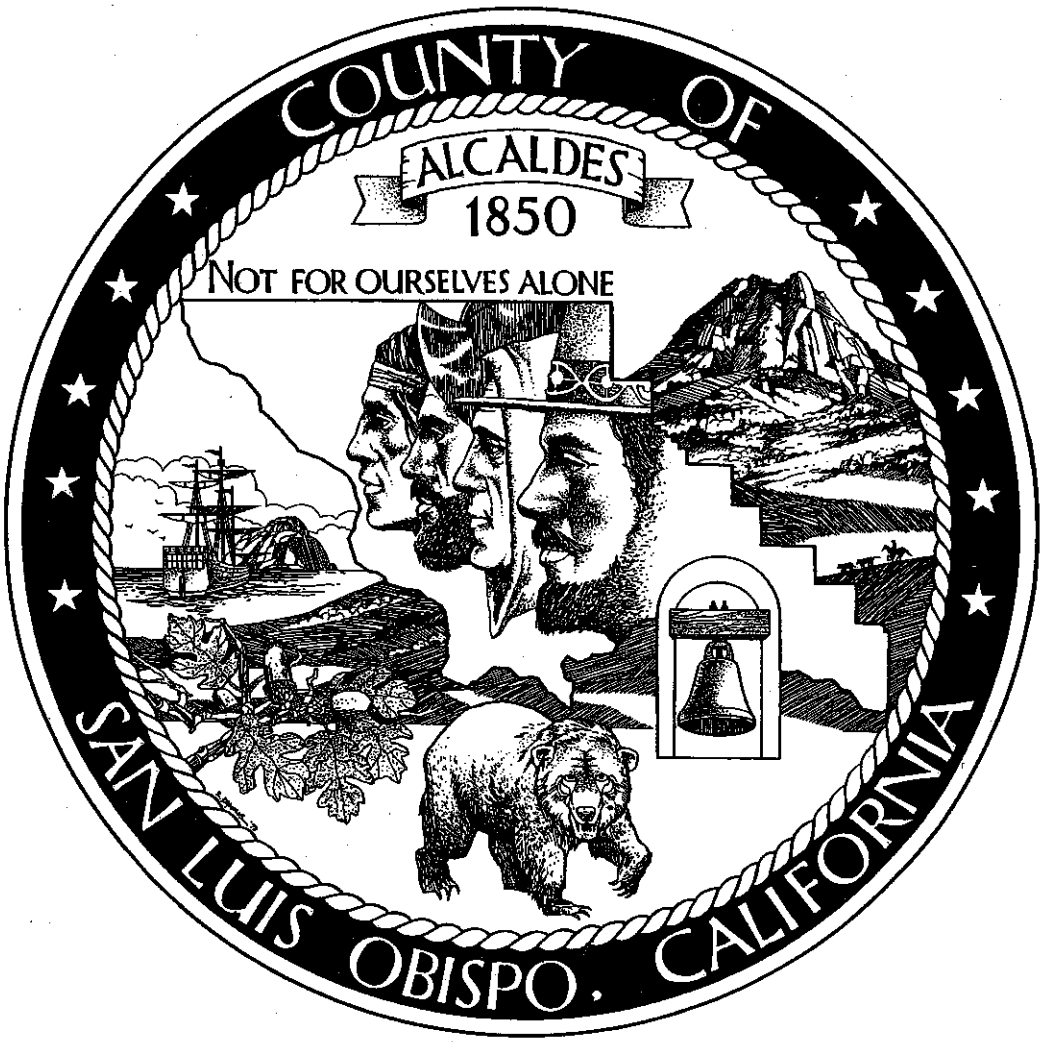
SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS



PUBLIC IMPROVEMENT STANDARDS

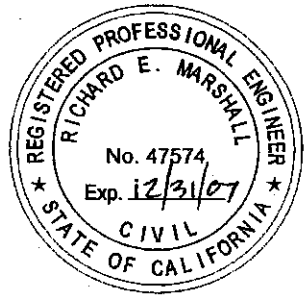
SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS
PUBLIC IMPROVEMENT STANDARDS
AUGUST, 2006 EDITION

Approved:

Glen L. Priddy 8/22/06

Glen L. Priddy
Deputy Director of Public Works

Recommended for Approval:



Richard Marshall 8/22/06

Richard Marshall
Development Services Engineer

Adopted by the Board of Supervisors:

Resolution No. 2006-293
August 22, 2006

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

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Provide public facilities and services that ensure health and safety and enhance quality of life for the community.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

INTRODUCTION

The purpose of establishing these Public Improvement Standards is to provide uniform and functional facilities that ensure health and safety, and enhance the quality of life for the communities of San Luis Obispo County.

The Public Improvement Standards consist of three major components: (1) Design Standards, (2) Construction Specifications, and (3) Standard Construction Drawings. The Design Standards and Construction Specifications are presented together in each of the following Sections:

1. Improvement Plans
2. Site Preparation & Earthwork
3. Roadways
4. Road Edges
5. Storm Drainage
6. Water Supply
7. Wastewater Disposal
8. Utilities
9. Traffic Control
10. Project Completion

The Standard Construction Drawings are included at the end of the document.

The Public Improvement Standards establish the minimum requirements for the design and construction of any public improvement in the County of San Luis Obispo.

Public improvements are those which will be accepted for operation and maintenance by the County of San Luis Obispo, any County-operated Special District, any independent Special District which does not have its own requirements in these areas, or for any subdivision or land use permit where the improvement is determined to be of sufficient public benefit that compliance with these standards is required by the conditions of approval.

Additionally, these Public Improvement Standards establish requirements for grading on private property when associated with a subdivision. Chapter 2 provides more information on grading requirements.

Final authority for County approval of improvement plans, or acceptance of constructed improvements, rests with the Director of Public Works and his or her designee.

A. RELATED PUBLICATIONS

This document is supported by various publications which comprise the standard references for this type of work. In the event of any conflict or discrepancy between these Public Improvement Standards, and any of the related publications listed below, these Public Improvement Standards shall take precedence. If any element of a proposed design is not addressed by these Public Improvement Standards, it shall conform to the requirements of the California Department of Transportation (Caltrans) if addressed there; if not, the Project Engineer shall provide an appropriate reference such as those listed below to support the proposed design.

The most-recent versions of each of the following are considered incorporated by reference into this document:

San Luis Obispo County General Plan
Circulation Element
(in Framework for Planning and in Land Use Element Area Plans)

San Luis Obispo County Code
Title 8, Health and Sanitation
Title 13, Roads & Bridges, Streets & Sidewalks
Title 15, Vehicles and Traffic
Title 19, Building and Construction Ordinance
Title 21, Real Property Division Ordinance
Title 22, Land Use Ordinance – Inland (LUO)
Title 23, Coastal Zone Land Use Ordinance (CZLUO)

Other County Publications
Traffic Volumes
County Bikeways Plan
Speed Surveys
Americans with Disabilities Act (ADA) Transition Plan

Circulation Studies:

- South County (Nipomo, Nipomo Mesa)
- Avila Area
- Los Osos
- Templeton Area
- North Coast (Cambria, San Simeon)
- San Luis Obispo Fringe

San Luis Obispo Creek Watershed Drainage Design Manual

Community Drainage Studies:

http://www.slocountydrainagestudies.org

- San Miguel
- Santa Margarita
- Oceano
- Nipomo
- Cambria
- Cayucos
- Los Osos (not available online)

California Government Code

Subdivision Map Act

California Business & Professions Code

Professional Land Surveyors' Act
Professional Engineers' Act

California Code of Regulations

California Department of Transportation (Caltrans)

Highway Design Manual
California Supplement to MUTCD, listed below
Construction Manual
Standard Specifications
Standard Plans
Manual of Tests

Office of the State Architect

California Building Code (CBC)

California Department of Forestry & Fire Protection

San Luis Obispo County Fire Department – Developers' Guide

United States Department of Transportation – Federal Highway Administration

Manual on Uniform Traffic Control Devices (MUTCD)

American Association of State Highway and Transportation Officials (AASHTO)
A Policy on Geometric Design of Highways and Streets
Low-Volume Road Design
Roadside Design Guide

Institute of Transportation Engineers (ITE)
Residential Street Design and Traffic Control
Residential Streets
Traffic Calming – State of the Practice

American Public Works Association (APWA)

American Water Works Association (AWWA)

American Society for Testing and Materials (ASTM)

Other publications may need to be referenced as appropriate.

B. DEFINITIONS IN THE STATE SPECIFICATIONS

In the State Specifications, the intent and meaning of the terms that are used shall be as defined in Section I of the State Specifications except as herein below noted or revised.

Contractor. Any person or persons, firm, partnership, corporation or combination thereof, who has/have entered into a contract with any person, persons, corporation, company, special district, or the County of San Luis Obispo as party or parties of the second part, or his/her/their legal representatives, for the construction of any public improvement or portion of any public improvement within the County of San Luis Obispo.

Department. The County of San Luis Obispo acting by and through its Department of Public Works and Transportation, including the Director and his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

Director. The Director of the Department of Public Works and Transportation of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

Engineer. (1) Where the duties described indicate the acceptance or approval of the project or the plans therefor, or any other duties and functions of the Department or Director as described in these Design Standards and Standard

Specifications, Engineer shall mean the Deputy Director of the Department of Public Works, Engineering Services, of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her. (2) Where the duties described indicate the functions and responsibilities for the preparations of the plans for the project and the other duties assigned to the Project Engineer in these Design Standards and Standard Specifications for the construction, inspection, and certification of the project, Engineer shall mean the Project Engineer as defined below.

Laboratory. 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 Director.

State. When the State Specifications are applicable, the word "State" as used in the State Specifications shall mean the State of California and its political subdivision, San Luis Obispo County.

C. DEFINITIONS IN THESE PUBLIC IMPROVEMENT STANDARDS

In these Public Improvement Standards, the intent and meaning of the terms that are used shall be as defined below.

Contractor. Any person or persons, firm, partnership, corporation or combination thereof, who has/have entered into a contract with any person, persons, corporation, company, special district, or the County of San Luis Obispo as party or parties of the second part, or his/her/their legal representatives, for the construction of any public improvement or portion of any public improvement within the County of San Luis Obispo.

County. The County of San Luis Obispo, California.

Department. The County of San Luis Obispo acting by and through its Department of Public Works and Transportation, including the Director and his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

Developer. The owner of land where any public improvement is proposed to be constructed, or his/her designated representative.

Director. The Director of the Department of Public Works and Transportation of San Luis Obispo County, acting directly or through his/her duly authorized representatives, either employed by or contracting with the Department, acting within the scope of the particular duties delegated to him/her.

Encroachment Permit. Authorization by the Department to conduct work, reconstruct or place improvement in established County rights-of-way. No work or improvement shall be conducted outside the limits of the permit.

Laboratory. 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 Department.

Project Engineer. 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 County of San Luis Obispo.

