be 2" in diameter and be placed at an elevation of 1' above the flow line of the channel.

4. Curing - Shall be accomplished by the pigmented curing compound method as specified in Section 40-1.02C of the State Specifications, except that the manual operation of an unshielded spray nozzle will be permitted. Surface shall be kept moist or wet until the curing compound is applied. Curing compound shall not be applied to surfaces of construction joints.

5. Materials for Gunite Lining:

- a. Portland cement shall conform to the requirement of Section 90-1.02A of the State Specifications.
- b. Sand shall be washed sand and shall be hard, dense durable, clean and sharp and graded evenly from fine to coarse within the following limits:

<u>Sieve Size</u>	<u>Percentage Passing by Weight</u>
3/8"	100
No. 4	97-100

No. 8	70-85
No. 16	60-73
No. 30	36-47
No. 50	10-20
No. 100	0-5

Sand shall be free from organic matter and shall contain not more than 5% by weight of deleterious substances, and shall have a fineness modulus of between 2.70 and 3.30.

- c. The materials above shall be mixed in the proportions of 1 part Portland cement to 4-1/2 parts of sand, by volume.

K. Concrete Lined Channels. Concrete lined channels shall be constructed of the materials and in accordance with Section 72-5 of the State Specifications.

- 1. Weep Holes - Shall be provided at intervals of 10' midway between contraction joints. The holes shall be backed by a minimum of 1 cubic foot of concrete aggregate wrapped in geotextile fabric to insure proper operation of the weep hole. The aggregate shall extend at least 0.5' above the weep hole.
- 2. All weep holes shall be 2" in diameter and be placed at an elevation of 1' above the flow line of the channel.

L. Grouted Rock Rip Rap Channels. Shall conform to the materials and methods called for in State Specifications 72-5.

Weep Holes - Weep hole pipe consisting of 2 1/2" diameter galvanized iron pipe shall be placed through the grouted rock rip rap along both sides of the channel approximately 1' above the channel invert. Spacing of weep holes shall be such as to provide complete drainage of the foundation and filter material and shall not exceed 10'.

5.08 STRUCTURE BACKFILL

- A. Backfilling operations shall conform to the following requirements: Material for use as structure backfill shall have a sand equivalent value of not less than 20 as determined by Test Method No. Calif. 217. The percentage composition by weight as determined by laboratory sieves shall conform to the following grading:

<u>Sieve Size</u>	<u>Percent Passing Sieves</u>
2 1/2"	90-100
No. 4	35-100

- B. Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected by the Engineer and approved for backfilling. No backfill material shall be deposited against the back of concrete abutments, concrete retaining walls, or the outside walls of cast-in-place concrete culverts until the concrete has developed a strength of not less than 2,500 pounds per square inch in compression as determined by test cylinders cured under conditions similar to those prevailing at the site and tested in accordance with Test Method No. California 521, or until approved by the Engineer.
- C. Backfill material shall be placed in horizontal, uniform layers not exceeding 0.67' in thickness, before compaction, and shall be brought up uniformly on all sides of the structure or facility. Each layer of backfill shall be compacted to a relative compaction of not less than 90%, except that the upper 2' shall be compacted to 95%. Backfill outside the roadway prism shall have a sand equivalent of not less than 20 and shall be compacted to not less than 85%. It shall conform to the above grading limits.
- D. At the option of the contractor, backfill material conforming to the requirements hereinafter specified may be used at the following locations:
1. Footings for slope protection, slope paving and aprons.
 2. All headwalls and culvert wingwalls.
 3. Retaining walls, except for portions under any roadbed.
 4. Drop inlets in median areas or in traffic interchange loops.
- E. The backfill material at the above locations may consist of material from excavation, free from stones, or lumps exceeding 2-1/2" in greatest dimension, namely, clay or adobe type material, vegetable matter or other unsatisfactory material, and shall be compacted to a relative compaction of not less than 90%.
- F. Compaction of structure backfill by jetting will be permitted, when, as determined by the Engineer, the backfill material is of such character that it will be self-draining when compacted and that foundation material will not soften or be otherwise damaged by the applied water and no damage from hydrostatic pressure will result to the structure. Jetting of the upper 4' below subgrade will not be permitted. When jetting is permitted, material for use as structure backfill shall be placed and compacted in layers not exceeding 4' in thickness. The work shall be performed

without damage to the structure and embankment, and in such a manner that water will not be impounded. Jetting shall be supplemented by the use of other compaction equipment when necessary.

- G. The contractor shall submit a statement with an Encroachment Permit application that states where they will be disposing of the unsuitable materials.

5.09 POST CONSTRUCTION DRAINAGE STANDARDS

Post Construction Stormwater Standards were adopted by the Central Coast Regional Water Quality Control Board on September 6, 2012, and re-adopted on July 12, 2013. The Post Construction Standards are the basis for these Drainage Standards. Therefore, the Post Construction Stormwater Standards, and any subsequent updates, are hereby incorporated by reference in these Post Construction Drainage Standards. Exceptions to the City's Post Construction Drainage Standards are outlined in the following sections. Developers seeking exceptions that are not listed below must obtain Central Coast Water Board Approval prior to approval by the Engineer.

5.09.1 APPLICABILITY:

Projects subject to these Post-Construction Performance Requirements include all new development or redevelopment projects that create and/or replace >2,500 square feet of impervious surface (collectively over the entire project site). The flow charts on pages 42 through 45 are included as aids in determining, which of the Performance Requirements are applicable. Performance Requirements are additive, meaning that a project will have to comply with all the Performance Requirements up to the triggered level.

5.09.2 DETERMINING POST CONSTRUCTION PERFORMANCE REQUIREMENT(S)

5.09.21 NEW DEVELOPMENT PROJECTS

- A. Site Design Measures shall be applied throughout the project site.
- B. Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements, as applicable to the Project, shall apply to the Project's entire Equivalent Impervious Surface Area (EISA) for the site (see page 68 for definition and calculation). Once the EISA is determined, the developer shall use the charts on pages 42 through 45 to determine the Performance requirements that apply.

5.09.22 REDEVELOPMENT PROJECTS:

- A. Site Design Measures shall be applied throughout the project site.
- B. Water Quality Treatment and Runoff Retention Performance Requirements shall apply to the Regulated Project's entire Equivalent Impervious Surface Area for the site (see page 68 for definition and calculation).
- C. Peak Management Performance Requirements shall apply only to the additional runoff generated by increased impervious surfaces on the project site. Water Quality Treatment Performance Requirements shall apply to the runoff from existing, new, and replaced impervious surfaces on sites where runoff from existing impervious surfaces cannot be separated from runoff from new and replaced impervious surfaces.

5.09.23 STEP 1 - DETERMINE EQUIVALENT IMPERVIOUS SURFACE AREA

The following method is used to determine the project's Equivalent Impervious Surface Area. Equivalent Impervious Surface area is used to determine the Performance Requirements that apply to the project.

$$E_i = I_t + P_t$$

Where:

E_i = Equivalent Impervious Surface Area (ft^2)

I_t = Impervious Tributary Surface Area (ft^2)

P_t = Pervious Tributary Surface Area (ft^2)

1. Impervious Tributary Surface Area (I_t) is defined as the sum of all of the site's conventional impervious surfaces. When calculating Impervious Tributary Area:
 - Includes: concrete, asphalt, conventional roofs, metal structures and similar surfaces
 - Does not include: green roofs

2. Pervious Tributary Surface Area (P_t) is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient. When calculating Pervious Tributary Surface Area:

- Include surfaces such as: unit pavers on sand; managed turf²; disturbed soils; and conventional landscaped areas (see Table 1 for correction factors).

Example:

Project Site includes 500 ft² of unit pavers on sand.
Pervious Tributary Surface Area = 500 ft² x C = 50 ft²
 Where C = Correction Factor for unit pavers, 0.1, from Table 1.

- Does not include: Infiltration stormwater control measure (SCMs) surfaces (e.g., SCMs designed to specific performance objectives for retention/infiltration) including, bioretention cells, bioswales; natural and undisturbed landscape areas, or landscape areas compliant with the Model Water Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7).

Table 1
Correction Factors³ For Calculating Equivalent Impervious Surface Area

Pervious Surface	Correction Factor
Disturbed Soils/Managed Turf ² (dependent on original Hydrologic Soil Group)	A: 0.15 B: 0.20 C: 0.22 D: 0.25
Pervious Concrete	0.60

² Managed Turf includes turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings.

³ Table from the Central Coast Water Board's Attachment 1, Post Construction Stormwater Management Requirements for Development Projects In the Central Coast Region.

Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10

5.09.24 STEP 2 - DETERMINING PROJECT STORMWATER PERFORMANCE REQUIREMENTS

The flow charts on pages 43 through 46 are included as an aid to determining the Project Stormwater Performance Requirement(s) that each development project must include.