Public Improvement. Public improvements are those which will be accepted for operation and maintenance by the County of San Luis Obispo, any County-operated Special District, any independent Special District which does not have its own requirements in these areas, or for any subdivision or land use permit where the improvement is determined to be of sufficient public benefit that compliance with these standards is required by the conditions of approval.

Public Improvement Standards. The Design Standards, Construction Specifications and Standard Construction Drawings which comprise this volume, along with all other standard references incorporated herein.

State Standard Specifications. The latest edition of the Standard Specifications, and of the associated Standard Plans, of the State of California, Department of Transportation (Caltrans).

D. OTHER REGULATORY AGENCIES

Regulatory permits and/or agreements may be required by other State and Federal agencies, including but not limited to the California Regional Water Quality Control Board, the California Department of Fish & Game and the U.S. Army Corps of Engineers. Approval of any improvement plans or construction activity by the County does not exempt the project owner from the requirement to comply with the regulations of any of these agencies. Prior to construction of public improvements, the developer shall provide copies of all such permits to the Department, or document that such permits are not required.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

1. IMPROVEMENT PLANS

Complete plans and specifications for all proposed public improvements, as defined herein, which are not initiated by County Public Works, shall conform to the requirements of this chapter. These plans and specifications shall be submitted to the Department for approval, and must receive the required approval prior to the beginning of construction of any such improvements.

1.1 PREPARATION OF PLANS

1.1.1 PLAN REVIEW PROCEDURE

A. Plancheck Intake. For the first submittal of plans, the Project Engineer must schedule an "intake" appointment, at which time the Department will determine whether all required information has been provided. More information about this process is available from the Department. The first submittal must include a transmittal, three sets of plans, soils report (where required) and drainage calculations. Other items may be required by the Department, as determined necessary at the intake appointment. One copy of the plans and other items, showing necessary revisions, will be returned to the Project Engineer. All subsequent submittals require only two sets of plans and other items, unless specified otherwise by the Department. A drawing of the site plan or subdivision layout shall be included with each set of subdivision improvement plans submitted. Plans not conforming to the normal standards of quality and neatness may be rejected.

Plans that require review by other entities, including but not limited to:
- Public Works – Utilities Division
- General Services – Parks Division
- Public Health – Environmental Health Division

must be submitted directly to those entities. Some may require a copy of both the final map and improvement plans with the submittal.

B. Plans Approval. When all corrections have been made to the satisfaction of the Department, the Project Engineer may submit original signed, sealed and dated drawings for approval. No construction will be authorized, or plan approved, until such time as the Department signifies approval by signature and seal on the original drawings of the title sheet.

C. Bonding Estimate. Once improvement plans are approved by the Department, a bonding estimate may be submitted for review and approval, where applicable. Bonds may be submitted to the Department following approval of the bonding estimate. More information about this procedure, along with standard forms to be used for this purpose, may be obtained from the Department.

D. Plan Revisions. There shall be no revisions made to an approved set of plans, unless such revisions are submitted to the Department for approval prior to being constructed. 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, County 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.

E. Phased Improvements. 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 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.

1.1.2 PLANS LAYOUT

All plans shall be prepared on mylar, vellum or bond, or approved equal, measuring 24" x 36".

A. Earthwork. If any grading is proposed outside the roadway prism, a grading plan shall be submitted with the other required improvement plans. Finished grading shall be depicted by contour lines, spot elevations, or by "top/toe" indications, as determined appropriate by the Department. The grading plan shall include a reference to the project soils report (if applicable), including its title, date and author.

B. Retaining Walls. For any proposed retaining walls, a separate sheet shall be provided which depicts the elevation view and typical section for each wall.

C. Roadway Improvements. Roadway plan and profile sheets shall be of appropriate scale to clearly show the proposed plan layout, along with existing and proposed profiles of all roadways. The boundaries of lots fronting on the roadway, drainage easements, utility easements, slope easements, section lines and corners, land grant lines and temporary construction easements shall be shown on all roadway improvement sheets, with proper dimensions.

Appropriate scales include:

- horizontal 1"=20', vertical 1"=2' or 1"=4'
- horizontal 1"=30', vertical 1"=6'.

The scale may be varied in rough terrain. Each roadway plan and profile sheet shall include the typical section.

D. Cross Sections. Cross sections shall be provided for all designs involving widening existing roads. The spacing of cross sections shall be based on the characteristics of the project, as determined necessary by the Department.

The following items of work may be depicted together with the roadway improvement plans. However, the Department may require that they be separated from the roadway improvement plans if necessary for clarity.

E. Storm Drainage. Plans for minor drainage facilities may be shown on roadway plans, if appropriate. Plans for major drainage facilities shall conform to the sheet size and scale shown above for roadway improvements. Profiles of all culverts and drainage structures shall be provided, along with the hydraulic grade line.

F. Water Supply. Plans for water system layout and improvements shall be submitted on the same plans as the roadways. Improvements outside the roadway prism shall be drawn on separate sheets and to an appropriate scale.

G. Wastewater Disposal. Plans for wastewater disposal systems shall be prepared on standard sheets as defined above for roadway improvements. Scales are to be as follows, except in unusually rough terrain where the scales may be varied.

Appropriate scales include:

- horizontal 1"=20', vertical 1"=2' or 1"=4'
- horizontal 1"=30', vertical 1"=6'.

H. Utilities. A layout for all utilities including water, sewer, electric, telephone, cable television and gas system improvements shall be submitted on a composite utility plan in an appropriate scale, unless approved otherwise by the Department. Roadway plans shall show placement of utilities in the typical section.

I. Traffic Control. Plans for work zone traffic control, and for installation of new permanent traffic control devices, shall be drawn on sheets and to an appropriate scale. Work zone traffic control may reference the appropriate State Standard Plan for Traffic Control Systems. The standard traffic control notes (Section 9.2.2 A of these Standards) shall be placed on the same sheet. If new permanent traffic control devices include traffic signals or lighting, the necessary electrical details shall be incorporated into these sheets.

J. Erosion Control. Temporary and permanent erosion control measures are to be shown. The standard erosion control notes shall be placed on the same sheet.

K. Details. The plans shall include one or more sheets entitled "Details," which shall show the following as applicable:

- Detail of all concrete structures
- Other agencies' standard details which are referenced in the design
- Miscellaneous details
- Copy of all County Standard Drawings which are referenced in the design
- Details of any element of the plans required for clarity

1.1.3 PLANS FORMAT

The following items are to be shown on plans submitted for approval:

A. Title Sheet. On improvement plans exceeding two sheets in the set, a title sheet shall be prepared. The title sheet shall also include an index of sheets.

B. Vicinity Map. The title sheet shall include a vicinity map depicting the following:

- Boundaries of the site, and any Special Districts or City Limits nearby
- Street names
- Section and/or Grant lines and corners
- Location of the project within the County, depicting a minimum 1.5-mile radius around the project location

C. Title Block. Each sheet of the set of drawings, including the title sheet, shall have an approved title block showing:

- Name and/or number of the project
- Sheet title
- Sheet number and total number of sheets
- Project Engineer's name, professional registration number, seal and signature, as required by the Professional Engineers' Act
- Date
- Scale of the drawing
- Signature blocks for Department approval

D. Right-of-Way. Right-of-Way lines, the boundaries of lots fronting on the roadway, drainage easements, utility easements, slope easements, and temporary construction easements (existing and proposed) shall be shown on the plans. All right-of-way and easement lines shall be properly dimensioned.

E. Survey Monuments. Pursuant to Section 8771(b) of the California Business and Professions Code, existing survey monuments that control the location of subdivisions, tracts, boundaries, roads, streets or highways, or provide survey control, that are within or adjacent to the area of work, shall be located and referenced by or under the direction of a licensed land surveyor or registered civil engineer. This shall occur prior to the time when any streets, highways, other rights-of-way, or easements are improved, constructed, reconstructed, maintained, resurfaced or relocated. In the event that any existing survey monument is disturbed in any way by the improvement work, as determined by a licensed land surveyor or registered civil engineer, it shall be reset accordingly and an appropriate document shall be filed with the County Surveyor, prior to the final acceptance of the work by the Department.

F. Topography. All pertinent topographic features which may affect the design, construction and operation of the improvements shall be shown on the plans, including, but not limited to, the following:

- Roadway lines
- Curbs, sidewalks, shoulders
- Storm drains, drainage ditches
- Water lines, fire hydrants
- Wastewater Disposal systems
- Existing utility lines and facilities
- Existing structures, fences, trees and other foliage
- High water and frequent inundation limits

G. Profiles. The plans shall clearly show the existing and proposed profiles of all roadways, drainage ditches, storm drains, water lines, sanitary sewers,

and clearances at structures and power lines, including elevations at 25' minimum intervals for warped surfaces.

H. Stationing and Orientation. The stationing on plan and profile sheets shall read from left to right. Insofar as practical, the plans shall be arranged so that the north arrow is either pointed toward the top or to the right edge of the sheet. Wherever possible, stationing shall conform to existing stationing provided by the Department.

I. Benchmark. The plans shall indicate a durable local benchmark that will be utilized for the construction of the improvements. The plans shall include a description of the benchmark and the datum for its reference elevation, and shall include an indication of its location on the Vicinity Map or the plans.

J. Basis of Bearings. The plans shall indicate the basis of bearings that will be utilized for construction of the improvements. The plans shall include a description of the points that form the basis of bearings, along with the appropriate reference information.

K. Units of Measurement. The units of measurement on plans submitted to the Department shall be English Units (United States Standard Measures). If an improvement plan includes facilities which are under the jurisdiction of another agency which requires the use of Metric Units, then Metric Units may be used on the plans for County improvements as well, if approved by the Department.

L. Notes. The title sheet of the plans shall include the required County General Notes. The most recent version of these is available from the Department. The Plans shall also include the required County Traffic Control Notes, as described in Chapter 9, in an appropriate location. Any special notes, unique to the project design, shall be shown on the relevant sheet of the plans, as much as possible.

1.2 DESIGN ADJUSTMENTS

Requests for adjustment to the requirements of the Design Standards, Standard Specifications or Standard Drawings, such as substitution of methods or materials differing from those set forth herein, may be proposed in writing. The Project Engineer must furnish complete descriptive information to the Department (including any additional information the Department may request). The Department will provide written response to such requests for adjustment, either approving or denying the request.

The Department 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 fifteen calendar days before date of use.

Design alternatives may be approved by the Department where the proposed alternative provides the same level of service, approximately the same estimated maintenance costs, and is not adverse to public health, safety and welfare.

The provision for design alternatives is intended to provide for some flexibility in designing streets with bikeways, pedestrian and equestrian paths; to facilitate the protection of trees or other resources; when an area Specific Plan has been adopted showing an alternate to the standard drawings, or where appropriate in order to provide compatibility with adjacent areas.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

2. SITE PREPARATION & EARTHWORK

2.1 DESIGN STANDARDS

2.1.1 SITE PREPARATION

This section provides standards for all work that is required to prepare a site for construction of any public improvements, as defined in these Public Improvement Standards.

A. Clearing and Grubbing. Clearing and grubbing activities shall conform to Section 16 of the State Standards. Additional requirements shall apply if determined necessary by the project soils and geological report.

B. Tree Removal. All trees to be removed or impacted shall be depicted on the improvement plans, and shall be consistent with the environmental determination which was prepared for the project. Required tree removal and/or replacement shall allow for clear zone requirements, as defined in Section 4.1.7 A and B of this document. No stumps or other vegetative material shall remain or be placed in any fill area which will support any structure or roadway. See the Appendix for the County policy on trees.

C. Removal of AC and Concrete. Where existing AC or concrete pavement will be removed as part of the work, the removal shall conform to Section 15-2.02A of the State Standards.

D. Grinding AC. Grinding of existing AC pavement, to prepare for overlay, shall conform to Section 42-2 of the State Standards.

E. Disposal of Removed Materials. Debris from removal of any materials from the work area shall be disposed of in a manner which complies with Chapter 22.52 (Inland) or Chapter 23.05 (Coastal) of the County Code.

F. Abandonment of Existing Facilities. Certain existing facilities may be abandoned in place, if approved by the Department, according to the following requirements:

1. Wells. Existing wells which will no longer remain in service shall either be demolished and removed, or abandoned, as determined by the County Department of Public Health, Division of Environmental Health Services.

2. Septic Systems. Existing septic systems which will no longer remain in service shall either be removed or abandoned, as determined by the County Department of Planning & Building. A permit from the Department of Planning & Building shall be required for this work.

3. Culverts. Existing drainage culverts which will no longer remain in service shall either be removed or abandoned, as determined by the Department. If a culvert is removed, the area shall be re-compacted to the requirements of Chapter 2 of this document, and of the project soils and geological report. If a culvert is abandoned, it shall conform to the requirements of Section 15-2.05A of the State Standards.

G. Demolition of Structures. Any existing structure on a project site, which is proposed to be demolished, shall require a demolition permit from the Department of Planning & Building.

2.1.2 EARTHWORK DESIGN

The following requirements apply to the design of site grading associated with subdivisions, to be reviewed by the Department as described above.

A. Maximum Height of Cuts/Fills. The maximum height of cut and fill slopes shall be as required by the California Building Code (CBC), unless a more restrictive limit has been established by the conditions of approval or by the soils and geological report for the project. The design shall incorporate the provision of "benches" whenever the slope height requires them, as indicated by the CBC.

B. Maximum Slope. The maximum slope of cut and fill slopes shall be as required by the CBC, unless a more restrictive limit has been established by the conditions of approval, or by the soils and geological report for the project, or by other provisions of these Standards.

C. Grading Site Boundaries. Each lot line within a proposed new subdivision shall be considered a "grading site boundary" for purposes of implementing grading setbacks as required by the CBC.

D. Foundation Elevations. All grading designs shall depict on the plans the "point of discharge" which satisfies the requirements of the CBC, Section 1806.5.5.

E. Elevation Standards. In Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories, or other sites where determined necessary by the Department, architectural plans for building construction shall use the same benchmark elevation as the street improvement plans (whether prepared by the Department or by the Project Engineer).

The following requirements for the relationship between street improvements and building elevations shall also apply to the architectural plans for building construction:

1. The plans shall depict the finish floor elevation at all building entrances fronting a current or future public street.

2. The plans shall depict the back-of-sidewalk elevations at the locations of all building entrances referenced in #1, based on a typical sidewalk cross-slope of 1.5%.

3. The plans shall demonstrate compliance with ADA and CBC requirements for pedestrian access to all building entrances.

F. Drainage Systems on Slopes. Drainage systems on slopes shall be designed as required by the CBC, Appendix 33.

G. Slope Easements Required. Slope easements shall be required for any grading which occurs outside the overall project site boundary, for any excavation or embankment slopes which are steeper than 5:1 (horizontal:vertical). All such easements shall provide for access and working space rights.

H. Retaining Walls. Prior approval is required for the construction of any reinforced concrete, or reinforced concrete masonry unit (CMU) retaining wall which would require a construction permit as defined in the CBC. If a proposed wall is below the threshold where a construction permit would be required, it shall be shown in the grading plan only, in order to evaluate its relationship to site drainage. Retaining walls shall be constructed based on an approved design. Examples of approved designs include:

- County Design Tables (available from Planning & Building)
- Design Tables from the State Standard Plans

- Design Tables from an approved alternate reference
  [e.g., "Standard Plans for Public Works Construction," APWA]
- Designs prepared, signed and sealed by a registered civil or structural engineer

In addition, the following requirements shall apply to any retaining walls proposed as part of any public improvements, as defined in these Public Improvement Standards:

1. Designs for any retaining wall shall include the location in plan view, a typical cross-section, and an elevation view of the full length of the proposed wall. The Project Engineer shall also provide all design calculations, signed and sealed, to the Department for review, along with any applicable geological or geotechnical reports.

2. Wood retaining walls shall be no greater than 2 feet in exposed height, and shall be considered appropriate for landscaping purposes only.

3. Any wall greater than thirty (30) inches in exposed height may require a pedestrian railing as defined in the CBC, or maintenance worker fence as defined by Cal-OSHA and shown in the State Standard Plans.

4. Retaining walls shall not be permitted within the right-of-way as part of the design of roads for any public improvements.

2.1.3 OTHER EARTHWORK REQUIREMENTS

Where applicable, grading constructed for projects regulated by these County Standards shall conform to the provisions of the following references:

- Sections 4 through 22 of the State Standard Specifications
- The latest edition of the California Building Code

as well as the applicable portions of the San Luis Obispo County Code:

- Title 19, Building and Construction Ordinance
- Title 22, Land Use Ordinance – Inland (LUO)
- Title 23, Coastal Zone Land Use Ordinance (CZLUO)

Note that LUO Section 22.52.050 (B) (1) (a) (6) states that grading activity is exempt from the provisions of that Title, when associated with improvement plans for final subdivision maps and consistent with the standards, guidelines and

provisions of that Chapter. CZLUO Section 23.05.026 (c) provides for the same exemption in the Coastal Zone, when the subdivision map is accompanied by an approved coastal development permit.

Therefore, on-site grading within subdivisions may be included in the improvement plans reviewed by the Department without obtaining a separate Grading Permit, but will be subject to the same design requirements.

Furthermore, grading that is associated with a subdivision, but which occurs outside its boundaries, (such as borrow or disposal sites), may require a separate Grading Permit under the provisions of Title 22 or 23 listed above.

In addition to the requirements noted above, grading activity reviewed by the Department will be subject to the requirements listed below.

A. Soils and Geological Report. The Department may require a soils and geological report to substantiate road designs and/or lot stability.

B. Preservation of Trees. Existing trees within the area of any grading shall be preserved as required by the conditions of approval for the subdivision or land use permit. All trees to be removed or impacted shall be depicted on the grading plan. The Department may require additional trees to be removed for reasons of safety or maintenance. See tree policy in the Appendix.

C. Earthwork Quantities. The Project Engineer shall enumerate the quantity of cut and of fill on the face of the grading plans.

D. Erosion/Sedimentation Control Plan. All public improvements involving earthwork shall prepare an Erosion and Sedimentation Control Plan. See Appendix C for plan requirements.

E. Dust Control. The grading plans shall include a note identifying that proper dust control shall be maintained at all times during construction. Dust control shall conform to the provisions of Section 10 of the State Standard Specifications.

2.2 CONSTRUCTION SPECIFICATIONS

2.2.1 MATERIALS

A. Deleterious Materials. No vegetative matter, nor any other deleterious materials, shall be permitted within any area which will support any structure or roadway. No organic material shall be permitted in structural

fills. If fill is specified to be a non-structural land reclamation, erosion control, or agricultural fill, organic material may be allowed.

B. Retaining Walls. Both reinforced concrete and reinforced CMU retaining walls shall have compressive strength verified by standard cylinder tests (or by Certificates of Compliance for lots <50 cubic yards). The use of hand-mixed concrete or grout is not permitted. The use of plastic cement is not permitted. The following requirements apply:

1. Concrete – The required compressive strength for concrete used in footings shall be as shown on the approved Design Table or plan, but shall not be less than 3,250 psi in 28 days.

2. Grout – Shall conform to CBC Standard No. 21-14 (Mortar cement) and shall be proportioned in conformance with CBC Table 21-B. The required compressive strength for grout shall be as shown on the approved Design Table or plan, but shall not be less than 2,000 psi in 28 days.

3. Mortar – Shall be ASTM C270 Type "M" or "S" and shall be proportioned in conformance with CBC Table 21-A. The required compressive strength for mortar shall be as shown on the approved Design Table or plan, but shall not be less than 1,800 psi in 28 days.

4. Railings – Shall be in conformance with State Standard Specification for "Pipe Handrailings," Section 83-1.02A.

2.2.2 CONSTRUCTION

A. Compaction Standards. The Project Engineer shall collect compaction data throughout construction, as required by the CBC. Following completion of the work, the Project Engineer shall provide compaction reports to the Department, certifying compliance with these requirements, for all the following areas:

- Each graded lot pad
- All roadways*
- All roadway shoulders*
- All sidewalk areas, where applicable*

* Compaction tests in these areas shall comply with the State Standards.

B. Elevation Certification. The Project Engineer shall collect elevation data for all graded lot pads. Following completion of the work, the Project Engineer shall provide elevation certifications to the Department prior to project completion, or building foundation pour, whichever occurs first.

C. Inspections Required. In Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories, or other sites where determined necessary by the Department, an inspection shall be required prior to building foundation pour, to verify the relationship between building floor elevations and back-of-sidewalk elevations. If the street improvement design was prepared by the Department, this inspection shall be conducted by the Department. If the street improvement design was prepared by the Project Engineer, the inspection shall be conducted by the Department and the Project Engineer.

D. Grading in Open Space Areas. No grading shall occur in any Open Space area before the pertinent Open Space Agreement is recorded.

E. Erosion Control During Construction. Follow-up applications of hydroseeding shall be made as needed to cover weak spots, and to maintain adequate soil protection. These applications shall avoid over-spray onto the traveled way, sidewalks, lined drainage channels, and existing vegetation. After any rainfall event, the developer is responsible for maintaining all slopes to prevent erosion.

F. Retaining Walls Inspection. Inspections by the Project Engineer are required at several phases of wall construction. It is the responsibility of the developer to ensure that these inspections are requested and made:

1. Footings (prior to pour)
2. Masonry pre-grout/reinforcement steel (prior to grouting)
3. Backfill/drainage (prior to backfill)
4. Final

When pre-approved by the Department, a Special Inspector may be retained by the Project Engineer or Developer to certify the wall construction. The Special Inspector shall be professionally certified in Reinforced Concrete and/or Structural Masonry inspection by the International Code Council. The Special Inspector shall submit the appropriate documentation of required inspections to the Department, prior to acceptance or approval of the work.