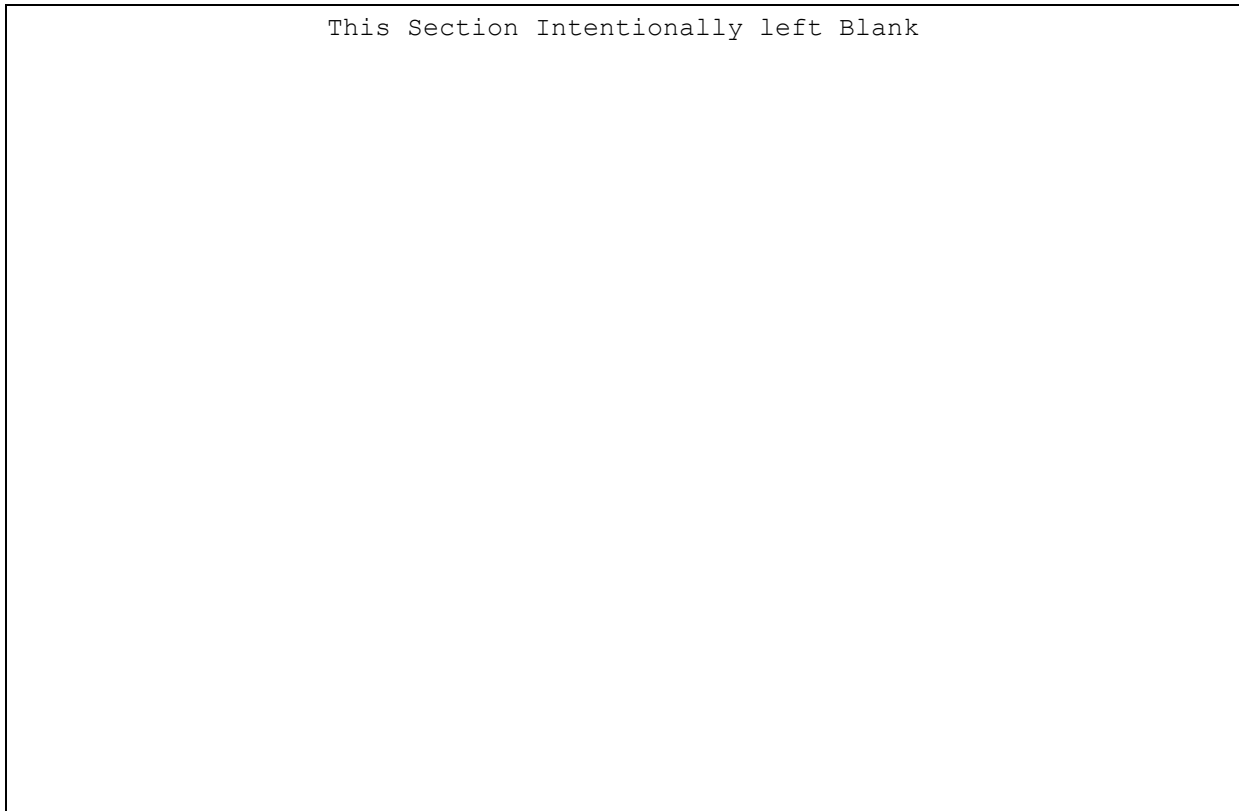


Figure 1 - Initial Screening for all development and Redevelopment projects

FLOW CHART TO DETERMINE PERFORMANCE REQUIREMENTS

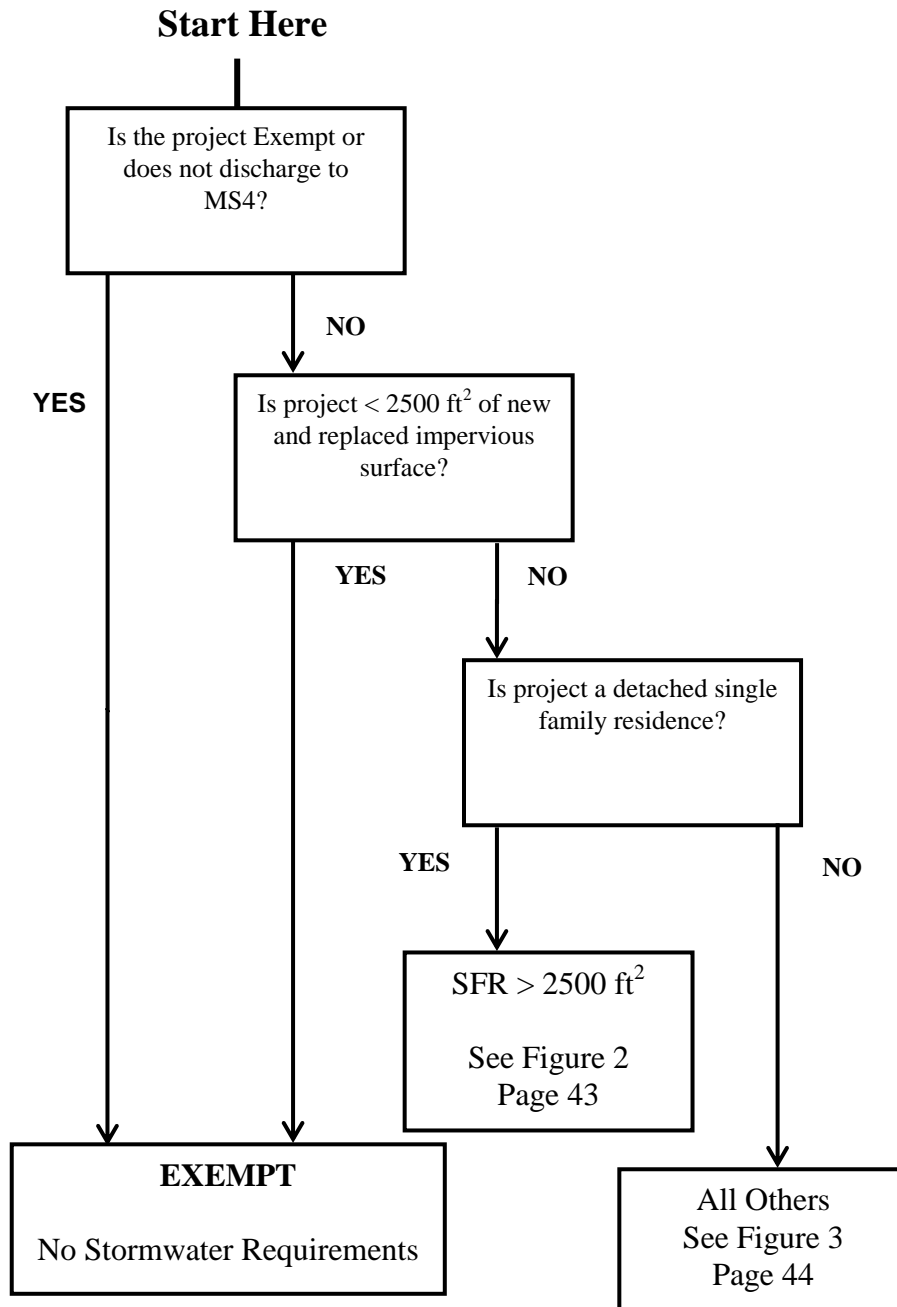


Figure 2 - Requirements for Single Family Residential projects

DETACHED SINGLE FAMILY RESIDENTIAL PROJECTS

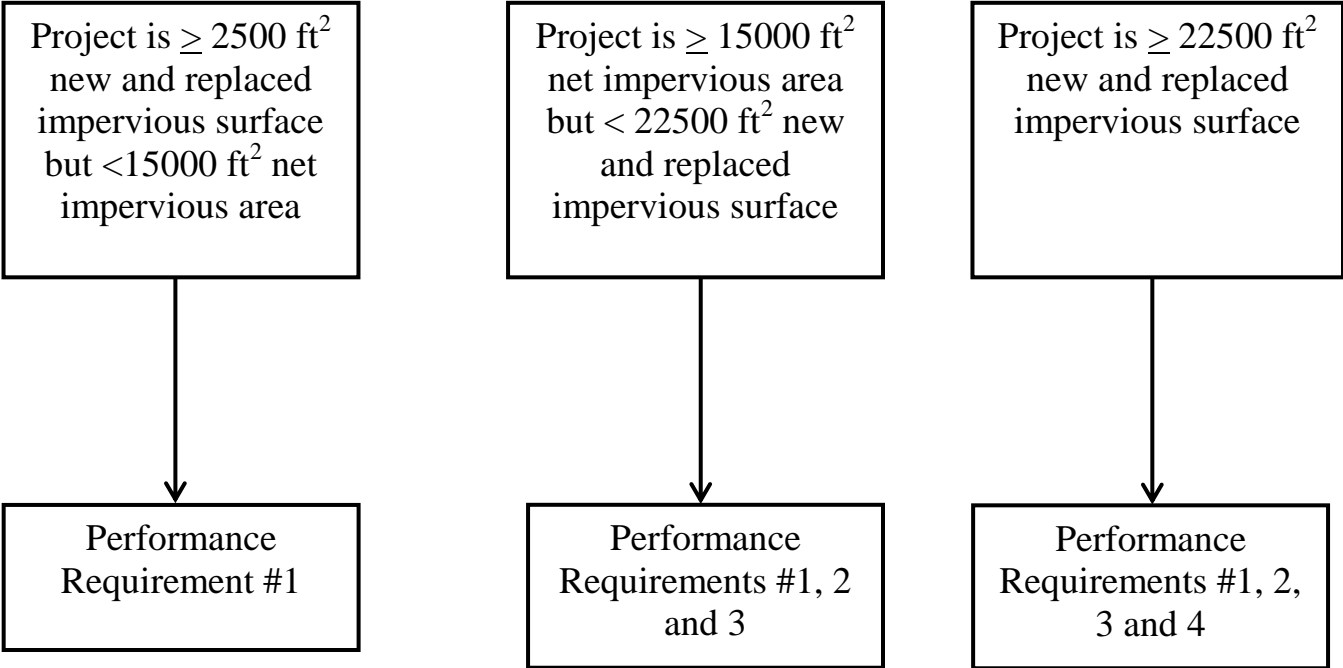


Figure 3 - Requirements for small to moderate development projects

Development Projects ≥ 2500 ft²

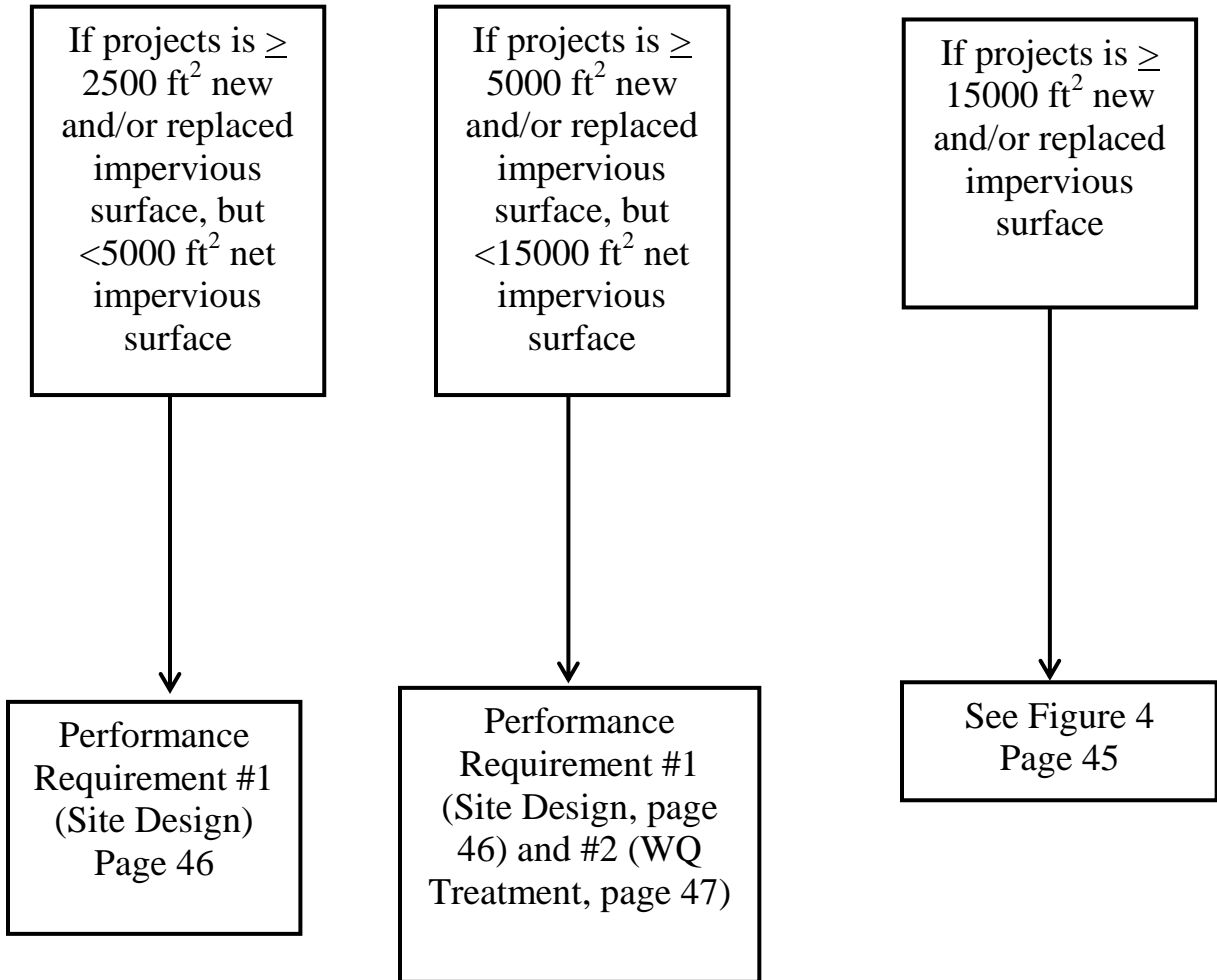
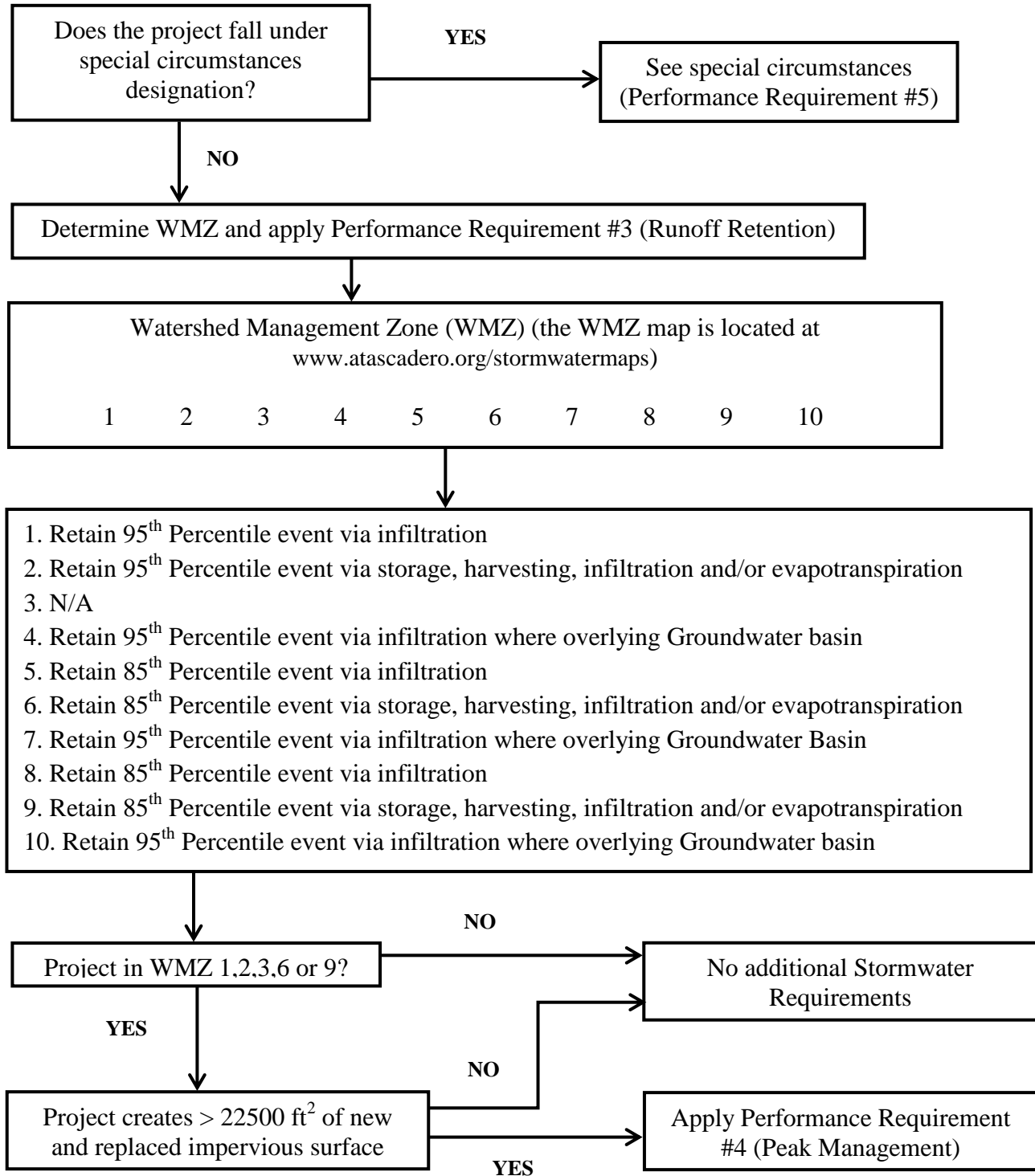


Figure 4 - Requirements for Large Development Projects

PROJECTS \geq 15000 FT² NEW AND REPLACED IMPERVIOUS AREA



5.10 PERFORMANCE REQUIREMENT NUMBER 1 - SITE DESIGN AND RUNOFF REDUCTION

- A. Each project subject to Performance Requirement Number 1 (PR1) shall implement the following site design strategies to the Engineer's satisfaction. In addition, the developer shall submit a certification with the Project Engineer's certification (**Exhibit B**) that all site design strategies have been incorporated, or, marked not applicable. The Project Engineer shall provide an explanation in the case where a site design strategy is not applicable.
- B. Projects that create and/or replace > 2,500 square feet of impervious surface (collectively over the entire project site), including detached single-family home projects, must implement the following design strategies:
1. Limit disturbance of creeks and natural drainage features. The plans must show the locations of creeks and natural drainage features.
 2. Minimize compaction of highly permeable soils. The plans must show the locations of highly permeable soils (Type A soils). The limits of grading must be shown on the plans.
 3. Limit clearing and grading of native vegetation at the site to the minimum area needed to build the project, allow access, and provide fire protection. The limits of grading must be shown on the plans.
 4. Minimize impervious surfaces by concentrating improvements on the least-sensitive portions of the site, while leaving the remaining land in a natural undisturbed state.
 5. Minimize stormwater runoff by implementing one or more of the following site design measures:
 - a. Direct roof runoff into cisterns or rain barrels for reuse.