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3. ROADWAYS

3.1 DESIGN STANDARDS

3.1.1 DEFINITIONS

A. Rural Road. A Rural road is one which serves all properties outside Urban Reserve Lines, as defined in the Land Use Element of the General Plan. In addition, a road is considered Rural when it provides access to Residential Suburban, Residential Rural, Rural Lands and Agricultural land use categories inside Urban Reserve Lines. Rural roads shall be designed to the requirements of Standard Drawing series A-1, unless specified otherwise by project conditions of approval.

B. Gravel Road. A Gravel road is one which serves Residential Rural, Rural Lands and Agricultural land use categories, as those categories are shown by the Land Use Element of the General Plan. The Gravel Road standard may be utilized when the following criteria are met:

- number of lots to be ultimately served by the road is 20 or less
- when the projected Average Daily Traffic (ADT) will be 100 or less
- the roadway will not be needed for areawide circulation
- the roadway will be offered for dedication to the public
- a property owners' association is formed for the maintenance of the roadway

Gravel Roads shall be designed to the requirements of Standard Drawing A-1(j), unless specified otherwise by project conditions of approval.

C. Urban Street. An Urban street is one which serves Residential Single Family and Residential Multiple Family land use categories inside Urban Reserve Lines, as well as Open Space and Recreational categories adjacent to those categories as shown in the Land Use Element of the General Plan. Urban streets shall be designed to the requirements of Standard Drawing series A-2, unless specified otherwise by project conditions of approval.

D. Commercial/Industrial Road or Street. A Commercial/Industrial road or street is one which serves Commercial Retail, Commercial Service, Office/Professional and Industrial land use categories within Urban Reserve Lines, as those categories are shown by the Land Use Element of the General Plan. Commercial/Industrial roads or streets shall be designed to the requirements of Standard Drawing series A-3, unless specified otherwise by project conditions of approval.

E. Arterial Road or Street. An Arterial road or street is one which is primarily for the purpose of carrying traffic between State Highways and population centers, or which is needed to serve large volumes of traffic within an urban area. As used in these Standards, the term "Arterial" includes all those roads or streets designated Principal Arterial or Arterial in the Circulation Element of the General Plan.

F. Collector Road or Street. A Collector road or street is one which is or will be used primarily to enable traffic to move to and from Local roads or streets and Arterial roads or streets. As used in these Standards, the term "Collector" includes all those roads or streets designated Collector in the Circulation Element of the General Plan.

G. Local Road or Street. A Local road or street is one which is or will be used primarily for access to abutting property. As used in these Standards, the term "Local" includes all other roads not considered Arterial or Collector.

3.1.2 DESIGN CRITERIA

In order to maintain consistency with the County General Plan, the design of roadway public improvements shall take into account the Street Design Considerations from Framework for Planning. A copy of these guidelines is included in the Appendix.

A. Longitudinal Grade. The grade along the profile or flowline of any new roads or streets shall conform to the following:

1. The minimum longitudinal grade along the profile or flowline of new roads or streets constructed of asphalt concrete shall be 0.50 percent.

2. The minimum grade along the profile or flowline of new roads or streets constructed of portland cement concrete shall be 0.30 percent.

3. The maximum longitudinal grade along any new road or street shall conform to Standard Drawings A-1, A-1j, A-2 and A-3.

B. Cross Slope. The slope transverse to the profile or flowline of roads or streets shall conform to the following:

1. The standard cross-slope to be used for all new construction shall be 2.0 percent.

2. The minimum cross slope for widening any roads or streets shall be 1.0 percent, except for superelevated sections or approaches to cross gutters.

3. The maximum cross slope for widening any roads or streets shall be 5.0 percent, except for superelevated sections.

C. Intersecting Street or Road Grades. When two streets or roads intersect, neither shall have a grade greater than 3.0 percent for a minimum distance of 40 feet measured from the curb line of the intersected street or road to the beginning of the first vertical curve, except in unusually rough terrain, where the Department may allow up to a maximum of 5.0 percent.

D. Sight Distance at Intersections and Driveways. Road or street intersections, or driveway approaches, shall be designed to conform with the sight distance requirements established in the Standard Drawings.

E. Bikeways. Bikeways shall be incorporated into the design of any public improvements whenever a street or road that is to be improved is recommended for bikeway improvements by the *County Bikeways Plan.*

Where Class I or Class II bikeways are required, those bikeway improvements shall be added to the street or road cross-section as otherwise determined above.

Where Class I bikeways are to be constructed within County-maintained road rights-of-way, they shall be constructed of Portland Cement Concrete if they are to be maintained by the Department. If a Homeowners' Association or other mechanism is proposed for maintenance, other materials may be considered.

Where Class III bikeways are required, in no case shall roadway travel lanes be less than 12 feet in width.

The design of bikeways shall conform to Chapter 1000 of the Highway Design Manual, and the recommendations of the *County Bikeways Plan.*

F. Cross Gutters. No cross gutters will be allowed across any road or street with a 20-year forecast traffic volume greater than 3,000 ADT.

G. Curve Data. The computed curve data for all centerline curves shall be shown on the plans.

The minimum radius of the property line on the exterior corner of all corner lots shall be 20 feet. The minimum radius of curb returns shall be 30 feet. Larger radii may be required when specified in project conditions of approval, or as required by the County Traffic Engineer.

H. Obstructions at Public Road Intersections and Knuckles. No signs, hedges, shrubbery, vegetation, fence or other sight distance obstruction shall be placed within the restricted area at the corner of any public road intersection, or inside curve of any knuckle. An obstruction shall be considered any such item which is higher than 2.5 feet above either the nearest pavement surface or the nearest traveled way (where there is no pavement). The dimensions of the restricted area are provided in the Standard Drawings.

I. Right-of-Way. Right-of-way shall be offered for dedication to the public, as necessary to contain all elements of the roadway prism, as depicted in the Standard Drawings.

J. Street and Road Profiles. Certain streets or roads are required to be extended to the boundary of a site proposed for development, to comply with the Real Property Division Ordinance or project conditions of approval. In such cases, the design shall include an extension of the street or road profile for a minimum distance of 200 feet beyond the project limits, depicting both existing grade and a potential design grade which will comply with the required design speed.

K. Mid-Block Tapers. Tapers shall be provided at each end of a segment of road widening within a block, and shall be located beyond the end of the development site. Tapers which affect the width or lateral placement of travel lanes shall be designed based on the design speed provided by the Department, using the methods found in the Highway Design Manual. All other tapers shall be designed at a ratio of 5 (longitudinal): 1 (lateral), with a minimum length in all cases of 40 feet.

L. Intersection Tapers. When new public road intersections are constructed, intersection tapers shall be provided according to the following table:

Table 3-1 Intersection Taper Requirements

Main Road	Intersecting with	Urban/Rural	Taper Requirement
Arterial	Arterial	Rural	Highway Design Manual (HDM) Figure 405.7
Arterial	Collector	Rural	HDM 405.7
Arterial	Local	Rural	HDM 405.7
Collector	Collector	Rural	HDM 405.7
Collector	Local	Rural	20:1, minimum 200 ft
Local	Local	Rural	5:1, minimum 40 ft
Arterial	Arterial	Urban	10 ft shoulder, 60 ft 35 ft radius curb return
Arterial	Collector	Urban	8 ft shoulder, 60 ft
Arterial	Local	Urban	8 ft shoulder, 60 ft
Collector	Collector	Urban	30 ft radius curb return
Collector	Local	Urban	30 ft radius curb return
Local	Local	Urban	30 ft radius curb return

Increased requirements (corner radius, length of approach widening) may be applied in conditions of approval, depending on project operational requirements.

M. Retaining Walls. Retaining walls shall not be permitted within the right-of-way as part of the design of roads for any public improvements.

3.2 CONSTRUCTION SPECIFICATIONS

3.2.1 FACILITIES

A. 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 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 as depicted in Standard Drawing M-2. The barricade shown in Standard Drawing M-2a may be used if the road is to be extended in less than five years.

B. Raised Medians. Where the construction of raised medians is required by project conditions of approval, they shall conform to the requirements of the Highway Design Manual. In addition, the following requirements shall apply:

1. Width. No portion of the median shall be less than four feet in width. Any portion of the median less than eight feet in width shall be surfaced with stamped concrete. No vegetation shall be permitted in these areas. A two (2) foot shoulder shall be provided on the roadway surface adjacent to the median curb and the traveled way.

2. Lighting. Overhead lighting which conforms with the requirements of the electric utility service shall be provided at each end of a segment of raised median. Lighting shall be designed to provide a minimum illumination on the street or road surface of:

- 1.0 foot-candles at the centerline intersection of the street/road with the median and the intersecting street/road or driveway, and
- 0.6 foot-candles within the entire area which comprises the intersection.

3. Landscaping. A landscaping plan shall be provided to the Department for review and approval. Proposed landscaping shall provide for intersection and driveway sight distance requirements as required by the Highway Design Manual and these Standards. Landscaping shall be installed under an Encroachment Permit issued by the Department. The permit shall identify a specific entity which will be responsible, in perpetuity, for maintenance of the landscaping and lighting, and removal of the median if necessary in the future.

4. Maintenance. Maintenance of all landscaped medians shall be the responsibility of the developer who is required to install the median, unless the maintenance responsibility is assumed by a public entity or property owners' association. Maintenance responsibility must be established prior to approval of improvement plans. Maintenance activities shall be performed under an Encroachment Permit issued by the Department.

C. Knuckles. A knuckle may be used, in lieu of the appropriate horizontal curve, in the design of Urban streets with an ADT less than 500 and design speed of 25 mph or less, or on Commercial/Industrial streets whenever required to make a 90-degree bend. Knuckle designs shall conform to the requirements of Standard Drawing A-6b. The use of knuckles in rural areas is discouraged. Subdivisions in these land use categories should use

horizontal curves appropriate for the required design speed as determined by Standard Drawing A-1.

D. Left-Turn Channelization. The need for provision of left-turn channelization shall be determined by use of NCHRP graphs or AASHTO warrant table. The length of the channelization shall be the minimum storage plus deceleration length as determined from Highway Design Manual section 405.2, unless a greater length is required by project conditions of approval. A 20 mph speed reduction may be used in determining the required length of deceleration, if approved by the County Traffic Engineer.

E. Right-Turn Channelization. Right-turn channelization shall be provided wherever forecast right-turning traffic volume will be 300 vehicles per hour, as determined by the Department. The layout of the channelization shall be based on Highway Design Manual section 405.3, with deceleration length included, unless a greater length is required by project conditions of approval. A 20 mph speed reduction may be used in determining the required length of deceleration, if approved by the County Traffic Engineer.

3.2.2 CONSTRUCTION

Roadway work shall conform to the applicable provisions in Sections 24 through 29, and 37 through 42, of the State Standard Specifications and these Standards.

The roadway shall be prepared and constructed in accordance with the applicable portions of the State Specifications, unless otherwise modified in the following or approved by the Department. The construction shall incorporate the minimum Traffic Index as provided by the Department.

A. Aggregate Base. All aggregate base shall be Class 2, and shall conform to the provisions of Section 26, "Aggregate Bases," of the State Standard Specifications. No additional testing, other than that specified in Section 26 (Gradation Limits, R-Value, Sand Equivalent and Durability Index), shall be required. The following additional requirements apply to the placement of all aggregate bases:

1. The Department shall be notified no less than 24 hours prior to placement of aggregate base materials (whether new or recycled).

2. The Department shall reject any improvements based on materials not in compliance with these Specifications. If rejected, this shall require the removal and replacement of the material just installed.

B. Recycled Aggregate Base. The County encourages the use of recycled or reclaimed materials for new construction projects, provided they comply with these Specifications. The following items apply to the use of recycled or reclaimed aggregate base:

1. The restriction in Section 26 of the State Standard Specifications, that the amount of recycled/reclaimed material included in Class 2 aggregate base not exceed 50 percent of the total volume of the aggregate used, shall not apply.

2. The testing requirements of Section 26 of the State Standard Specifications require recycled/reclaimed material to be tested at the source and at the job site.

3. The Project Engineer, Developer and Contractor shall show due diligence to ensure that recycled/reclaimed aggregate base material meets the quality requirements of Section 26 and be free of organic, metal and other deleterious materials prior to placement. The Department shall be notified prior to any use of recycled base.

C. Asphalt Concrete. Shall conform to the requirements for Type B Asphalt Concrete (AC) as specified in Section 39 of the State Specifications utilizing the 3/4 inch maximum aggregate on new roads with a 20-year projected ADT of 1,500 or greater, and ½ inch maximum aggregate on all other roads. Asphalt binder shall conform to PG 64-10 as specified in Section 92 of the State Standard Specifications.

D. Survey Monuments. Survey monuments shall be provided at the following locations within a public improvement:

1. In making a survey, the surveyor shall set permanent monuments at all angle points and curve points on the exterior boundaries of the parcel or tract map, and at all parcel corners. Permanent monuments shall be set at angle and curve points on the centerline of on-site streets so that each monument will be intervisible with at least two other monuments and shall be set at the point of intersection of all on-site streets, and at their intersections with existing streets. In the Rural Lands and Agriculture land use categories, centerline street monuments at curve points may be omitted, provided right-of-way monuments are installed at curve points.

2. Any monument as required by Title 21 of the County Code, which is disturbed or destroyed before acceptance of all improvements shall be replaced by the Developer.

3. All monuments shall be subject to the inspections and approval of the County Surveyor before approval of any related subdivision map. In case the street improvement work in the subdivision is proposed to be installed subsequent to the recordation of the map, the County Surveyor may enter into a Monumentation Agreement with the subdivider and authorize posting of security in accordance with the Subdivision Map Act, to assure installation of the monuments required by this section which cannot be permanently placed until completion of the improvement work.

4. Monuments located in streets or roads shall be installed in conformance with the requirements of Standard Drawings M-1 and M-1a.

E. Planting Cut and Fill Slopes. Cut and fill slopes shall be planted as required by the Department. An erosion control plan shall be submitted when improvement plans are required. The erosion control plan shall include the County's standard erosion control notes and be approved by the Department prior to any earthwork.

Erosion control planting shall consist of hydroseeding all disturbed areas other than paved or gravelled surfaces, utilizing the appropriate seed mix as approved by the Department. The planting shall be designed to achieve 90% coverage prior to project completion.

F. Sawcutting of Pavement. All sawcuts shall be subject to approval by the Department, and shall comply with the following requirements:

1. In all cases where it is necessary to widen, connect to, trench or remove and replace existing pavement, the existing pavement shall be sawcut along a clean line a minimum of one foot inside the existing edge. A greater area of existing pavement may be required to be sawcut and removed so that any new paving joins to competent asphalt concrete. All sawcut lines shall be either parallel with or perpendicular to the direction of travel. No parallel sawcuts shall be along a wheel path or within any bike lane.

2. Cut edges shall be vertical, with square corners, and shall be straight and neat in appearance.

3. Rotomilling/grinding may be utilized in place of sawcut when approved in advance of the work by the Department.

4. The initial sawcut for pavement removal and structural excavation shall follow the alignment of the facility to be installed therein. After

the structure backfill has been completed and temporary paving (if any) is placed, the finished surface shall be re-sawcut a minimum of one foot into the existing pavement, or to competent pavement, in accordance with the requirements in #1 above. The structural section applicable to the re-paving area (as determined by these Standards, the project plans and any Encroachment Permit issued pursuant to those plans) shall then be placed.

3.2.3 TESTING

A. Basement Soil. Resistance factor "R" (State Stabilometer method) tests shall be made by the Project Engineer as required by the Department. 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.

"R" value tests may be required prior to approval of construction plans in cases where a road is anticipated to have very high forecast traffic volumes and traffic index, and/or known poor quality basement soil.

Relative compaction tests shall be made by an appropriately licensed professional on subgrade material, and material placed within the street areas of the development, as required by the Department of Public Works. Said tests will be made prior to placing the next layer of material.

B. Aggregate Bases. Tests for aggregate bases shall be made by the developer as required by the Department on a minimum of two representative samples taken at the source from which material will be imported. The sample shall be taken within 15 days prior to placing of either base or subbase. Test results submitted shall indicate clearly the location of the source of material. Base material shall also be subject to testing as it is delivered to the job site in accordance with State Standards.

C. Asphalt Concrete. Compaction testing of in-place asphalt concrete (AC) shall be done using nuclear source equipment, and in accordance with California Test Method No. 375. Relative density shall be 95% or greater, based on average maximum density from the source, or from a sample taken at the project site at the time of placement.

The following information shall be collected by the Project Engineer at the time of placement of AC paving:

- compaction of AC
- temperature of AC at time of placement
- thickness of AC and aggregate base
- asphalt content (for all projects with total tonnage >500 tons)

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4. ROAD EDGES

4.1 DESIGN STANDARDS

4.1.1 SIGHT DISTANCE

A. Public Road Intersections. Sight distance at all public road intersections shall comply with the "intersection" requirements of Standard Drawings A-5a and A-5b.

B. Driveways. Sight distance at all driveways entering onto public roads shall comply with the "driveway" requirements of Standard Drawings A-5a and A-5b.

4.1.2 SIDEWALKS

Concrete curbs, gutters and sidewalks shall be installed within urban areas as required by the Land Use Ordinance or Coastal Zone Land Use Ordinance. They may also be required in other areas if established as a condition of approval of a subdivision or land use permit.

A. Accessibility and Usability of Sidewalks, Curbs and Related Facilities within the Public Right-of-Way by Persons with Disabilities. In accordance with Government Code Section 4450 *et seq.*, and Health and Safety Code Section 19955 *et seq.*, all items along the Accessible Route of Travel shall be constructed in accordance with the requirements of:

- California Building Code (CBC);
- Accessibility Guidelines prepared by the federal Access Board, as adopted by the United States Department of Justice, to implement the Americans with Disabilities Act of 1990; and
- these Design Standards, Standard Specifications and Standard Drawings.

These requirements will be strictly construed. All new construction, within the public right-of-way, not in conformance therewith will be rejected and shall be removed and replaced.

B. Curb Ramps Required. Any installation of concrete curbs, gutters and sidewalks fronting a property at a public road intersection, shall include the installation of curb ramps which comply with the current Caltrans Standard Plans. Curb ramps shall be required on each corner of an intersection, as indicated in Standard Drawing C-5, at the time of curb, gutter and sidewalk improvements on that property.

C. Attached and Detached Sidewalks. Where sidewalk is to be constructed, it may be attached (i.e., integral with the curb) or detached (separated from the curb by a landscaped parkway), as required by the conditions of approval, Planning Area Standard, or Specific Plan. Where no requirements have been established, the sidewalk may be attached or detached at the option of the developer, using widths based on the land use category. Dimensions for attached and detached sidewalks, based on land use categories, are provided in the Standard Drawings.

4.1.3 MULTI-USE PATHS

Multi-use paths shall be installed in urban or rural areas as required by project conditions of approval. Their design and construction shall be reviewed and approved by both the Department of Public Works and the Department of General Services/Parks Division.

A. Materials. Multi-use paths shall be constructed of a minimum six (6) inches compacted angular decomposed granite, with a maximum aggregate size of 3/8 inch. Compacted sand may be used if it is confined either by the roadway or by an approved root barrier installed on both sides of path to a minimum depth of 24 inches.

B. Attached and Detached Paths. Where a multi-use path is to be constructed, it may be attached (i.e., integral with the edge of the roadway pavement) or detached (separated from the roadway by a landscaped parkway), as required by the conditions of approval, Planning Area Standard, or Specific Plan. Only where not otherwise specified, the path may be attached or detached at the option of the developer. Dimensions for attached and detached paths are provided in Standard Drawings A-1a and A-2a. Detached paths must be used when the design speed for the adjacent roadway is 45 mph or greater, and shall be a minimum of 10 feet from the edge of traveled way.

C. Crossing Locations. Multi-use paths which cross public streets or roads shall cross only at intersections, or other approved locations designated in the County Trails Plan.

4.1.4 PEDESTRIAN CROSSINGS

As noted in the California Vehicle Code, crosswalks, either marked or unmarked, exist at all intersections of streets unless the local authority has adopted regulations to restrict the crossing of pedestrian traffic. Marking of crosswalks, however, shall be done only after an engineering study is performed and has determined if marked crosswalks are appropriate at a location that is not controlled by traffic signals, yield signs or stop signs. In addition, proper signage, warning devices, ADA compliance and lighting may need to be installed to support the marked crosswalk. The study will evaluate pedestrian demand, collision history, traffic volumes, site geometry, sight distance and visibility conditions at night. The following guidelines shall be used when marking crosswalks and making intersection improvements:

A. Installation of Marked Crosswalks on Uncontrolled Approaches of an Intersection. Based on standards from the Caltrans Traffic Manual, the Manual of Uniform Traffic Control Devices, and Federal Highway Administration criteria, the table included in the Appendix shall be used to determine the appropriateness of marking crosswalks on public streets. Note that crosswalks used on roads with posted speed limits of 45 mph and above will require signage or other improvements. The County Traffic Engineer shall be consulted prior to any installation.

   The County Traffic Engineer may authorize the installation of a marked crosswalk that does not satisfy all the criteria in the table, if it is based on an engineering analysis of the site, or other unique circumstances warrant the installation of a marked crosswalk.

B. Installation of Marked Crosswalks Between Intersections (Midblock). A midblock marked crosswalk may be installed if it meets the following requirements:

   1. The crossing location is greater than 600 feet from the nearest intersection on a through highway; and

   2. There is a reasonable demand (40 pedestrians per hour) by pedestrians, as demonstrated by a survey of the street within the concentrated area; and

   3. The crossing is more than 300 feet from the nearest signal or stop-controlled intersection; and

   4. There is a high pedestrian volume generator nearby.

The County Traffic Engineer may authorize the installation of a marked crosswalk that does not satisfy all the criteria in this section if it is deemed that, based on the analysis, other unique circumstances warrant the installation of a marked crosswalk in a midblock location.