- b. Direct roof runoff onto vegetated areas safely away from building foundations and footings, consistent with California building code.
- c. Direct runoff from sidewalks, walkways, and/or patios onto vegetated areas safely away from building foundations and footings, consistent with California building code.
- d. Direct runoff from driveways and/or uncovered parking lots onto vegetated areas safely away from building foundations and footings, consistent with California Building Code.
- e. Construct bike lanes, driveways, uncovered parking lots, sidewalks, walkways, and patios with permeable surfaces.

C. Certification: The Project Engineer shall submit the project stormwater certification, see **Exhibit B**, with the project plans and drainage report.

5.20 PERFORMANCE REQUIREMENT NUMBER 2 - WATER QUALITY TREATMENT

A. Projects that add ≥5,000 square feet of Equivalent Impervious Area are subject to Performance Requirement 2 - Water Quality Treatment. Credit for removed impervious surface is allowed for all projects that trigger Performance Requirement Number 2. Projects that trigger Performance Requirements 3 & 4 are not allowed to take credit for removed impervious surface area. Net Impervious Area is calculated as described in 5.20 A.1. NOTE: Single family residences are exempt from this requirement, unless the developer is adding 15,000 square feet or more of Equivalent Impervious Surface as part of the single family residence project.

1. Net Impervious Area is the total (including new and replaced) post-project impervious areas, minus any reduction in total imperviousness from the pre-project to post-project condition: *Net Impervious Area = (New and Replaced Impervious Area) - (Reduced Impervious Area Credit)*, where *Reduced Impervious Area Credit* is the total pre-project to post-project reduction in impervious area, if any.

- B. Projects subject to Water Quality Treatment Performance Requirements to treat runoff using the onsite measures below, listed in the order of preference (highest to lowest):
1. Low Impact Development (LID) Treatment Systems - Implement harvesting and use, infiltration, and evapotranspiration stormwater control measures that collectively achieve the following hydraulic sizing criteria for LID systems:
 - a. Hydraulic Sizing Criteria for LID Treatment Systems - LID systems shall be designed to retain stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data.
 2. Biofiltration Treatment Systems - Implement biofiltration treatment systems using facilities that must be demonstrated to be at least as effective as a biofiltration treatment system with the following design parameters:
 - a. Maximum surface loading rate appropriate to prevent erosion, scour and channeling within the biofiltration treatment system itself and equal to 5 inches per hour, based on the flow of runoff produced from a rain event equal to or at least:
 - i. 0.2 inches per hour intensity; or
 - ii. Two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall depth
 - b. Minimum surface reservoir volume equal to the biofiltration treatment system surface area times a depth of 6 inches.
 - c. Minimum planting medium depth of 24 inches. The planting medium must sustain a minimum infiltration rate of 5 inches per hour throughout the life of the project and must maximize runoff retention and pollutant removal. A mixture of sand (60%-70%) meeting the specifications of American Society for Testing and Materials (ASTM)

C33 and compost (30%-40%) by weight may be used. A Project may utilize an alternative planting medium if it demonstrates its planting medium is equal to or more effective at attenuating pollutants than the specified planting mixture.

- d. Proper plant selection.
 - e. Subsurface drainage/storage (gravel) layer with an area equal to the biofiltration treatment system surface area and having a minimum depth of 12 inches.
 - f. Underdrain with discharge elevation at top of gravel layer.
 - g. No compaction of soils beneath the biofiltration facility (ripping/loosening of soils required if compacted).
 - h. No liners or other barriers interfering with infiltration, except for situations where later infiltration is not technically feasible.
3. Non-Retention Based Treatment Systems - Implement Stormwater Control Measures that collectively achieve at least one of the following :
- a. Hydraulic Sizing Criteria for Non-Retention Based Treatment Systems:
 - i. Volume Hydraulic Design Basis - Treatment systems whose primary mode of action depends on volume capacity shall be designed to treat stormwater runoff equal to the volume of runoff generated by the 85th percentile 24-hour storm event, based on local rainfall data
 - ii. Flow Hydraulic Design Basis - Treatment systems whose primary mode of action depends on flow capacity shall be sized to treat:
 - The flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the applicable area, based on historical records of hourly rainfall

depths; or

- The flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity.

A. Stormwater Control Plan Requirements - For each Project subject to this Requirement, the Applicant must provide the below information in a Stormwater Control Plan. Final project approval shall not be granted until the Stormwater Control Plan demonstrates the Project design meets the Performance Requirements.

1. Project name, application number, location including address and assessor's parcel number.
2. Name of Applicant.
3. Project Phase number (if project is being constructed in phases).
4. Project Type (e.g., commercial, industrial, multi-unit residential, mixed-use, public), and description.
5. Total project site area.
6. Total new impervious surface area, total replaced impervious surface area, total new pervious area, and calculation of Net Impervious Area.
7. Statement of Water Quality Treatment Performance Requirements that apply to the Project.
8. Summary of Site Design and Runoff Reduction (Performance Requirement No. 1) measures selected for the project.
9. Description of all post-construction structural Stormwater Control Measures.
10. Supporting calculations used to comply with the applicable Water Quality Treatment Performance Requirements
11. Documentation certifying (Exhibit B) that the selection, sizing, and design of the Stormwater Control Measures meet the full or partial Water Quality Treatment Performance Requirement
12. Water quality treatment calculations used to comply with Performance Requirements and any analysis to support infeasibility determination

13. Statement of Compliance:

Statement that Water Quality Treatment Performance Requirement has been met on-site, or, if not achievable:

- a. Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements.
- b. Statement of intent to comply with Performance Requirements through Alternative Compliance

5.30 - PERFORMANCE REQUIREMENT NO.3: RUNOFF RETENTION

- A. Projects, except detached single-family homes, that create and/or replace $\geq 15,000$ square feet of impervious surface (collectively over the entire project site), and detached single-family homes $\geq 15,000$ square feet of Net Impervious Area (see calculation in Section 5.02.A.1), in WMZs 1, 2, 5, 6, 8 and 9, and those portions of WMZs 4, 7, and 10 that overlie the Atascadero Groundwater Sub-Basin (see **Exhibit C**) to meet the Runoff Retention Performance Requirements in Sections 5.30.B and 5.30.C using the LID Development Standards in Section 5.30.D for optimal management of watershed processes.
- B. Adjustments to the Runoff Retention Performance Requirements for Redevelopment - Where the Project includes replaced impervious surface, the below adjustments apply. These adjustments are accounted for in the Retention Tributary Area calculation below.
 1. Determination of Retention Tributary Area: Determining the Retention Tributary Area is the basis for calculating the runoff volumes subject to Performance Requirement Number 3. Retention Tributary Area should be calculated for each individual Drainage Management Area to facilitate the design of SCMs for each Drainage Management Area. The generic equation below illustrates how various portions of the site are addressed when determining the Retention Tributary Area. The Retention Tributary Area calculation must also account for the adjustments for Redevelopment Projects subject to Performance Requirement No. 3.
 - a. Compute the Retention Tributary Area, using the equation:

$$\text{Retention Tributary Area} = (\text{Entire Project Area}) - (\text{Undisturbed or Planted Areas})^* - (\text{Impervious Surface Areas that Discharge to Infiltrating Areas})^{**}$$

*As defined in Section 5.30.D.4.a.

** As defined in Section 5.30.D.4.b.

- b. Adjustments for Redevelopment Project Retention Tributary Area - Where the Regulated Project includes replaced impervious surface, the following Retention Tributary Area adjustments apply:
 - i. Redevelopment Projects outside an approved Urban Sustainability Area, as described in Section C.3. - The total amount of replaced impervious surface area shall be multiplied by 0.5 when calculating the Retention Tributary Area.
 - ii. Redevelopment Projects located within an approved Urban Sustainability Area (**Section 5.60.A.3**) - The replaced impervious surface areas may be subtracted from the Retention Tributary Area. The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.
 2. Redevelopment Projects outside an approved Urban Sustainability Area, as described in Section 5.60.A.3. The total amount of replaced impervious surface shall be multiplied by 0.5 when calculating the volume of runoff subject to Runoff Retention Performance Requirements.
 3. Redevelopment Projects located within an approved Urban Sustainability Area (Section 5.60.A.3) - The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.
- C. Projects subject to the Runoff Retention Performance Requirements, must meet the following:
1. Watershed Management Zone 1 and portions of Watershed Management Zones 4, 7 and 10 which overlie designated Groundwater Basins:
 - a. Retain 95th Percentile Rainfall Event - Prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.⁴
 - b. Compliance must be achieved via infiltration.

⁴ www.atascadero.org/stormwatermaps

2. Watershed Management Zone 2:
 - a. Retain 95th Percentile Rainfall Event - Prevent offsite discharge from events up to the 95th percentile 24-hour rainfall event as determined from local rainfall data.
 - b. Compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotranspiration.
 3. Watershed Management Zones 5 and 8:
 - a. Retain 85th Percentile Rainfall Event - Prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.
 - b. Compliance must be achieved via infiltration.
 4. Watershed Management Zones 6 and 9:
 - a. Retain 85th Percentile Rainfall Event - Prevent offsite discharge from events up to the 85th percentile 24-hour rainfall event as determined from local rainfall data.
 - b. Compliance must be achieved via storage, rainwater harvesting, infiltration, and/or evapotranspiration.
- D. LID Development Standards -Projects subject to Runoff Retention Performance Requirements, must meet the Requirements (Sections 5.30.B and 5.30.C) using the following LID Development Standards:
1. Site Assessment Measures -Applicants for each Project must identify opportunities and constraints to implement LID Stormwater Control Measures. The applicant must document the following, as appropriate to the development site:
 - a. Site topography
 - b. Hydrologic features including contiguous natural areas, wetlands, watercourses, seeps, or springs
 - c. Depth to seasonal high groundwater
 - d. Locations of groundwater wells used for drinking water
 - e. Depth to an impervious layer such as bedrock

- f. Presence of unique geology (e.g., karst)
 - g. Geotechnical hazards
 - h. Documented soil and/or groundwater contamination
 - i. Soil types and hydrologic soil groups
 - j. Vegetative cover/trees
 - k. Run-on characteristics (source and estimated runoff from offsite which discharges to the project area)
 - l. Existing drainage infrastructure for the site and nearby areas including the location of municipal storm drains
 - m. Structures including retaining walls
 - n. Utilities
 - o. Easements
 - p. Covenants
 - q. Zoning/Land Use
 - r. Setbacks
 - s. Open space requirements
 - t. Other pertinent overlay(s)
2. Site Design Measures -Each Project must optimize the use of LID site design measures, as feasible and appropriate at the project site. Projects subject to Performance Requirement No. 3 must augment design strategies required by Performance Requirement No. 1 (**Section 5.10.B**) with the following:
- a. Define the development envelope and protected areas, identifying areas that are most suitable for development and areas to be left undisturbed
 - b. Conserve natural areas, including existing trees, other vegetation, and soils
 - c. Limit the overall impervious footprint of the project

- d. Construct streets, sidewalks, or parking lot aisles to the minimum widths necessary, provided that public safety and mobility uses are not compromised
 - e. Set back development from creeks, wetlands, and riparian habitats
 - f. Conform the site layout along natural landforms
 - g. Avoid excessive grading and disturbance of vegetation and soils
3. Delineation of discrete Drainage Management Areas (DMAs) -Each Project must delineate DMAs to support a decentralized approach to stormwater management.
- a. Each Project must provide a map or diagram dividing the entire project site into discrete DMAs
 - b. Each Project must account for the drainage from each DMA using measures identified in Sections 5.30.D.4.a and 5.30.D.4.b, below.
4. Undisturbed and Natural Landscape Areas - Each Project must implement appropriate Site Design (Section 5.30.D.2, and Runoff Reduction Measures in Performance Requirement No. 1, to reduce the amount of runoff for which retention and treatment is required. Runoff reduction measures that can be used to account for this reduction also include the below measures. The Retention Tributary Area calculation in Exhibit D accounts for these reductions.
- a. Undisturbed or areas planted with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas may be considered self-treating and no additional stormwater management is required.
 - b. Runoff from impervious surfaces, generated by the rainfall events identified in **Section 5.30.C**, may be directed to undisturbed or natural landscaped areas. When the applicant can demonstrate that this runoff will be infiltrated and will not produce runoff to the storm drain system, or a surface receiving waterbody, or create nuisance ponding that may affect vegetation health or contribute to vector problems, then no additional stormwater management is required for these impervious surfaces.