C. Re-Installation of Marked Crosswalks Covered by Roadway Surfacing. The re-installation of marked crosswalks shall be evaluated as part of all roadway resurfacing projects that cover pavement markings (chip seal or overlay). All marked crosswalks that do not meet the criteria in this policy shall be removed, unless there are unique circumstances which warrant re-installation of the markings, as determined by the County Traffic Engineer.

The California Vehicle Code, Section 21950.5, requires a public hearing 30 days prior to the removal of a crosswalk. Any crosswalk scheduled for removal shall be posted at the site ten days prior to the scheduled hearing before the Board of Supervisors. The public hearing process shall be initiated by the County Traffic Engineer.

D. Marked Crosswalks at Traffic Signal Locations. Marked crosswalks shall be designated across all approaches of a signalized intersection, unless individual approaches have had pedestrian traffic prohibited. In rural areas, the County Traffic Engineer may elect to delete installation of marked crosswalks due to the low volume of pedestrian traffic.

E. School Crosswalks. School Crosswalks shall be established by the County Traffic Engineer, based on adopted "safe routes to school" maps developed by the Department and the individual school principal or site committee, and reviewed by the California Highway Patrol.

F. In-Pavement and Sign-Mounted Warning Light Systems for Crosswalks. The installation of in-pavement and/or sign-mounted warning light systems, which incorporate flashing systems based on pedestrian demand, shall be considered only if all the following requirements are met:

1. The pedestrian volume is 100 or more for 12 hours in a single day, or the pedestrian volume after dark is 40 or more for any 4 hours.

2. The roadway carries 10,000 ADT or more.

3. The 85th percentile approach speed is 40 mph or less.

4. The roadway has more than 2 lanes but not more than 5 lanes in both directions.

5. The crosswalk is not controlled by a traffic signal, stop or yield sign.

The County Traffic Engineer may elect a sign-mounted warning light system without in-pavement warning lights due to approach visibility and speeds to the crossing, or when the pavement condition is not suitable for in-pavement warning lights.

G. Illumination of Intersections (Crosswalks). Within urban reserve lines, all new intersections and crossings (either marked or unmarked crosswalks), on streets with buildout traffic over 5,000 ADT, shall have the level of illumination, as defined in Section 3.2.1 B2 of these Standards. Lighting standards shall conform to the style provided in the applicable Community Design Plan, or those shown in the Standard Drawings.

If the new crosswalk installation, either marked or unmarked, is created through land development, the developer shall arrange for the installation, maintenance and operation of the street light. Operation and maintenance shall be paid for either through an existing Lighting District, Community Services District or Homeowners' Association for the development.

H. Crosswalk Dimensions and Markings. All marked crosswalks shall consist of two transverse lines, no less than eight (8) feet apart, or as defined under the latest State ADA requirements. Crosswalk transverse lines shall be a minimum of 12 inches wide. The County Traffic Engineer may require the use of "ladder" or "zebra" style crosswalks. The curb ramp treatments at both ends of a marked crosswalk shall be brought into compliance with current ADA requirements at the time the crosswalk is marked.

4.1.5 DRIVEWAYS

A. Sight Distance. All driveways, at the point where they connect with any roadway which is a public improvement, as defined in this document, shall conform with the sight distance requirements of the Standard Drawings. Additional grading of slopes, or height restriction of fencing, signs or landscaping may be needed to meet this requirement.

B. Rural Driveways. All driveways in rural areas shall conform to the requirements of the Standard Drawings, B-1 series. The specific type of driveway shall be determined by the Department at the time of issuance of an encroachment permit, or prior to improvement plan approval.

C. Urban Driveways. All residential driveways in urban areas shall conform to the requirements of the Standard Drawings, B-2 series. All commercial drawings shall conform to the requirements of Drawing B-3 and B-3a, unless it is determined that a B-3b (High Volume Driveway) is required, as defined in (D.) below.

D. High Volume Driveways. A High Volume Driveway shall conform to Standard Drawing B-3b, and shall be required as determined by the criteria set forth thereon.

E. Driveways on Arterial Streets and Roads. Driveways on arterial streets and roads shall conform to the following requirements:

1. Driveway access to major activity centers shall be located no closer than 200 feet to the adjacent intersection, and may be served by a break in a center median, where one is installed. If driveways must be provided closer to intersections, these driveways shall not be served by breaks in a center median, and shall not be located any closer than 50 feet from an intersection.

2. The distance between driveways along commercially developed arterial streets and roads shall not be less than 200 feet.

3. Where possible, driveways shall be located on cross streets or roads, rather than on arterial streets or roads.

4. Residential driveways along arterial streets or roads shall not be permitted; these properties shall take access from local streets.

4.1.6 ANGLED PARKING

A. Planning Elements. Angled parking may be designated on private property as provided for in the Land Use Ordinance or Coastal Zone Land Use Ordinance. Angled parking within public improvements shall be restricted to the following locations:

1. Central business district areas which qualify as a business district under the California Vehicle Code. Said business district will need to have a defined boundary as established by a gateway feature, such as a monument, roadside bulbout treatments or other type of roadside element to define the downtown.

2. Significant public areas, such as a park, located off defined arterial and collector roadways.

3. Potential major traffic generators which are not located on defined arterial and collector roadways, as approved by the Department.

At no time will school zones or residential districts be authorized for angled parking on County-maintained roads.

B. Design Criteria. The following design criteria shall be adhered to in locating and designing of angled parking:

1. Stall angle layout shall be 45 degrees.

2. The right-of-way required to provide angled parking shall be a minimum of 90 feet. The minimum paved width shall be 39 feet from centerline.

3. Parking stalls shall conform to current ADA requirements (five disabled person stalls per 100 stalls).

4. The block to be considered for angled parking shall have either no driveways, or a minimum number of driveways, such that there is a distinct two-to-one advantage in placing angled parking over parallel parking.

5. All layouts at intersections, driveways and parking stalls shall accommodate a minimum stopping sight distance requirement for 25 miles per hour.

6. Angled parking shall not be allowed for one block, in either direction, of a signalized intersection.

C. Implementation Criteria.

1. Marked parking spaces between two intersections shall be either all angled parking spaces or all parallel spaces.

2. A defined walkway, at least five feet wide, must exist between the right-of-way line and the edge of the angled parking lane, to facilitate pedestrian traffic for the length of the block.

3. If a developer is required to, or desires to, implement angled parking in front of a specific property, additional pavement widening shall be constructed to enable implementation of angled parking for the length of the entire block between two intersections.

4.1.7 OTHER DESIGN STANDARDS

A. Clear Zone. There shall be a clear zone of ten (10) feet, measured from the outside edge of the traveled way, on all roadway public improvements. There shall be no unyielding fixed objects within the clear zone. Examples of unyielding fixed objects include, but are not limited to: trees; utility

poles, transformers or other above-ground facilities; fire hydrants, sampling stations or other utility installations; or signs mounted on standards without "break-away" provisions. Examples of yielding fixed objects which may be permitted within the clear zone include landscaping other than trees, and signs mounted on standards with "break-away" provisions.

B. Preservation of Trees. Existing trees within the area of any roadway public improvement shall be preserved as possible, and as required by the conditions of approval for the subdivision or land use permit. All trees to be removed or impacted shall be depicted on the roadway plan. The Department may require additional trees to be removed, or guardrail to be installed, for reasons of safety or maintenance. See the Appendix for more requirements and information on preservation of trees.

C. Railings and Barriers. Railings and barriers shall be placed as needed to address roadway safety conditions, pedestrian and bicycle traffic, compliance with Americans with Disabilities Act (ADA) requirements and compliance with Occupational Safety and Health Administration (OSHA) requirements. The Project Engineer shall evaluate the need to install such railings and barriers based on the following criteria:

1. Guard rails. Guard railing shall be designed in accordance with the 1996 California Traffic Manual and State Specifications. The Project Engineer shall consider the elimination of either the existing or created obstacles prior to proposing installation of guard railing as an appropriate solution. In those locations where guard railing is approved by the Department, the design shall incorporate reduced height of AC dike, as required in the Caltrans standards.

2. Bikeways. Railings shall be installed on structures and along the pavement edge where embankment slopes drop off steeper than 1½:1, on any bikeway route identified in the County Bikeways Plan. Railings shall conform to the Caltrans Bridge Design Specifications Section 2.7.2 "Bicycle Railing."

3. Pedestrian Railings. Railings shall be required when a sidewalk or multi-use path exceeds 30 inches in height above the grade below within 5 feet, and the side slope exceeds 2:1. Railings shall conform to the Caltrans Bridge Design Specifications Section 2.7.3 "Pedestrian Railing." For locations along a sidewalk where the dropoff is greater than 4 inches but less than 30 inches and the side slope exceeds 2:1, a 6-inch warning curb shall be installed along the edge in conformance with CalDAG (California Disabled Accessibility Guidebook) requirements. At the terminal ends of sidewalks which

do not adjoin either existing sidewalks or paths, a sidewalk barricade per Drawing M-3 shall be installed.

4. Maintenance Work Surfaces. In any road right-of-way with retaining walls greater than 4 feet in height, but not subject to the bikeway or pedestrian requirements listed above, a railing system shall be provided pursuant to OSHA Standard 1910.23(b) "Protection for wall opening and holes," for the safety of maintenance workers. Railing systems shall be, at a minimum, a Cable Type railing as detailed in the State Standard Plans.

D. Clearance Requirements for County Rights-of-Way. Clearance requirements for County road rights-of-way were established by the Board of Supervisors in Resolution 2003-412. A copy of the Policy and Procedure that were adopted in that Resolution are included in the Appendix. It shall be the responsibility of property owners to maintain sidewalks and multi-use paths fronting their property free from all encroachments, as required in this Policy and Procedure.

E. Bus Turnouts. Where construction of a bus turnout is required by project conditions of approval, it shall conform to the requirements of Standard Drawing A-6a.

F. Community Mailboxes. Community mailboxes shall not be located closer than 100 feet to the entrance to the community they serve. If the entrance street where they will be located will carry more than 1,000 forecast ADT, a turnout shall be provided, utilizing the design standards for bus turnouts as shown in Standard Drawing A-6a.

G. Asphalt Dikes. On Rural roads, where needed for proper control of roadway drainage, asphalt dikes shall be utilized which comply with the requirements of Standard Drawing C-3. The type and placement shall conform to the requirements of Standard Drawing Series A-1. Drainage inlets or overside drains shall be placed as needed to comply with the requirements concerning depth and spread of flow in Section 5.2.1 B. Asphalt curbs shall use PG 70-10 asphalt binder, as specified in Section 92 of the State Standard Specifications.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

5. STORM DRAINAGE

5.1 DESIGN STANDARDS

These standards are intended to meet the requirements of the National Flood Insurance Program and other County ordinances.