5. Structural Stormwater Control Measures - Where Applicants have demonstrated in their Stormwater Control Plans, and the use of Site Design measures listed in Section 5.30.D.2 are in place Runoff Reduction measures listed in Performance Requirement No.1, and undisturbed and natural landscape areas discussed in Section 5.30.D.4 has been maximized to the extent feasible, Structural Stormwater Control Measures designed for water quality treatment and/or flow control shall be used to comply with Performance Requirement No. 3.
 - a. The Project must use structural Stormwater Control Measures that optimize retention and result in optimal protection and restoration of watershed processes, such as Structural Control Measures associated with small-scale, decentralized facilities designed to infiltrate, evapotranspire, filter, or capture and use stormwater.
 6. Hydrologic Analysis and Structural Stormwater Control Measure Sizing - To determine Stormwater Control Measure sizing and design, Project must use one of the following: 1) hydrologic analysis and sizing methods as outlined in Exhibit D locally/regionally calibrated continuous simulation model that results in equivalent optimization of on-site runoff volume retention; or 3) hydrologic analysis and sizing methods, equally effective in optimizing on-site retention of the runoff generated by the rainfall event specified in **Section 5.30.C**, that have been approved by the Central Coast Water Board Executive Officer.
- E. Ten Percent Adjustment for Sites with Technical Infeasibility - Where technical infeasibility, as described in Section 5.60.A.1 prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention is not required and the Project is required to dedicate no less than ten percent of the Project's Equivalent Impervious Surface Area⁵ to retention-based Stormwater Control Measures.
1. Use the Exhibit E instructions to calculate the ten percent adjustment for applying the Runoff Retention Performance Requirement.
 2. The Water Quality Treatment Performance Requirement is not subject to this adjustment, i.e., mitigation to achieve full compliance with the Water Quality

Treatment Performance Requirement is required on- or off-site.

- F. Off-Site Mitigation - Off-site mitigation is required when Projects do not retain the full Retention Volume per Section 5.30.B and 5.30.C and 1) fail to demonstrate technical infeasibility of full retention; or 2) demonstrate technical infeasibility of full retention AND fail to dedicate at least ten percent of the Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.
1. Use the Exhibit F instructions to calculate the Off-Site retention requirements when a Project subject to the Runoff Retention Performance Requirement does not allocate the full ten percent of the project site's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures.
- G. Reporting Requirements - For each Project subject to the Runoff Retention Performance Requirement, the Applicant must provide the below information in a Stormwater Control Plan. Final project approval will not be granted until the Stormwater Control Plan Project design meets the Water Quality Treatment and Runoff Retention Performance Requirements.
1. Project Name, application number, and location including address and assessor's parcel number.
 2. Name of Applicant.
 3. Project Phase number (if project is being constructed in phases).
 4. Project Type (e.g., commercial, industrial, multiunit residential, mixed-use, public), and description.
 5. Total project site area.
 6. Total new and/or replaced impervious surface area.
 7. Statement of Water Quality Treatment and Runoff Retention Performance Requirements that apply to the Project.
 8. Adjusted Requirements based on the local jurisdiction's approval, that the Project is allowed a Special Circumstance, Watershed or Regional Plan, or Urban Sustainability Area designation.
 9. Site assessment summary
 10. LID Measures used:

- a. Site design measures.
 - b. Runoff Reduction Measures.
 - c. Post-construction structural Stormwater Control Measures.
11. Summary of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area, as well as for the entire site.
 12. Supporting calculations used to comply with the applicable Water Quality Treatment and Runoff Retention Performance Requirements.
 13. Documentation demonstrating infeasibility where Site Design and Runoff Reduction measures cannot retain required runoff volume.
 14. Documentation demonstrating infeasibility where retention-based Stormwater Control Measures cannot retain and/or treat the required runoff volume.
 15. Documentation demonstrating infeasibility where on-site compliance cannot be achieved.
 16. Documentation demonstrating percentage of the project's Equivalent Impervious Surface Area dedicated to retention-based Stormwater Control Measures.
 17. Documentation of certification that the selection, sizing, and design of the Stormwater Control Measures meets the applicable Water Quality Treatment and Runoff Retention Performance Requirement.
 18. O&M Plan for all structural Stormwater Control Measures to ensure long-term performance
 19. Owner of facilities.
 20. Statement of Compliance:
 - a. Statement that the Water Quality Treatment and Runoff Retention Performance Requirements have been met on-site, or, if not achievable:
 - i. Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance volume.
 - ii. Statement of intent to comply with Water Quality Treatment and Runoff Retention

Performance Requirements through an Alternative Compliance agreement.

5.40 PERFORMANCE REQUIREMENT NO. 4: PEAK MANAGEMENT

- A. Projects that create and/or replace $\geq 22,500$ square feet of impervious surface (collectively over the entire project site) in Watershed Management Zones 1, 2, 3, 6, and 9 must manage peak stormwater runoff as required below (Section 5.40.A.1.a), and to meet Water Quality Treatment and Runoff Retention Performance Requirements.
1. The following Peak Management Performance Requirements must be applied:
 - a. Post-development peak flows, discharged from the site, shall not exceed pre-project peak flows for the 2- through 10-year storm events.
 2. Reporting Requirements - For each Project subject to the Peak Management Performance Requirement, the Applicant must provide the below information in a Stormwater Control Plan. Final project approval will not be granted until the Stormwater Control Plan demonstrates the Project design meets the Water Quality Treatment, Runoff Retention, and Peak Management Requirements.
 - a. Project Name, application number, and location including address and assessor's parcel number.
 - b. Name of Applicant.
 - c. Project Phase number (if project is being constructed in phases).
 - d. Project Type (e.g., commercial, industrial, multiunit residential, mixed-use, public), and description.
 - e. Total project site area.
 - f. Total new and/or replaced impervious surface area.
 - g. Statement of Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements that apply to the Project.
 - h. Adjusted Requirements based on the local jurisdiction's approval, that the Project is allowed a Special Circumstance, Watershed or Regional Plan, or Urban Sustainability Area designation.

- i. Site assessment summary.
- j. LID Measures used:
 - i. Site design measures.
 - ii. Runoff Reduction Measures.
 - iii. Post-construction structural Stormwater Control Measures.
- k. Summary of Runoff Reduction Measures and Structural Stormwater Control Measures, by Drainage Management Area, as well as for the entire site.
- l. Supporting calculations used to comply with the applicable Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements.
- m. Documentation demonstrating infeasibility where on-site compliance cannot be achieved.
- n. Documentation of certification that the selection, sizing, and design of the Stormwater Control Measures meet the applicable Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements.
- o. O&M Plan for all structural SCMs to ensure long-term performance.
- p. Owner of facilities.
- q. Statement of Compliance:
 - i. Statement that the Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements have been met on-site, or, if not achievable:
 - Documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements.
 - Statement of intent to comply with Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements through an Alternative Compliance agreement.

5.50 PERFORMANCE REQUIREMENT NO. 5: SPECIAL CIRCUMSTANCES

A. Projects may be considered subject to Special Circumstances based on certain site and/or receiving water conditions. The Special Circumstances designation exempts a Project from Runoff Retention and/or Peak Management Performance Requirements where those Performance Requirements would be ineffective to maintain or restore beneficial uses of receiving waters. The Project subject to Special Circumstances must still comply with the Water Quality Treatment Performance Requirements.

1. Special Circumstances include:

a. Highly Altered Channel Special Circumstance:

The City may designate Projects as subject to Special Circumstances for Highly Altered Channels for the following conditions:

- i. Project runoff discharges into stream channels that are concrete-lined or continuously armored from the discharge point to the channel's confluence with a lake, large river (>200-square mile drainage area).
- ii. Project runoff discharges to a continuous underground storm drain system that discharges directly to a lake, large river (>200-square mile drainage area),
- iii. Project runoff discharges to other areas identified by the Central Coast Water Board
- iv. Under no circumstance described in Section 5.50.A.1.a can runoff from the Project result in adverse impacts to downstream receiving waters

b. Intermediate Flow Control Facility Special Circumstance:

- i. The City may designate Projects as subject to Special Circumstances for Intermediate Flow Control Facilities if the project runoff discharges to an existing (as of July 12, 2013) flow control facility that regulates flow volumes and durations to levels that have been demonstrated to be protective of beneficial uses of the receiving water downstream of the facility.

- ii. The flow control facility must have the capacity to accept the Project's runoff.
 - iii. Demonstration of facility capacity to accept runoff and to regulate flow volumes and durations must include quantitative analysis based on numeric, hydraulic modeling of facility performance.
 - iv. Under no circumstance described in Section 5.50.A.1.b can runoff from the Project result in adverse impacts to downstream receiving waters.
- c. Historic Lake and Wetland Special Circumstance:
- i. The City may designate Projects as subject to Special Circumstances for Historic Lakes and Wetlands for the following conditions:
 - Project is located where there was once a historic lake or wetland where pre-development hydrologic processes included filtration and storage but no significant infiltration to support downstream receiving water, or;
 - The Special Circumstance has been established based on a delineation of the historic lake or wetland approved by the Central Coast Water Board Executive Officer.

2. Performance Requirements for Highly Altered Channel and/or Intermediate Flow Control Facility Special Circumstances:

- a. For Projects that: 1) create and/or replace >22,500 square feet of impervious surface; 2) are located in WMZs 1, 2, 5, and 8, and those portions of WMZs 4, 7, and 10 that overlie a designated Groundwater Basin:
 - i. Water Quality Treatment (Performance Requirement No. 2)
 - ii. Runoff Retention (Performance Requirement No. 3)
- b. For Projects that: 1) create and/or replace >22,500 square feet of impervious surface; and 2) are located in WMZs 3, 6, and 9, and those

substantiate the requested Special Circumstances designation; and

- ii. Documentation that the proposal was completed by a registered professional engineer, geologist, architect, and/or landscape architect.

5.60 Alternative Compliance (Off-Site Compliance)

A. Alternative Compliance refers to Water Quality Treatment, Runoff Retention and Peak Management Performance Requirements that are achieved off-site through mechanisms such as developer fee-in-lieu arrangements and/or use of regional facilities. Alternative Compliance may be allowed under the following circumstances:

1. Technical Infeasibility: Off-site compliance with Water Quality Treatment, Runoff Retention, or Peak Management Performance Requirements may be allowed when technical infeasibility limits or prevents use of structural Stormwater Control Measures.
 - a. To pursue Alternative Compliance based on technical infeasibility, the developer, for Regulated Projects outside of Urban Sustainability Areas, must submit a site-specific hydrologic and/or design analysis conducted and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect, demonstrating that compliance with the applicable numeric Post-Construction Stormwater Management Requirements is technically infeasible.
 - b. The Regulated Project applicant must submit a description of the project(s) that will provide off-site mitigation. The proposed off-site projects may be existing facilities and/or prospective projects that are as effective in maintaining watershed processes as implementation of the applicable Post-Construction Stormwater Requirements on-site.

The description shall include:

- i. The location of the proposed off-site project(s) must be within the same watershed as the Regulated Project. Alternative Compliance project sites located outside the watershed may be approved by the Central Coast Water Board Executive Officer.

- ii. A schedule for completion of offsite mitigation project(s), where the off-site mitigation project(s) has not been constructed.
 - c. Technical infeasibility may be caused by site conditions, including:
 - i. Depth to seasonal high groundwater limits infiltration and/or prevents construction of subgrade stormwater control measures.
 - ii. Depth to an impervious layer such as bedrock limits infiltration.
 - iii. Sites where soil types significantly limit infiltration.
 - iv. Sites where pollutant mobilization in the soil or groundwater is a documented concern.
 - v. Space constraints (e.g., infill projects, some redevelopment projects, high density development).
 - vi. Geotechnical hazards.
 - vii. Stormwater Control Measures located within 100 feet of a groundwater well used for drinking water.
 - viii. Incompatibility with surrounding drainage system (e.g., project drains to an existing stormwater collection system whose elevation or location precludes connection to a properly functioning treatment or flow control facility).
- 2. Approved Watershed or Regional Plan: (Reserved for future use if a Watershed Plan is adopted by the City).
- 3. Approved Urban Sustainability Area: (Reserved for future use if a Urban Sustainability area is adopted by the City).

5.70 Field Verifications of Post-Construction Stormwater Control Measures

- A. Prior to occupancy of each Regulated Project, the contractor shall provide field verification that the Site Design, Water Quality Treatment, Runoff Retention, and/or Peak Management controls have been implemented in accordance with these Drainage Standards. In order to fulfill this requirement,

this City will allow or require the contractor/owner to provide third-party verification of SCMs. The third party SCMs shall be observed and endorsed by a registered professional engineer, geologist, architect, and/or landscape architect.

5.80 Operation and Maintenance for Structural SCMs

- A. The Permittee shall require O&M Plans and Maintenance Agreements that clearly establish responsibility for all structural Water Quality Treatment, Runoff Retention, and/or Peak Management controls on private and public Regulated Projects. The Permittee shall also maintain a structural SCM tracking database to support long-term performance of structural SCMs.
1. O&M Plan: The Regulated Project applicant shall develop and implement a written O&M Plan that, at a minimum, includes each component listed below. The Permittee may allow the Regulated Project applicant to include the O&M Plan components in the Stormwater Control Plan in place of developing a separate document. The Permittee shall approve the O&M Plan prior to final approval/occupancy. The O&M Plan must include, at minimum:
 - a. A site map identifying all structural Stormwater Control Measures requiring O&M practices to function as designed.
 - b. O&M procedures for each structural stormwater control measure including, but not limited to, LID facilities, retention/detention basins, and proprietorship devices.
 - c. The O&M Plan will include short-and long-term maintenance requirements, recommended frequency of maintenance, and estimated cost for maintenance.
 2. Maintenance Agreement and Transfer of Responsibility for SCMs: Prior to issuing approval for final occupancy each Permittee shall require that Regulated Projects subject to these Post-Construction Requirements provide verification of ongoing maintenance provisions for Structural Stormwater Control Measures, including but not limited to legal agreements, covenants, CEQA mitigation requirements, and or conditional use permits. Verification shall include, at a minimum:
 - a. The project owner's signed statement accepting responsibility for the O&M of the installed onsite and/or offsite structural treatment and flow control SCMs until such responsibility is legally transferred to another entity; and either:

- i. A signed statement from the public entity assuming responsibility for structural treatment and flow control SCM maintenance and stating that the SCM meets all local agency design standards; or
 - ii. Written conditions in the sales or lease agreements or deed for the project that require the buyer or lessee to assume responsibility for the O&M of the onsite and/or offsite structural treatment and flow control SCM until such responsibility is legally transferred to another entity; or
 - iii. Written text in project deeds, or conditions, covenants and restrictions for multi-unit residential projects that require the homeowners association or, if there is no association, each individual owner to assume responsibility for the O&M of the onsite and/or offsite structural treatment and flow control SCM until such responsibility is legally transferred to another entity; or
 - iv. Any other legally enforceable agreement or mechanism, such as recordation in the property deed, that assigns responsibility for the O&M of the onsite and/or offsite structural treatment and flow control SCM to the project owner(s) or the Permittee
1)
- B. The project owner shall ensure, through conditions of approval or other legally enforceable agreements or mechanisms, that site access is granted to all representatives of the City or State of California for the sole purpose of performing operation and maintenance (O&M) observations of the installed Stormwater Control Measures

Exhibit A

Definitions

Bioretention - A Stormwater Control Measure designed to retain stormwater runoff using vegetated depressions and soils engineered to collect, store, treat, and infiltrate runoff. Bioretention designs do not include underdrains.

Biotreatment or Biofiltration Treatment - A Stormwater Control Measure designed to detain stormwater runoff, filter stormwater through soil media and plant roots, and release the treated stormwater runoff to the storm drain system. Biotreatment systems include an underdrain.

Discretionary Approval - A project approval which requires the exercise of judgment or deliberation when the MS4 decides to approve or disapprove a particular activity, as distinguished from situations where the MS4 merely has to determine whether there has been conformity with applicable statutes, ordinances, or regulations.

Dispersion - The practice of routing stormwater runoff from impervious areas, such as rooftops, walkways, and patios, onto the surface of adjacent pervious areas. Stormwater runoff is dispersed via splash block, dispersion trench, or sheet flow and soaks into the ground as it moves slowly across the surface of the pervious area.

Drainage Management Area (DMAs) - Following the low impact development principle of managing stormwater through small-scale, decentralized measures, DMAs are designated individual drainage areas within a Regulated Project that typically follow grade breaks and roof ridge lines and account for each surface type (e.g., landscaping, pervious paving, or roofs). Stormwater Control Measures for runoff reduction and structural facilities are designed for each DMA.

Equivalent Impervious Surface Area - is equal to *Impervious Tributary Surface Area* (ft²) + *Pervious Tributary Surface Area* (ft²), where *Impervious Tributary Surface Area* is defined as the sum of all of the site's conventional impervious surfaces, and *Pervious Tributary Surface Area* is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient (see Attachment E for how to calculate).

Evapotranspiration (ET) - The loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues).

Flow-Through Water Quality Treatment Systems - Stormwater Control Measures that are designed to treat stormwater through filtration

and/or settling. Flow-through systems do not provide significant retention or detention benefits for stormwater volume control.

Groundwater Basins - Groundwater basin areas defined by the California Department of Water Resources (DWR) and used in the Central Coast Water Board Joint Effort for Hydromodification Control to identify groundwater receiving-water issues and areas where recharge is a key watershed process. DWR based identification of the groundwater basins on the presence and areal extent of unconsolidated alluvial soils identified on a 1:250,000 scale from geologic maps provided by the California Department of Conservation, Division of Mines and Geology. DWR then further evaluated identified groundwater basin areas through review of relevant geologic and hydrogeologic reports, well completion reports, court-determined adjudicated basin boundaries, and contact with local agencies to refine the basin boundaries.

Impervious Surface - A hard, non-vegetated surface area that prevents or significantly limits the entry of water into the soil mantle, as would occur under natural conditions prior to development. Common impervious surfaces include, but are not limited to, roof tops, walkways, patios, driveways, parking lots or storage areas, concrete or asphalt paving, oiled, macadam or other surfaces which similarly impede the natural infiltration of stormwater. Open, uncovered retention/detention facilities shall not be considered as impervious surfaces for purposes of determining whether the thresholds for application of Performance Requirements are exceeded. However, for modeling purposes, open, uncovered facilities that retain/detain water (e.g., retention ponds, pools) shall be considered impervious surfaces.

Land recycling - The reuse of abandoned, vacant, or underused properties for redevelopment or repurposing

Landscaped Areas - Areas of soil and vegetation not including any impervious surfaces of ancillary features such as impervious patios, BBQ areas, and pools.

Large River - A river draining 200 square miles or more.

Low Impact Development (LID) - A stormwater and land use management strategy that strives to mimic pre-disturbance hydrologic processes of infiltration, filtration, storage, evaporation, and transpiration by emphasizing conservation, use of on-site natural features, site planning, and distributed stormwater management practices that are integrated into a project design.

Ministerial Approval - A project approval which only involves the use of fixed standards or objective measurements.

Native Vegetation - Vegetation comprised of plant species indigenous to the Central Coast Region and which reasonably could have been expected to naturally occur on the site.

Net Impervious Area - The sum of new and replaced post-project impervious areas, minus any reduction in total imperviousness from the pre-project to post-project condition: *Net Impervious Area = (New and Replaced Impervious Area) - (Reduced Impervious Area Credit)*, where *Reduced Impervious Area Credit* is the total pre-project to post-project reduction in impervious area, if any.

New Development - Land disturbing activities that include the construction or installation of buildings, roads, driveways and other impervious surfaces. Development projects with preexisting impervious surfaces are not considered New Development.

Percentile Rainfall Event (e.g., 85th and 95th) - A percentile rainfall event represents a rainfall amount which a certain percent of all rainfall events for the period of record do not exceed. For example, the 95th percentile rainfall event is defined as the measured rainfall depth accumulated over a 24-hour period, for the period of record, which ranks as the 95th percentile rainfall depth based on the range of all daily event occurrences during this period.

Permeable or Pervious Surface - A surface that allows varying amounts of stormwater to infiltrate into the ground. Examples include pasture, native vegetation areas, landscape areas, and permeable pavements designed to infiltrate.

Pre-Project - Stormwater runoff conditions that exist onsite immediately before development activities occur. This definition is not intended to be interpreted as that period before any human-induced land activities occurred. This definition pertains to redevelopment as well as initial development.

Project Site - The area defined by the legal boundaries of a parcel or parcels of land within which the new development or redevelopment takes place and is subject to these Post-Construction Stormwater Management Requirements.

Rainwater Harvest - Capture and storage of rainwater or stormwater runoff for later use, such as irrigation (without runoff), domestic use (e.g. toilets), or storage for fire suppression.

Receiving Waters - Bodies of water, surface water systems or groundwater that receive surface water runoff through a point source, sheet flow or infiltration.

Redevelopment - On a site that has already been developed, construction or installation of a building or other structure subject to the Permittee's planning and building authority

including: 1) the creation or addition of impervious surfaces; 2) the expansion of a building footprint or addition or replacement of a structure; or 3) structural development including construction, installation or expansion of a building or other structure. It does not include routine road maintenance, nor does it include emergency construction activities required to immediately protect public health and safety.

Replaced Impervious Surface - The removal of existing impervious surfaces down to bare soil or base course, and replacement with new impervious surface. Replacement of impervious surfaces that are part of routine road maintenance activities are not considered replaced impervious surfaces.

Retention Tributary Area - The entire project area except for undisturbed areas, planted areas with native, drought-tolerant, or LID appropriate vegetation that do not receive runoff from other areas, and impervious surface areas that discharge to infiltrating areas that will not produce runoff or create nuisance ponding. The Drainage Management Areas are smaller Retention Tributary Areas that cumulatively make up the Retention Tributary Area for the entire site.

Routine Road Maintenance - includes pothole and square cut patching; overlaying existing asphalt or concrete pavement with asphalt or concrete without expanding the area of coverage; shoulder grading; reshaping/regrading drainage systems; crack sealing; resurfacing with in-kind material without expanding the road prism or altering the original line and grade and/or hydraulic capacity of the road.

Self-Retaining Areas - (also called "zero discharge" areas), are designed to retain some amount of rainfall (by ponding and infiltration and/or evapotranspiration) without producing stormwater runoff. Self-Retaining Areas may include graded depressions with landscaping or pervious pavement.

Self-Treating Areas - are a portion of a Regulated Project in which infiltration, evapotranspiration and other natural processes remove pollutants from stormwater. The self-treating areas may include conserved natural open areas and areas planted with native, drought-tolerant, or LID appropriate vegetation. The self-treating area only treats the rain falling on itself and does not receive stormwater runoff from other areas.

Single-Family Residence - The building of one single new house or the addition and/or replacement of impervious surface associated with one single existing house, which is not part of a larger plan of development.

Stormwater Control Measures - Stormwater management measures integrated into project designs that emphasize protection of watershed processes through replication of predevelopment runoff

patterns (rate, volume, duration). Physical control measures include, but are not limited to, bioretention/rain gardens, permeable pavements, roof downspout controls, dispersion, soil quality and depth, minimal excavation foundations, vegetated roofs, and water use. Design control measures include but are not limited to conserving and protecting the function of existing natural areas, maintaining or creating riparian buffers, using onsite natural drainage features, directing runoff from impervious surfaces toward pervious areas, and distributing physical control measures to maximize infiltration, filtration, storage, evaporation, and transpiration of stormwater before it becomes runoff.

Stormwater Control Plan - A plan, developed by the Regulated Project applicant, detailing how the project will achieve the applicable Post-Construction Stormwater Management Requirements (for both onsite and offsite systems).

Exhibit B

Certification Page

Certification for Runoff Reduction Requirements (This language shall be included in all drainage reports submitted to the City):

Check all that apply:

Performance Requirement 1

I hereby certify that all site design strategies have been incorporated, or, marked not applicable. I have provided an explanation in the case where site design strategies are not applicable.

Performance Requirement 2

I hereby certify that the selection, sizing, and design of the Stormwater Control Measures comply with the full or partial Water Quality Treatment Performance Requirement specified in the City of Atascadero's Drainage Standards.

I further certify that the Water Quality Treatment Performance Requirement has been met on-site, or, if not achievable, I have provided documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements, and the project intends to comply with Performance Requirements through Alternative Compliance.

Performance Requirement 3

I hereby certify that the Water Quality Treatment and Runoff Retention Performance Requirements have been met on-site, or, if not achievable:

1. I have provided documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance volume, and;
2. I have provided a statement of intent to comply with Water Quality Treatment and Runoff Retention Performance Requirements through an Alternative Compliance agreement.

Performance Requirement 4

I hereby certify that the Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements have been met on-site, or, if not achievable:

1. I have provided documentation of the volume of runoff for which compliance cannot be achieved on-site and the associated off-site compliance requirements, and;
2. The project owner(s) intend(s) to comply with the Water Quality Treatment, Runoff Retention, and Peak Management Performance Requirements through an Alternative Compliance agreement.

Exhibit C

Atascadero Groundwater Sub-basin

Visit: www.atascadero.org/stormwatermaps

Exhibit D

Retention Tributary Area Calculation

Project site conditions will influence the ability to comply with the Water Quality Treatment and Runoff Retention Performance Requirements. This Appendix provides the acceptable Stormwater Control Measure (SCM) sizing methodology to evaluate runoff characteristics. This guidance provides a simple event-based approach and a runoff routing approach. Both of these approaches are based on sizing for a single-event and avoid the necessity of using calibrated, continuous simulation modeling. The Permittee can allow project applicants to use a locally/regionally calibrated continuous simulation-based model to improve hydrologic analysis and SCM sizing.

1) Determination of Retention Tributary Area

Determining the Retention Tributary Area is the basis for calculating the runoff volumes subject to Performance Requirement Number 3. Retention Tributary Area should be calculated for each individual Drainage Management Area to facilitate the design of SCMs for each Drainage Management Area. The generic equation below illustrates how various portions of the site are addressed when determining the Retention Tributary Area. The Retention Tributary Area calculation must also account for the adjustments for Redevelopment Projects subject to Performance Requirement No. 3.

- a) Compute the Retention Tributary Area, using the equation:

$$\text{Retention Tributary Area} = (\text{Entire Project Area}) - (\text{Undisturbed or Planted Areas})^* - (\text{Impervious Surface Areas that Discharge to Infiltrating Areas})^{**}$$

*As defined in Section B.4.d.iv.1.

** As defined in Section B.4.d.iv.2.

- b) Adjustments for Redevelopment Project Retention Tributary Area - Where the Regulated Project includes replaced impervious surface, the following Retention Tributary Area adjustments apply:
- i) Redevelopment Projects outside an approved Urban Sustainability Area, as described in Section C.3. - The total amount of replaced impervious surface area shall be multiplied by 0.5 when calculating the Retention Tributary Area.