The design of proposed development sites shall handle waters generated by storms, springs, or other sources from both on-site and off-site impacts. Each improvement shall be designed so as to not alter the rate, concentration or location of historic flow patterns. There must not be damage to either the development site itself or any other land, either upstream or downstream. "Damage," as used here, is defined as water having sufficient depth or velocity to damage improvements or to deposit or scour soil. Where it is reasonable to do so, the design shall seek to improve adverse conditions that affect the site or adjacent lands.

Provisions shall be made in the design of a drainage system to insure that the system may be extended to serve and to properly handle the entire drainage area at the time of ultimate development. This is to include the entire upstream portion and the portion of the drainage watershed outside the development site, regardless of existing conditions.

The design standards contained herein are minimal, and are intended to provide general guidance. Design details are the responsibility of the Project Engineer and must follow good engineering practice.

Exceptions to these standards may be allowed by the Department, when it can be determined that such exceptions are in the best interest of the public in the neighborhood of the development site. For example, an exception to allow alteration or concentration of flow onto adjacent properties may be permitted by the Department, if there are adequate downstream facilities provided to handle the total flow without adverse affect on other properties. In this event, the Developer may be required to participate in the cost of said facilities, and/or obtain easements or other rights as needed.

Drainage improvement designs should incorporate recommendations from the community drainage studies referenced in the Introduction of this volume.

5.1.1 HYDROLOGY

A. Drainage Report Requirements. The design calculations for all drainage systems shall include, at a minimum, the following information:

1. Drainage narrative, describing pre- and post-development hydraulic conditions
2. Drainage map showing contours and watershed boundaries, including beyond project limits
3. Drainage area in acres
4. Time of concentration
5. Rainfall intensity
6. Coefficient of runoff
7. Design flow to each structure, channel or culvert
8. Design capacity of each structure, channel or culvert
9. Flow line elevation of each structure, channel or culvert
10. Top of structure elevation
11. Water surface elevation at each structure
12. Hydraulic gradient for primary and secondary design storm
13. Size, length and gradient of any channel or culvert
14. Velocities in any channel or culvert
15. Schematic diagram of any storm drain system
16. Design of inlet scour protection (headwater) and/or outlet velocity dissipator (tailwater)
17. Basin calculations, if appropriate
18. Spread width for flow in roadways

B. Rational Method. Hydraulic designs shall use the Rational Method, for areas not to exceed 200 acres. This method is discussed in the Federal Highway Administration (FHWA) Hydraulic Engineering Circular No. 22 (2001), "Urban Drainage Design Manual."

C. Special Design Problems. For special design problems, or drainage areas in excess of 200 acres, the Project Engineer shall provide such reference information, as is necessary to confirm the hydraulic design being proposed. The design must conform to the Design Approach laid out at the beginning of this Chapter. An acceptable method for determining storm runoff is the National Resource Conservation Service method.

D. Runoff Coefficients. Runoff coefficients for use in the Rational Method shall be determined using County Standard H-3 for developed areas, and H-3a for undeveloped areas.

E. Design storms. The following information shall be used for determining the appropriate design storm:

Table 5-1 Determination of Design Storms

Type of Waterway	Drainage Area	Primary Design Storm[1]	Secondary Design Storm[2]
Major	>4 square miles (>2,560 acres)	100 years	N/A
Intermediate	1-4 square miles (640-2,560 acres)	50 years	100 years
Minor	<1 square mile (<640 acres)	25 years	50 years

[1] All components of a drainage system must be designed to convey the runoff from the Primary Design Storm, with freeboard.

[2] All components of a drainage system must be able to convey the runoff from the Secondary Design Storm without freeboard; otherwise, alternate surface routes must be identified and provided with proper erosion protection and easement status.

Note that a given waterway may be classed as minor in its upper reaches, then change to intermediate at a point where the drainage area exceeds one square mile and change again to major where the drainage area exceeds four square miles.

Drainage calculations shall show that there will be no damage to properties under either the Primary or Secondary Design Storm for any size waterway.

5.1.2 HYDRAULIC DESIGN STANDARDS

A. Open Channels and Culverts. Manning's Formula shall be used to compute capacities of all open channels and culverts. The methods presented in FHWA Hydraulic Circular No. 5, "Hydraulic Charts for the Selection of Highway Culverts," may be used to evaluate culvert flow conditions.

The "n" values to be used in Manning's Formula shall conform to the values provided in the Appendix.

B. Hydraulic Grade Line. While conveying the runoff from the Primary Design Storm, the hydraulic grade line shall be a minimum of 0.50 feet below the elevation of:

- The top of inlet grate or the bottom of curb opening of catch basins, and
- The manhole covers of storm drain manholes.

The hydraulic grade line at those structures shall be calculated by adding to the hydraulic grade line in the culvert main the following:

- The velocity head within the main culvert into which the inlet (and lateral, if any) discharges or which the manhole serves,
- The head loss within said lateral, and
- All the minor losses necessary to attain that velocity.

C. Downstream Constraints. Discharge leaving the site in the Primary and Secondary Design Storms shall not be greater than pre-development discharge in each case, unless it can be demonstrated that downstream facilities have adequate capacity.

D. Provide for Overland Escape. All components of drainage systems in public improvements shall be evaluated to consider the effect of failure of individual components and identify the route of overland escape. The evaluation shall identify any necessary measures to prevent erosion along this route.

E. Conveyance of Drainage in Urban Areas. In all subdivisions of an average lot size of 20,000 square feet or less, and in all developments within other land use categories inside Urban Reserve Lines, all surface drainage shall be conveyed in street gutters and cross-gutters. Any flows which cannot be conveyed within the capacity of these facilities (per Section 5.1.1 E of these Standards) shall be conveyed in culverts. No concentrated flows shall be permitted across the surface of any sidewalk. Inlets or under-sidewalk drains shall be used in such situations where needed, when approved by the Department, and shall conform to Standard Drawing series D-4.

F. San Luis Obispo Creek Watershed Drainage Design Manual. The City and County of San Luis Obispo have developed the San Luis Obispo Creek Watershed Drainage Design Manual to provide criteria and planning procedures for floodplains, waterways, channels and culverts in the San Luis Obispo Creek watershed. This watershed comprises Zone 9 of the San Luis Obispo County Flood Control and Water Conservation District.

It is recommended that private property owners submitting applications for grading and building permits within the San Luis Obispo Creek watershed follow these guidelines and procedures if they wish to streamline their environmental permitting processes. The design criteria will be used by the County in drainage facility design review and the checking of design and construction of private projects. It is required that these guidelines and procedures be followed on projects which, upon completion, will be managed and maintained by the County.

Drainage facility review, as used here, includes the review of all drainage and hydraulic structures, and all supporting engineering calculations. Drainage facilities include, but are not limited to: hydraulic structures, open channels, culverts, pipes and culverts, stormwater management structures, bank stabilization and bank repair structures, and grade control and aquatic enhancement structures that may be placed in stream channels.

Guidelines for stream corridor planting and management, bank repair and stabilization structures and devices, and general erosion control and stormwater management requirements are also provided in this Manual.

It is critically important that any proposed channel modification and/or drainage improvement project preserve, protect and enhance the waterways within the San Luis Obispo Creek watershed, include stream-side or riparian vegetation and aquatic habitat and fisheries. Although specific design criteria and design procedures are presented, the Project Engineer is invited to be as creative as possible in ways that provide functional, safe and aesthetically pleasing channels or waterways, which are also compatible with the environment.

Early consultation with the Department of Public Works, and the Department of Planning & Building, and collaboration with stream geomorphologists and biologists prior to completing engineering designs that potentially impact creek resources in this watershed, is strongly encouraged.

Alternate methods of analysis and design are subject to the approval of the Department.

Copies of the San Luis Obispo Creek Watershed Drainage Design Manual are available for review or purchase from the Department. The manual is also available on-line at the following address:

http://suntzu.larc.calpoly.edu/slo_creek/Drainage_Design_Manual_2-03.pdf

5.1.3 DIVERSION OF DRAINAGE

A. Maintain Historic Path. Unless an individual project requires diversion of water to conform to a comprehensive drainage plan, water shall be received and discharged in substantially the same location and velocity 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.

B. Diversion Permitted Only Within Limits of Project. The diversion of natural watercourses 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 County has been executed with the adjoining property owners.

C. Improvements In Natural Watercourses. Improvements in natural watercourses will not be approved unless the capacity of the improved waterway is at least that of the natural waterway.

D. Permits. No work shall be permitted in natural watercourses without the appropriate permits from State and Federal regulatory agencies (e.g., California Department of Fish & Game, U.S. Army Corps of Engineers, U.S. Fish & Wildlife Service, Regional Water Quality Control Board, and others as required.)

5.1.4 ALIGNMENT OF DRAINAGE FACILITIES

A. Locate within Road or Public Easement. Drainage facilities accepting runoff from public roads, streets or other public areas shall be located in a public street or road, or within a public drainage easement. These easements must be offered for dedication to the public before the improvement will be approved for construction.

B. Avoid Combining with Utility Easements. Drainage easements shall be used for drainage purposes exclusively and shall not be combined with easements required for other public utility purposes.

C. Easement Width. Easements for culverts shall provide a minimum width of ten feet, with pipe at the quarter point on the north or west. All such easements shall provide access and future maintenance working areas.

Whenever possible, easements for culverts shall be along or adjacent to property lines and outside of areas where structures are planned. On pipes of 24" diameter or greater, or trenches exceeding five feet in depth, the easement shall have additional width to provide ample future maintenance working area as required by the Department.

D. Culvert Alignment. Storm drain lines are to be parallel with the centerline of streets. The design shall avoid meandering, offsetting, and unnecessary angular changes. No angular changes more than 10° shall be made without a junction structure. No single change, even with a junction structure, shall exceed 90°.

E. Adjacent Property. Where a minor improvement of a drainage facility falls on adjacent property, a recorded easement from the adjacent property owners for such construction and a copy of the approval of the adjacent owners shall be submitted to the Department prior to approval of the improvement plans. Agreements between property owners shall hold the County harmless from any damage claim arising from said agreement.

5.2 CONSTRUCTION SPECIFICATIONS

5.2.1 DRAINAGE STRUCTURES

The design and construction of drainage structures and special drainage items shall conform to the designs contained in these Standards (unless otherwise noted). Special care must be taken to insure that all drainage structures and pipe are designed at such a capacity that the drainage system may be extended or enlarged to serve the entire drainage area at ultimate development. The Rational Method formula (Q=CIA), with all numerical quantities for the Primary Design Storm, shall be indicated on the improvement plans at each drainage structure.

A. Manholes. 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 Department. All manholes shall conform to the following requirements:

1. Any pipes placed at a grade of 1% or flatter, shall have manholes provided every 200 feet. Pipes at a grade of greater than 1% shall follow the criteria in #2 and #3 below.

2. Manholes shall be located at junction points, changes in gradient and changes in pipe size. On curved pipes with radii of 200 feet to 400 feet, manholes shall be placed at the BC or EC of the curve and on 300-foot maximum intervals along the curve for pipes of 24 inches

and less in diameter, and 500-foot maximum intervals along the curve for pipes greater than 24 inches in diameter. Curves with radii less than 200 feet will be handled on an individual basis.