- ii) Redevelopment Projects located within an approved Urban Sustainability Area (Section C.3) - The replaced impervious surface areas may be subtracted from the Retention Tributary Area. The total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

2) Determination of Retention Volume

- a) Based on the Regulated Project's Watershed Management Zone, determine the Regulated Project's Runoff Retention Requirement (e.g., Retain 95th Percentile 24-hour Rainfall Event, or, Retain 85th Percentile 24-hour Rainfall Event).

- b) Determine the 85th or 95th percentile 24-hour rainfall event: Use either the methodology provided in Part I.D of the December 2009 Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act,⁶ or, rainfall statistics provided by the Central Coast Water Board, whichever produces a more accurate value for rainfall depth.

- c) Compute the Runoff Coefficient⁷ "C" for the area tributary to the SCMs, using the equation:

$$C = 0.858i^3 - 0.78i^2 + 0.774i + 0.04$$

Where "i" is the fraction of the tributary area that is impervious⁸

- d) Compute Retention Volume:

$$\text{Retention Volume for } 95^{\text{th}} \text{ Percentile 24-hr Rainfall Depth} \\ = C \times \text{Rainfall Depth}_{95^{\text{th}}} \times \text{Retention Tributary Area}$$

or,

$$\text{Retention Volume for } 85^{\text{th}} \text{ Percentile 24-hr Rainfall Depth} \\ = C \times \text{Rainfall Depth}_{85^{\text{th}}} \times \text{Retention Tributary Area}$$

All rainfall directly incident to each SCM must be considered in determining runoff, including: tributary landscaping, impervious areas, pervious pavements, and bioretention features.

⁶USEPA, 841-B-09-00. http://www.epa.gov/owow/NPS/lid/section438/pdf/final_sec438_eisa.pdf

⁷ As set forth in WEF Manual of Practice No. 23/ASCE Manual of Practice No. 87, (1998), pages 175-178 and based on the translation of rainfall to runoff using a runoff regression equation developed using two years of data from more than 60 urban watersheds nationwide.

⁸ As defined in Post-Construction Requirements Attachment C.

Note: For redevelopment projects located within an approved Urban Sustainability Area (**Section 5.60.A.3**), the total amount of runoff volume to be retained from replaced impervious surfaces shall be equivalent to the pre-project runoff volume retained.

3) Structural Stormwater Control Measure Sizing

The Permittee shall require the Regulated Project applicant to use structural SCMs that optimize retention and result in optimal protection and restoration of watershed processes, such as Structural Control Measures associated with small-scale, decentralized facilities designed to infiltrate, evapotranspire, filter, or capture and use stormwater, to address the volumes calculated in 2 (above). Where the Regulated Project is within a Watershed Management Zone where infiltration is required, Permittees must use SCM designs that optimize infiltration of the entire Retention Volume to minimize the potential need for off-site mitigation. Various resources provide design guidance for fully infiltrative SCMs including:

- The Contra Costa C.3 Manual
- The City of Santa Barbara LID BMP Manual
- The City of San Diego LID Design Manual, July 2011
- Central Coast LID Initiative Bioretention Design Guidance

- a) Calculate SCM Capture Volume - Calculate the required SCM Capture Volume, associated with the Regulated Project's Runoff Retention Requirement, by one of the following methods:

Method 1: Simple Method

$$\frac{SCM \text{ Capture Volume}}{\text{Percentile 24-hr Rainfall Depth}} = \text{Retention Volume for } 95^{th}$$

or,

$$\frac{SCM \text{ Capture Volume}}{\text{Percentile 24-hr Rainfall Depth}} = \text{Retention Volume for } 85^{th}$$

Method 2: Routing Method

Use a hydrograph analysis⁹ to determine the SCM Capture Volume needed to retain the Retention Volume for 95th or 85th Percentile 24-hr Rainfall Depth calculated in 2 (above). The SCM Capture Volume shall be based on both the rate of flow from tributary areas into the SCM, and

⁹ HydroCAD is an example of a commonly used and widely accepted program for performing hydrograph analyses and design of stormwater infrastructure. HydroCAD is based on U.S. Department of Agriculture Soil Conservation Service's (now Natural Resources Conservation Service) TR-55: Urban Hydrology for Small Watersheds.

the rate of flow out of the SCM through infiltration into the underlying soil during the rain event. When conducting the hydrograph analysis, adhere to the criteria included in Table 1. The SCM shall be designed such that a single 95th or 85th Percentile 24-hr Rainfall Event will not overflow the SCM.

If the Retention Volume cannot infiltrate within 48-hours, a multiplier of 1.20 shall be applied to the SCM Capture Volume calculated through the routing method.

TABLE 1: Routing Method Criteria

Parameter	Criteria
Hydrograph Analysis Method	National Resources Conservation Service or Santa Barbara Urban Hydrograph
Pond Routing Method	Storage-indication, unless otherwise justified to be more correct based on site and storage conditions.
Infiltration Rate	Underlying soil saturated infiltration rate, as indicated by locally accepted data approved by the Permittee and/or by on-site testing, whichever is more accurate.
Rainfall Distribution	National Resources Conservation Service Type I ¹⁰ or based on local rainfall data
Time of Concentration	Permittee's current drainage and flood control standard
Time Increment	0.10 hour, unless otherwise justified to be more correct based on rainfall distribution

- b) Demonstration of Compliance - Permittees shall require Regulated Projects to demonstrate that site SCMs: a) will infiltrate and/or evapotranspire the Retention Volume or, b) will provide sufficient Capture Volume to retain the Retention Volume. Any outlet (i.e., underdrain) installed in a structural SCM shall be installed above the elevation of any portion of the structural SCM dedicated to Retention Volume storage.

¹⁰ The National Resources Conservation Service developed standard 24-hour rainfall distributions for hydrograph analyses. These rainfall distributions were intended to represent intensities associated with shorter duration storms, ranging from durations of 30 minutes to 12 hours. The National Resources Conservation Service Type 1 storm applies to the California West Coast, including the Central Coast Region. The Type 1 rainfall distribution was derived using National Oceanic Atmospheric Administration Atlas 2 rainfall statistics for the 1-year through 100-year storm.

- 4) Compliance with Water Quality Treatment Performance Requirement - Permittees shall require Regulated Projects that propose to use the retention-based structural Stormwater Control Measures to also meet the Water Quality Treatment Performance Requirement, to demonstrate, in the Stormwater Control Plan, that the Water Quality Treatment Performance Requirement is being fully met.

Exhibit E

Instructions For Calculating The Ten Percent Adjustment for Applying The Runoff Retention Performance Requirement

- 1) Where technical infeasibility, as described in **Section 5.60.A.1**, prevents full on-site compliance with the Runoff Retention Performance Requirement, on-site retention of the full Retention Volume per **Section 5.30.D.6** is not required and the Regulated Project is required to dedicate no less than ten percent of the Regulated Project's Equivalent Impervious Surface Area to retention-based Stormwater Control Measures. The Water Quality Treatment Performance Requirement is not subject to this adjustment, i.e., mitigation to achieve full compliance is required on- or off-site.

Calculating Ten Percent of a Project's Equivalent Impervious Surface Area

The area of the project that must be dedicated to structural SCMs to waive off-site compliance with the Runoff Retention Requirement is equal to ten percent of the project's Equivalent Impervious Surface Area, defined as:

$$\text{Equivalent Impervious Surface Area (ft}^2\text{)} = (\text{Impervious Tributary Surface Area (ft}^2\text{)} + (\text{Pervious Tributary Surface Area (ft}^2\text{)}))$$

Impervious Tributary Surface Area is defined as the sum of all of the site's conventional impervious surfaces. When calculating Impervious Tributary Area:

- Do include: concrete, asphalt, conventional roofs, metal structures and similar surfaces
- Do not include: green roofs

Pervious Tributary Surface Area is defined as the sum of all of the site's pervious surfaces, corrected by a factor equal to the surface's runoff coefficient. When calculating Pervious Tributary Surface Area:

- Do include surfaces such as: unit pavers on sand; managed turf¹¹; disturbed soils; and conventional landscaped areas (see Table 1 for correction factors).

Example:

Project Site includes 500 ft² of unit pavers on sand.

$$\text{Pervious Tributary Surface Area} = 500 \text{ ft}^2 \times C = 50 \text{ ft}^2$$

Where C = Correction Factor for unit pavers, 0.1, from Table 1.

¹¹ Managed Turf includes turf areas intended to be mowed and maintained as turf within residential, commercial, industrial, and institutional settings.

- Do not include: Infiltration SCM surfaces (e.g., SCMs designed to specific performance objectives for retention/infiltration) including bioretention cells, bioswales; natural and undisturbed landscape areas, or landscape areas compliant with the Model Water Efficient Landscape Ordinance (California Code of Regulations, Title 23. Waters, Division 2. Department of Water Resources, Chapter 2.7.), or a local ordinance at least as effective as the Model Water Efficient Landscape Ordinance.

TABLE 1: Correction Factors¹² for Use in Calculating Equivalent Impervious Surface Area

Pervious Surface	Correction Factor
Disturbed Soils/Managed Turf (dependent on original Hydrologic Soil Group)	A: 0.15 B: 0.20 C: 0.22 D: 0.25
Pervious Concrete	0.60
Cobbles	0.60
Pervious Asphalt	0.55
Natural Stone (without grout)	0.25
Turf Block	0.15
Brick (without grout)	0.13
Unit Pavers on Sand	0.10
Crushed Aggregate	0.10
Grass	0.10

¹² Factors are based on runoff coefficients selected from different sources: Turf and Disturbed Soils from *Technical Memorandum: The Runoff Reduction Method*. Center for Watershed Protection & Chesapeake Stormwater Network. p.13, April 18, 2008. http://town.plympton.ma.us/pdf/land/scheuler_runoff_reduction_method_techMemo.pdf. All other correction factors from *C.3 Stormwater Handbook, Santa Clara Valley Urban Runoff Pollution Prevention Program, Appendix F*, p. F-9., May 2004. [http://www.sanjoseca.gov/planning/stormwater/pdfs/appendices_files/Appendix F Final.pdf](http://www.sanjoseca.gov/planning/stormwater/pdfs/appendices_files/Appendix_F_Final.pdf)

Exhibit F

Instructions For Calculating The Off-Site Retention Requirements

Calculating Off-Site Retention Requirements When Less Than 10 Percent of the Project Site Equivalent Impervious Surface Area is Allocated to Retention-Based Structural Stormwater Control Measures

The following instructions demonstrate how to determine the Off-Site Retention Requirements when a Regulated Project subject to the Runoff Retention Performance Requirement, cannot allocate the full 10% of the project site's Equivalent Impervious Surface Area¹³ to retention-based Stormwater Control Measures (SCMs).

STEP A. Potential Off-Site Mitigation Retention Volume

First calculate the Potential Off-Site Mitigation Retention Volume, which represents the additional volume of runoff that would have been retained on-site, had the full 10% of Equivalent Impervious Surface Area been dedicated to retention-based SCMs.

Equation A:

Potential Off-Site Mitigation Retention Volume = (the portion of the 10% Equivalent Impervious Area not allocated on-site) X (the On-Site Retention Feasibility Factor)

Where:

- *The portion of the 10% Equivalent Impervious Surface Area not allocated on-site is that portion not allocated to on-site structural retention-based SCMs. For example, if 10% of Equivalent Impervious Surface Area is 1,000 ft² and only 8% (800 ft²) is allocated to retention-based SCMs, the remaining 2% (200 ft²) is the value inserted in the equation.*
- *The On-Site Retention Feasibility Factor is the ratio of Design Retention Volume¹⁴ managed on-site (ft³), to actual area (ft²) allocated to structural SCMs. This establishes the site's retained volume:area ratio, expressed as cubic feet of retained runoff volume per square foot of area. For example, if a project is able to infiltrate 3,500 ft³ of runoff over an 800-ft² area, this ratio of 3,500:800, or 4.38, is the On-Site Retention Feasibility Factor.*

¹³ Calculate Equivalent Impervious Surface Area using guidance in Post-Construction Requirements Attachment E

¹⁴ Calculate Design Retention Volume using guidance in Post-Construction Requirements Attachment D, or equivalent method. Final Design Retention Volumes should reflect the applicant's demonstrated effort to use non-structural design measures to reduce the amount of runoff (e.g., reduction of impervious surfaces) as required by the Post-Construction Requirements' LID Development Standards (Section B.4.d).

STEP B. Actual Off-Site Mitigation Retention Volume

Next, determine the Actual Off-Site Mitigation Retention Volume, which may be less than the Potential Off-Site Mitigation Retention Volume. The Actual Off-Site Mitigation Retention Volume is the lesser of the volume calculated in Equation A, and the remaining portion of the Design Retention Volume, calculated per Attachment D, not controlled on-site. There are two possible outcomes when the Runoff Retention Performance Requirement is not met on-site and less than 10% of the site's Equivalent Impervious Surface Area is allocated to retention-based SCMs:

- Potential Off-Site Mitigation Retention Volume is the Actual Off-Site Mitigation Retention Volume.
- Remaining Design Retention Volume represents Actual Off-Site Design Retention Mitigation Volume.

SECTION 6 - SEWERAGE

6.01 GENERAL

Sanitary sewer lines and appurtenances within City jurisdiction shall be constructed in accordance with the details shown on plans and specifications approved by the Engineer, these specifications, and State Specifications where applicable.

6.02 DESIGN FLOW AND GRADIENT

A. Design Flow. An average flow of 100 gallons per person per day shall be used for hydraulic design purposes, with the peak flow double the average flow. Pipes shall be sized to handle peak flows with pipes flowing 1/2 full.

B. Grades. Sanitary sewer grades shall be designed to provide a minimum velocity of 2' per second when flowing at peak flow. The following table indicates the slopes which will provide that velocity, and these shall be used as the minimum standard for design. Lesser slopes may be approved by the Engineer only when topographic conditions preclude the use of these values.

Diameter	Slope in Feet/Foot Min. Acceptable
8"	.005
10"	.0025
12"	.002
15"	.0015
18"	.0012
House Lateral	.02

Whenever a change in the size of the pipe, or an angle of 20 degrees or greater in alignment occurs, the flowline of the pipe flowing into the manhole shall be a minimum of 0.17' above the flowline of the pipe flowing from the manhole, or an amount necessary to match the inside crowns of the pipes, whichever is greater.

Unless special provisions for erosion protection have been provided, and approved by the Engineer, design velocities for sanitary sewers shall not exceed 10' per second. The maximum design discharge shall not exceed the flow at critical slope and velocity. Sanitary sewers should not be designed for flow conditions at critical slope and velocity.

6.03 LOCATION AND ALIGNMENT

A. Location. All sanitary sewers designed for the collection and transportation of domestic sewage and/or industrial wastes shall be constructed and installed within rights of way dedicated for public streets or roads, unless such construction or installation

is determined to be impractical by the Engineer.

Location of sewer lines in easements shall be kept to a minimum. Whenever possible, sewers shall be placed in the public roadway. Where sewer lines are located within easements, the easements shall be dedicated to the City.

The minimum width of any easement for sanitary sewer purposes shall be 15' wide; in special cases of terrain, depth of sewer line, etc., the required easement width shall be increased. All easements shall include right of ingress and egress over adjoining property for maintenance, replacement and operation.

The location of the sanitary sewers installed in any street or road shall normally be consistent with Standard Drawing 703.

B. Alignment. Sewerage systems shall be designed so as to have a minimum of curvature both horizontal and vertical.

Whenever possible, sewer lines shall be laid out in a straight line between structures. Curved sewer lines will be allowed only under special circumstances, must be approved by the City Engineer, and must meet the following conditions:

- a. All curve data shall be shown on the plans.
- b. Minimum radius of curvature and joint deflections shall be as recommended by the pipe manufacturer and approved by the Engineer.
- c. All deflections shall be at the pipe joints or by specialty mitered pipe sections.
- d. Horizontal and vertical curvature shall not be combined.
- e. Vertical curvature shall be designed to maintain minimum pipe grades per Section 6.02 B.

The location and installation requirements for any sanitary sewer to be installed in an existing street or road shall be obtained from the Engineer prior to submission of the plans.

6.04 DEPTH AND SIZE

A. Depth. The normal design depth of a sanitary sewer system shall be such as to obtain a cover of 36" for the house service lateral at the property line, and a minimum cover of 60" for main, trunk, and interceptor sewer lines. Under certain topographic conditions lesser depths may be allowed by the Engineer. Sewer mains and laterals shall be designed so as to be useable by each lot without the need for an ejector pump. Exceptions may be granted by the Engineer on a case-by-case basis.

B. Size. The normal minimum sewer main size shall be 8" inside diameter unless otherwise approved by the City Engineer.

C. Special Construction in Areas of Conflict Between Water and Sewer Lines. All new sewer main, force main, house service laterals and appurtenant items shall be installed in conformance with the State of California, Department of Health Services requirements for separation and special construction. Additionally, all new sewer installation shall conform to Standard Drawings 601 and 602.

6.05 MANHOLES

A. Spacing. Normal maximum spacing for manholes shall be 400'. Where the locations of two manholes are determined by intersecting lines, the distances between intervening manholes shall be approximately equal. A sewer on a curved alignment with a radius of less than 400' shall have manholes spaced at a maximum of 300' or adjusted to fit the individual case.

The maximum spacing of manholes on trunk sewer lines shall be as follows:

12" to 24" diameter	500'
27" to 36" diameter	600'

The spacing of manholes on trunk sewer lines larger than 36" in diameter shall be determined for each individual case.

B. Drop Manholes. The need for the construction of drop manholes should be avoided, whenever possible, by the adjustment of sewer pipe gradients during design. When avoidance is not possible, and when the vertical distance between the inverts of sewer lines coming into a manhole exceeds 24", a standard drop manhole shall be constructed in conformance with the Standard Drawing.

6.06 HOUSE SERVICE LINES

In all new subdivision work, the house service lines from the sewer to the property line shall be installed at the time the sewer is constructed. Each house service line shall be referenced to the plan stationing. Minimum size of any sanitary lateral or side sewer to serve individual residences, commercial structures, etc., shall be nominal 4" inside diameter. Actual size of laterals larger than 4" shall be determined by fixture unit requirements as per the current edition of the Uniform Plumbing Code.

6.07 SEWAGE LIFT STATIONS, FORCE MAINS AND TREATMENT PLANTS

A. General. All special structures such as treatment plants shall meet all requirements of the State Regional Water Quality Control Board, State and County Health Department and the Engineer. Special structures, such as pump stations, pressure

lines and sags, etc., shall require special considerations and approval by the Engineer.

Whenever the design of a sanitary sewerage system includes the necessity of a sewage lift station and a force main, the design data shall be submitted for tentative approval before plans are submitted.

B. Sewage Lift Station. The minimum distance from a lift station to any residence shall be 50' except with advance approval of the Engineer for the specific case.

No lift station shall be constructed with bypasses which will bypass any effluent into any stream or water course.

The Consultant shall submit the design computations for the pumps or ejectors, the type to be used, wet well capacity, control system and a plot plan showing the dimensions of the site and its location with respect to homes or other structures. Wherever possible, the equipment and construction used in the lift station shall be consistent and compatible with similar installations in the City as specified by the Engineer.

An alarm system, which meets the approval of the Engineer, shall be provided on all sewage lift stations.

C. Force Mains. The size and type of pipe to be used and a tentative alignment shall be submitted. Minimum velocity in any force main shall be 2' per second, with a maximum of 10' per second.

6.08 KIND OF PIPE

All sanitary lines shall be polyvinyl chloride, high density polyethylene, or ductile iron. Other types of pipe may be used upon approval by the City Engineer.

6.09 MATERIALS

A. General. All material that is to become a permanent part of any sanitary sewer or appurtenant structure, shall conform to the requirements for the particular material as set forth in these specifications. The Contractor shall supply any and all certificates of compliance, certified test results or shall perform tests as required to assure the Engineer that the material being incorporated into the work has met the requirements as specified. Approval of the Engineer shall be required for use of material not listed in these standards.

All pipe or conduits shall be of the size, material and strength as shown on the plans. All pipe and fittings shall be marked or stamped with the trade brand name of the manufacturer,

and strength or class of pipe. All pipe shall be designed to withstand all internal or external loads applied. Supporting strength of conduits as installed to safely carry imposed gravity loads and superimposed loads (including a suitable factor of safety) shall be determined by use of the Marston formula.

B. Vitrified Clay Pipe. Clay Pipe (CP) and fittings shall be new, first quality pipe and shall comply with the specifications for Extra Strength Unglazed Clay Pipe ASTM Designation C700-Latest Revision. Joints for bell and spigot CP shall conform to ASTM Designation C425. Installation of CP shall comply with ASTM Designation C-12. The only allowable variations from the above recommended practices will be as approved by the Engineer. Clay pipe shall only be used for repairs to existing clay pipe lines.

C. Ductile Iron Pipe. All ductile iron pipe (D.I.P.) and fittings for main sewers shall conform to AWWA Standard C-151, Class 52. Joints shall be approved type mechanical joints.

D. Polyvinyl Chloride (PVC) Pipe. PVC pipe up to 15" in diameter shall conform at least to ASTM standard D3034/SDR35. PVC pipe from 18 to 36" diameter shall conform to ASTM F-794.

E. High Density Polyethylene (HDPE) Pipe. HDPE pipe and fitting from 3 through 10" diameter shall comply with AASHTO standard M252. HDPE pipe and fittings from 12 through 36" diameter shall comply with AASHTO standard M294. Installation will comply with ASTM recommended practice D-2321.

F. Force Main Pipe. Pipe used in construction of force mains shall be either ductile iron or PVC Class 200 conforming to AWWA C-900.

G. Castings. All castings for manhole rings and covers, clean out frames and covers, or other purposes, shall be cast iron meeting the requirements of Specifications ASTM Designation A48, Class 25. The quality shall be such that a blow from a hammer will produce an indentation on a rectangular edge of the castings, without flaking the metal. Before leaving the foundry, all castings shall be thoroughly cleaned.

H. Manholes and Appurtenances.

1. Manhole Base - The manhole base shall be a 48" diameter pre-cast reinforced concrete pipe unit with all pipe connections cored into the base. The pipe connectors shall be installed with approved equipment by the pre-cast supplier or the contractor.
2. Riser Section - Shall be 48" diameter, pre-cast concrete conforming to ASTM C-478 and shall have a minimal amount of reinforcement with a 6" minimum wall thickness. The riser shall end with an eccentric cone.

3. Cover - Manhole frame and cover shall be Southbay Foundry 1900 or equal, with a sealed blind pickhole and 24" clear opening, and the cover shall be lettered "Sanitary Sewer". The frame shall be sealed to the grade ring with rubber resin CONSEAL C5-101 or equal.
4. Manholes serving pipelines over 16" in diameter shall be 60" in diameter.

6.10 CONSTRUCTION REQUIREMENTS

A. Lines and Grades. All lines and grades will be given by the Consultant and the Engineer shall be informed 24 hours in advance of the times and places at which work is to be done in order that lines and grades may be inspected and necessary measurements made with a minimum of inconvenience and delay. All stakes and marks once given shall be fully protected and preserved. Flow line elevations shall be established at all changes in grade and at 50' intervals.

B. Excavation For Sewers.

1. Unless otherwise specified, the excavation for sewer pipe shall be an open trench, excavated to 6" below the bottom of the pipe. This undercutting shall be refilled with suitable bedding material as specified in Section 6.10F of these Specifications. Where the trench is in granular or sandy material, the pipe may be bedded in the native material in lieu of importing bedding material providing it complies with the specification of bedding material. The Engineer shall determine the suitability of the native material.
2. When the trench is in an existing paved area, the pavement shall be sawed or scored and broken ahead of the trenching operations. The proper tools and equipment shall be used in marking and breaking so that the pavement will be cut accurately on neat and parallel lines 12" wider on each side than the trench width. When in the opinion of the Engineer the remaining paving has been damaged, an additional 12" shall be cut from each side to the approval of the Engineer.
3. Whenever the bottom of the trench is soft, yielding, or unsuitable as a foundation for the pipe, sufficient crushed rock or coarse, clean gravel shall be rammed into the soft material until, in the opinion of the Engineer, a suitable condition is achieved. If such treatment does not provide a proper foundation, the unsuitable material shall be removed to a depth determined by the Engineer, that when replaced with bedding material, it will provide a stable foundation.
4. When water is encountered, the trench shall be kept dewatered until the laying and jointing of the pipe, and placing of the bedding material has been completed,

inspected, and approved. The Contractor shall place not less than 6" of 2-1/2" maximum size rock below the required bedding material, or otherwise de-water the trench in a manner which has received prior approval of the Engineer. Ground water pumped from the trench shall be disposed of in such a manner as will not cause or be a menace to the public. The manner employed to dispose of water pumped from an excavation shall be subject to the approval of the Engineer.

C. Tunneling. Tunneling shall not be permitted unless approved by the Engineer.

D. Laying Sewer Pipe. The pipe shall be laid in conformity to the prescribed line and grade, and each pipe length checked to the grade lines. Three consecutive points shown on the same rate of slope shall be used in common, in order to detect any variation from a straight grade. In case any such discrepancy exists, the work shall be stopped and the discrepancy immediately reported to the Engineer. In addition, a string line shall be used in the bottom of the trench to insure proper alignment and grade. A laser may be used in lieu of a string line.

Pipe shall be laid continuously upgrade with the bell of the pipe forward. Each length of pipe shall be laid on a firm bed and shall have a true bearing for the entire length. No wedging or blocking up of the pipe will be permitted.

Both bell and spigot shall be clean before the joint is made, and care shall be taken that nothing but the joint-making material enters the joints.

When for any reason, pipe laying is discontinued for an hour or more, the open end of each line shall be closed with a close-fitting stopper.

The Contractor's attention is called to the required use of short lengths of sewer pipe to provide curves, flexibility, and prevent cracking or shearing failures. The use of short lengths of pipe is particularly required but not necessarily limited to these locations: (1) inlets and outlets to all manholes; and (2) vertical and horizontal curvilinear sewers.

E. Pipe To Be Placed By Boring Or Jacking. The work contemplated under this heading consists of placing pipe in a conductor pipe under a paved roadway, street, or railroad to a true line and grade as shown on the plans, by means of boring or jacking operations. The equipment and method of operation shall be approved by the Engineer before proceeding with the work.

The excavation for the boring operation shall be kept to a minimum, but shall be of sufficient dimensions to satisfactorily complete the work. If so required, bracing and shoring shall be provided to adequately protect the workmen and the roadway or

railroad.

The conductor pipe shall be placed closely behind and in conjunction with the boring operation. The bored hole shall be not more than 2" in diameter larger than the conductor pipe. Guide rails shall be accurately set to line and grade shown on the plans.

The pipe to be placed inside the conductor pipe shall have non-rigid joints and shall be installed by the use of suitable centering devices. A one sack cement grout shall then be pumped into the conductor pipe to completely fill the annular space around the pipe for its full length.

F. Trench Backfill.

1. Bedding material, approved by the Engineer and meeting the minimum standards listed below, shall be deposited and compacted to 90% relative compaction in the trench uniformly on both sides of the pipe for the full width of the trench and to a depth of 12" over the top of the pipe.

Sand Equivalent	20
<u>Sieve Size</u>	<u>Percentage Passing Sieve</u>
1"	100
No. 4	80-100
No. 200	0-15

The sand equivalent of 20 shall also be required outside of the roadway prism.

2. The balance of the backfill shall contain no rock, stones or boulders in excess of 4" in its greatest dimension, and shall be free from all deleterious matter. It shall be compacted to a relative compaction of 90% for the remainder of the trench, except that the top 12" shall be brought to 95%. The backfill under and around any and all pipes shall be thoroughly consolidated before any additional material is placed.
3. Compaction methods must be carried out so no damage or displacement of the pipe results.
4. Any trenches improperly backfilled, or where settlement occurs, shall be reopened to the depth required for proper compaction, then refilled and compacted, with the surface restored to the required grade and compacted and smoothed off.
5. All waste material shall be disposed of outside of the City right of way or as approved by the Engineer.

G. Manholes. The manhole base shall be a precast reinforced concrete pipe unit with all pipe connections cored into the base. The pipe connectors shall be installed with approved equipment by the precast supplier or the contractor. PVC or HDPE pipe shall be connected using KOR-N-SEAL or equal pipe connectors. Manholes to be constructed over pre-existing sewer mains may use a poured-in-place base upon approval by the City Engineer.

The invert shall be completed in a single pour and the full diameter channel invert shall be shaped to grade in the concrete. The radius of any invert curve must extend from wall to wall so that the finished invert does not restrict the insertion of cameras or cleaning tools into pipes. The surface of the channel and shelf shall receive a steel trowelled finish. The slope of the shelf shall be 1" in 12". Precast inverts are also acceptable providing they meet invert standards.

Collar shall be Class "A" concrete and trowelled to street grade, and allowed to cure 48 hours prior to any traffic use.

Adjustment rings shall be 3" or 6". Top of cone to top of frame shall not exceed 18". Grade rings shall be sealed at every joint with rubber resin CONSEAL CS-101 or equal. If grade can not be obtained to the existing surface with a standard grade ring and rubber resin, then no more than 2" of non-shrink grout may be added between the last set of grade rings. The grouted joint shall then be sealed on the outside of the grade ring with staples.

When adjusting an existing manhole to grade and the total depth of the throat from the top of the frame to the bottom of the throat exceeds 24", the upper portion of the manhole shall be removed to the first full-size manhole section. The upper portion shall then be reconstructed as outlined above.

The cone shall be eccentric. Straight side of cone shall be positioned over manhole inlet, or over mid-point of multiple inlets. Concentric cones may be used only in special cases with written approval of the Engineer.

Riser joints shall be set with butyl rubber sealant (RUB'R-NEK). Outside of all joints shall be grouted with a non-shrink grout.

Vacuum tests shall be conducted on newly constructed manholes. Preliminary manhole testing shall take place following construction after all connections are made, and before backfilling. Test results derived from this test will allow time for necessary repairs to be completed before further construction proceeds and hinders such repairs. Final tests must be performed after the manhole has been backfilled.

A vacuum of 10" Hg shall be maintained without a drop in vacuum of over 1" Hg for the prescribed duration.

VACUUM TEST TIMETABLE

<u>DEPTH-FEET</u>	<u>DIAMETER-INCHES</u>		
	<u>48"</u>	<u>60"</u>	<u>72"</u>
4'	10 SEC.	13 SEC.	16 SEC.
8'	20 SEC.	26 SEC.	32 SEC.
12'	30 SEC.	39 SEC.	48 SEC.
16'	40 SEC.	52 SEC.	64 SEC.
20'	50 SEC.	65 SEC.	80 SEC.
24'	60 SEC.	78 SEC.	96 SEC.
FOR EACH ADDITIONAL 2' ADD	05 SEC.	6.5 SEC.	08 SEC.

H. House Service Lateral. House service laterals shall be constructed as shown on the Standard Drawings.

Whenever house service laterals are to be installed as part of the contract for the construction of the lateral sewer, the use of wye or tee saddles will not be permitted.

That portion of any house service lateral to be placed under an existing curb and gutter and/or sidewalk shall be done by tunneling. Cutting of the existing curb and gutter and/or sidewalk will not be permitted.

All house service laterals shall be considered as part of the lateral sewers for the purpose of the hydrostatic test as set forth herein.

The location of house service laterals shall be permanently indicated by embedding the letter "S" in the curb face directly above the line. In new subdivisions when the house service laterals are installed before the curb is constructed, it shall be the sewer contractor's responsibility to place the "S" in the curb after it is poured. When house service laterals are constructed in existing easements or streets where curbing does not exist, 1/2" x 36" steel rebar shall be driven in the ground to 2" below the surface directly above the service line at the property line. Every house service lateral shall be so marked before final acceptance will be given of any job.

I. Connection To Existing Manholes. Connections to existing manholes shall be made by coring a hole of the proper diameter into the manhole and using KOR-N-SEAL or equal pipe connectors. Flow through the manhole shall be channeled according to the instruction for constructing manhole inverts and as shown on the standard manhole drawing.

The Contractor shall notify the Engineer 24 hours in advance before any connection is made to existing structures. He shall schedule his work so that interruption of flow is held to a minimum.

J. Testing of Gravity Sewer Lines. Prior to final approval, all gravity sewer lines shall be tested for leakage by a low pressure air test and for deflection by the use of a mandrel according to the following instructions:

1. A wetted interior pipe surface is desirable and will produce more consistent test results. Where practical, clean the line with cleaning balls prior to testing, to wet the pipe surface and eliminate debris.
2. All new pipe shall be low-pressure air tested to insure the integrity of the pipe and joints.
3. Air testing shall be performed by the contractor.

Equipment used shall meet the following minimum requirements:

- a. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
- b. Pneumatic plugs shall resist internal test pressures without requiring external bracing or blocking.
- c. All air used shall pass through a single control panel.
- d. Three individual hoses shall be used for the following connections:
 - * From control panel to pneumatic plugs for inflation.
 - * From control panel to sealed line for introducing the low pressure air.
 - * From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.
4. Air testing procedures shall follow guidelines outlined in ASTM specifications C828, C924 and/or Uni-Bell B6, (see ASTM C828, C924 and Uni-Bell B6). All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to the manufacturer's recommended inflation pressure. The sealed pipe shall be pressurized to 5 PSIG. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

After a manhole to manhole reach of pipe has been backfilled and cleaned, and the pneumatic plugs are checked by the

above procedure, the plugs shall be placed in the line at each manhole and inflated to manufacturer's recommended inflation pressure. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 PSIG. At least two minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 PSIG minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable" if the allocated line pressure decreases less than one PSI in the time shown for the given diameters in the following table:

Nominal Pipe Size Inches	Time Minutes per 100 Feet
4.....	.3
6.....	.7
8.....	1.2
10.....	1.5
12.....	1.8
15.....	2.1
18.....	2.4
21.....	3.0
24.....	3.6

In areas where ground water is known to exist, the height in feet shall be divided by 2.35 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 PSIG.)

If the installation fails to meet this requirement, the contractor shall, at his own expense, determine the source of leakage. He shall perform a leak location test and then repair or replace all defective materials and/or workmanship.

5. Joints

Individual joint air tests shall be performed on pipe over 24" in diameter according to ASTM C1103-89.

6. Deflection Test

Mandrel test (deflection test) shall be performed by the contractor in order to verify the roundness and proper installation of the pipeline.

A. Mandrels shall be approved by the Engineer with proving rings prior to use and shall meet the following requirements:

a. Mandrel Sizing: The outside diameter of the mandrel shall

be fabricated to the following specification:

Base Pipeline Diameter - (Percent of deflection limit times base pipeline diameter) = Mandrel diameter. In accordance with ANSI/ASTM D-3034 and F-679

- b. Mandrel Construction: The contact area of the fins shall be equal to the nominal inside diameter of the pipe.

B. Deflection Test

The deflection test shall consist of testing pipe for proper installation by the method outline: (See ASTM D3034).

After the pipeline has been installed and backfill materials have been compacted to their required standard densities (called out in ASTM D 2321 or other applicable standard), the mandrel shall be pulled by hand through the pipeline with a suitable rope or cable that is connected to an eyebolt at one end of the gauge. A similar rope or cable shall be attached to the eyebolt at the opposite end of the mandrel and tension shall be applied to it. This will insure that the mandrel maintains its correct position during testing and also to remove the mandrel if it should become lodged in an excessively deflected pipeline. Winching or other means of forcing the mandrel through the pipeline are unacceptable.

Pipeline deflection testing performed within 30 days of installation shall have a deflection not exceeding 5% of the base inside pipe diameter as established by ASTM Standards D3034 and F679 listed in the following table:

Deflection Gauge Dimensions: SDR 35

<u>Nominal Size</u>	<u>Average I.D.</u>	<u>Base I.D.</u>	<u>5% Deflection Gauge</u>
6"	5.893	5.742	5.46
8"	7.891	7.665	7.28
10"	9.864	9.563	9.08
12"	11.737	11.361	10.79
15"	14.374	13.898	13.20
18"	17.564	16.976	16.13
21"	20.707	20.004	19.00
24"	23.296	22.480	21.36
27"	26.258	25.327	24.06

Pipeline deflection testing performed 30 days beyond the date of installation shall have a deflection not exceeding 7.5% of the nominal inside diameter or as established otherwise by the applicable governing body.

- C. A permanent record of all testing with locations where

excessive pipeline deflections occur shall be kept by the Contractor and forwarded to the Engineer after completion of testing on each line.

- D. The Contractor shall immediately replace all sections of pipe which deflect more than 5% (or 7 1/2%).
- E. All material and labor required for testing and replacement of pipelines shall be furnished by the contractor and the cost thereof included in the prices bid for furnishing and laying sewers.

K. Testing of Force Mains. Force mains shall be hydrostatically pressure tested in accordance with the manufacturer's recommendations for the type of pipe being installed.

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

M. Video Testing. A televised inspection of a newly constructed or modified sewer line may be required before final approval is granted. At the discretion of the City Engineer, a copy of a video tape inspection (VHS-1/2") shall be provided to the City for their inspection and records.

N. Replacement of Road Surfaces. Paving replacement shall not proceed until the full requirements of Section 6.10 K has been met to the satisfaction of the Engineer, but in no less than 10 days after backfill has been completed.

- 1. The replacement of roadway structural section over all cuts in existing bituminous pavement shall be 6" minimum of aggregate base and 2" minimum of Type B asphalt concrete. In no case shall the structural section be less than the existing adjacent pavement section.

Until the permanent pavement is placed, the material at the surface of the trench shall be maintained at all times at a grade level with the street, suitable for the safe passage of traffic. When ready for repairing, the upper portion of the trench shall be excavated to a depth sufficient for installation of the required structural section. Aggregate base shall be placed, compacted and graded. Edges of the existing asphalt concrete shall be trimmed to provide a neat and straight vertical joint. The joint face shall then be cleaned and tacked with asphaltic emulsion. Type B asphalt

concrete shall be placed in accordance with Section 39 of the State Standard Specifications.

2. Where the sewer trench follows the edge of pavement or is placed in an existing shoulder, the top 6" of the backfill shall consist of Class II aggregate base compacted to 95%.

Shoulders having a greater depth of base material than 6" shall be replaced with a thickness at least equal to that removed and the approval of the Engineer as to the exact type of replacement in such cases is required.

The finished replacement shall be rolled and finished to make the best possible connection to the existing pavement.

3. Any exceptions to the above will be indicated on the plans, except that replacements of heavier pavements shall be of a thickness at least equal to that removed, with the approval of the Engineer.
4. The replacement of all pavement and shoulder surfaces as designated above shall be in conformance with SECTION 4 ROADS, of these specifications as to materials and methods of construction.

0. Temporary Pavement. In any case where a trench is cut across a main thoroughfare, or if noted on the drawings, a temporary asphalt plant-mix-cutback surface shall be placed immediately after the backfill has been completed and removed just prior to placing the permanent surfacing material.

SECTION 7 - MISCELLANEOUS

7.01 FENCING

A. Where these specifications require chain link fencing, such fencing shall be constructed in accordance with the following:

1. Chain link fence for drainage channel enclosure shall be Type CL-6 as specified in Section 80-1.01 of the State Specifications, with or without extension arms and barbed wire as specified.
2. Chain link fence shall be of the materials and construction as specified in Section 80-4 of the State Specifications.
3. Drive gates and walk gates will be provided, complete with master keyed locks and keys, at such locations as specified by the Engineer for the purpose of maintenance vehicles and personnel.
4. Attention is called to Section 5.03C of these Specifications for easement requirements of open channels. The fence shall be located 6" within the required easement lines and shall provide sufficient room for maintenance vehicles as set out, or as specified by the Engineer.

7.02 UTILITIES

A. General. Unless otherwise specified in project approval, utility installation for conditional use permits, precise plans, parcel maps and tract maps shall be installed underground, and shall include electrical, telephone, gas and cable television.

Utility plans shall be prepared in conformance with Section 2.04B of these specifications and shall be located according to Standard Drawing 703 wherever possible.

7.03 STREET TREES

Street trees, when required, shall be spaced at the required interval and shall be planted in accordance with Standard Drawing 417.

CITY OF ATASCADERO
STANDARD SPECIFICATIONS & DRAWINGS

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