3. Spacing of manholes or inlets, of such size as to be enterable for maintenance, shall not exceed 500 feet along a tangent alignment for pipes 24 inches and smaller in diameter, and 600 feet along a tangent alignment for pipes greater than 24 inches in diameter, except under special approved conditions. The spacing of manholes shall be nearly equal wherever possible.

4. All manholes shall have standard 24 inch diameter manhole covers. No manholes shall be allowed in roadway gutter or flowlines. Maintenance access points in roadway gutter or flowlines shall be standard drainage inlets with bicycle-proof grates.

B. Inlets. Gutter inlets shall be in accordance with the types shown on Standard Drawings series D-2, or approved equivalent "precast" products, or other approved special inlets. See the State Standard Drawings for extended curb opening inlets. Pavement drainage design approaches are presented in FHWA Hydraulic Engineering Circular No. 22.

All inlets shall conform to the following requirements:

1. The capacity and spacing of drainage inlets shall be such that the spread of water in a Primary Design Storm does not inundate the traveled way (which includes all through and center turning lanes, but does not include bike lanes or right-turn-only lanes), as follows:

   a. For roads with design speeds less than 45 mph, the spread encroachment on the traveled way shall not be greater than ½ the outside through lane width.

   b. For roads with design speeds greater than or equal to 45 mph, the spread shall not encroach on the traveled way at all; any inundation shall be limited to the area outside the traveled way as defined above.

2. Where there is a potential for ponding at sag vertical curves (or other locations), pavement drainage shall be checked for a Secondary Design Storm. The spread encroachment shall comply with the requirements above.

3. Sufficient drainage capacity shall be provided within the road right-of-way and other drainage facilities to convey a 100-year storm without damage to any structures.

4. No more than 1.0 cubic feet per second (cfs) shall be allowed to "bypass" a midblock inlet. No more than 0.3 cfs shall be allowed to go around a curb return at an intersection.

5. Sheet flow across a road shall not exceed 0.1 cfs.

6. All "at-grade" grates shall be adequate for State of California HS-20 traffic loading, and shall be "bicycle-proof."

C. Junction boxes. Junction boxes shall be constructed of reinforced Portland cement concrete which complies with the compressive strength requirements provided in the Appendix, or fabricated from reinforced concrete pipe sections where size limitations permit. All junction boxes shall conform to the following requirements:

1. Minimum wall thickness for poured-in-place reinforced concrete junction boxes shall be six inches; eight inches when invert is in excess of 6 feet.

2. The inside dimension of junction boxes shall be such as to provide a minimum of three inches clearance on the outside diameter of the largest outfall pipe.

3. All manholes shall have the standard 24-inch manhole cover (Phoenix P1090, Pinkerton A640, or approved equal).

D. Other Structures. The following requirements shall apply to other drainage structures, as noted:

1. All headwalls, wingwalls, and endwalls shall be of reinforced Portland cement concrete which complies with the compressive strength requirements found in the Appendix.

2. All headwalls, wingwalls, and endwalls shall be considered individually and shall be, in general, designed in accordance with the State Standards or approved by the Department.

3. Trash racks shall be provided where in the opinion of the Department they are necessary to prevent clogging of culverts and storm drains, or to provide safety to the general public.

4. Guardrail or pedestrian/worker railings may be required by the Department 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.

5. For reinforced concrete box culverts and structural plate arch culverts, all materials, designs and construction shall conform to the provisions of the State Specifications and the State Standard Plans unless approved otherwise by the Department.

5.2.2 BASINS

Two types of drainage basins are utilized in San Luis Obispo County, as determined appropriate by site conditions and project requirements: retention basins and detention basins. The Department shall determine which type of basin shall be used based on the downstream hydrology for each development site. The types of basins are further discussed below. In all cases, the Project Engineer shall provide evidence that the basin will completely drain within seven days to the satisfaction of the Department.

If a basin is determined to be required to serve a particular subdivision or land development project, which was not evaluated during the application phase of the project, then the developer shall consult with the Department of Planning & Building to determine if any grading permit or land use permit is required for the construction of the basin. If a grading permit or land use permit is required, a copy is to be submitted to the Department of Public Works prior to approval of the plans.

A. Retention Basin. Any drainage basin which is used as a terminal disposal facility shall be classified as a retention basin.

1. Basin Capacity. The basin capacity is to be based on the theoretical runoff from a 50-year storm, 10-hour intensity for 10-hour duration. No reduction in required capacity shall be given for soil percolation rates. In addition, an antecedent moisture factor of 1.3 shall be required in locations where there are limited areas for overflow (i.e., a natural sump).

2. Inlet Structure. The inlet structure shall be designed to meet the requirements of Section 5.2.1 B, above.

3. Percolation Test Required. A percolation test shall be submitted to the Department for approval prior to construction, to determine that the basin will be able to drain within the seven-day standard noted

above. Soil borings may be required by the Department, in areas where there is concern about shallow depth to groundwater.

B. Detention Basin. Any drainage basin which has a downstream outlet designed to meter the outflow shall be classified as a detention basin. Basin capacity shall be based on receiving the runoff from a 50-year storm with the watershed in its fully-developed condition, and releasing the flow equivalent to the runoff from a 2-year storm with the project site in its pre-development condition. The outlet shall release water in a non-erosive manner. Orifice plates shall not be permitted as a metering device.

C. Deep Basins. Any retention or detention basin shall be considered a deep basin if the depth to the overflow point is greater than two (2) feet. Deep basins shall be designed according to County Standard Drawing D-1.

D. Shallow Basins. Any retention or detention basin shall be considered a shallow basin if the depth to the overflow point is two (2) feet or less. Shallow basins shall be designed according to County Standard Drawing D-1a.

E. Subsurface Basins. As an alternative, subsurface basins may be used for either retention or detention of site runoff, where the Project Engineer demonstrates to the satisfaction of the Department that their application is suitable for project conditions. At a minimum, the Project Engineer must demonstrate that attention has been given to the following areas of concern:

- Depth to groundwater
- Percolation rate
- Lateral distance to wells or septic facilities
- Distance to structures on site
- Water quality of inflow (both sediment and chemical loading)
- Maintenance plan, including provisions for vehicular access and confined-space entry safety requirements, where applicable
- Overflow path (See 5.2.3 G below), including easements as required
- Freeboard (See 5.2.3 I below) – some may be included in parking areas, per the requirements of 5.2.3 L, below

F. Easement Requirements. All drainage basins accepting runoff from public roads, streets or other public areas shall be located in an easement offered for dedication to the public. Reversionary clauses shall not be permitted. The offer of dedication will only be accepted when the basin is complete and in use. If a fence is required it shall be located not more than four inches inside the drainage easement line, except where setbacks are required as part of the land use permit or by the Land Use Ordinance.

G. Overflow Path Required. The design of all drainage basins shall identify the designated route for overflow. The Project Engineer shall design the overflow path so that the flow in a 100-year storm is non-erosive and will not damage downstream improvements, including other basins. Easements will be required for concentrated flows onto private properties.

H. Fencing Requirements. All surface drainage basins shall be evaluated to determine if they require fencing, as follows:

1. All deep basins are required to be fenced according to the specifications found in the Materials section below. Exceptions to the requirement for fencing may be granted for locations with no public traffic, subject to approval of the Department.

2. Shallow basins are not required to be fenced.

I. Freeboard Requirements. All basins shall be designed to provide "freeboard," measured from the design water surface to the lowest-elevation (the "overflow point") at which the basin would overflow during a greater-than-design storm. This overflow point may be a location on the basin perimeter, a point outside the basin perimeter if the location is a natural sump, or the flowline of the inlet structure for gutter flow entering the basin. An overflow path shall be identified as required in subsection G, above. The amount of freeboard to be provided under design-storm conditions is as follows:

1. Deep basins require one foot of freeboard above the design-storm water surface elevation.

2. Shallow basins require freeboard equal to 15% of their design depth.

3. Subsurface basins require freeboard equal to 20% of their maximum storage depth.

J. Bench Requirements. All drainage basins shall provide a bench around the perimeter to provide for maintenance, as follows:

1. Deep basins shall provide a bench five feet wide between the fence and the top of the basin side slope.

2. Shallow basins shall provide a bench five feet wide between the easement line and the top of the basin side slope.

K. Maintenance Requirements. Perpetual maintenance of all drainage basins shall be the responsibility of the developer, unless the maintenance

responsibility is assumed by a public entity or a property owners' association. Deep basins shall provide an access ramp for maintenance vehicles, as depicted in Standard Drawing D-1. The Department will not assume maintenance responsibility for any subsurface basin.

L. Parking Areas. Parking areas may be used to store part of all of the volume required to be retained or detained, subject to the following criteria:

1. The maximum depth of inundation in the design storm shall be six (6) inches.

2. No more than 50% of the parking area shall be inundated in the Primary Design Storm.

5.2.3 CHANNELS AND SWALES

All channel realignment or improvement shall be shown on the improvement plans and shall conform to the requirements of these Standards and Specifications. No diversion to roadside ditches will be allowed from natural drainage courses.

A. Types. Open conduits may be natural watercourses, earthen channels or swales, or channels or swales lined with the materials such as those listed below:

- Low-growing grass, which will form a thick, dense sod. The proposed grass mixture is to be submitted to and approved by the Department.
- Temporary or permanent turf reinforcement mats/erosion control blankets.
- Rock slope protection, class and placement to be determined by the Project Engineer.
- Concreted-rock slope protection, class and placement to be determined by the Project Engineer.
- Concrete slope paving.
- Air-blown mortar, with reinforcement as determined necessary by the Project Engineer.
- Gabions – only if required by permit conditions from other regulatory agencies.
- Other natural linings approved by the Resource Conservation District, or State/Federal regulatory agencies.

Lining materials shall be selected which will be non-erosive under velocities calculated in the design storm, and which will provide for ease of ongoing maintenance, as approved by the Department. Where linings are required, they shall extend to the full height of freeboard, as defined below.

B. Freeboard Required. Realigned channels or swales may be required to be lined to an elevation of at least 1.0 foot above the design hydraulic gradient. The side slopes for realigned channels or swales shall not exceed 1:1 on the lined portion and 2:1 on the unlined portion (3:1 in sandy soil). Freeboard of at least one foot, or 0.2 of the specific energy (whichever is greater) shall be provided at design capacity for all channels or swales.

C. Improvement Plans. For all intermediate or major channels, either realigned or natural, within an improvement, the following information shall be shown on improvement plans in addition to the information heretofore required:

- Typical sections.
- Profile of the existing channel for a minimum of 500 feet each side of the development in order to establish an average profile grade through the development.

D. Velocity Requirements. Channels or swales shall comply with the following requirements:

1. Minimum velocity for channels or swales flowing full, with freeboard, shall be two feet per second (2 fps).

2. The maximum velocity in constructed, unlined earth channels or swales shall not exceed that which would cause erosion (maximum 4 fps).

3. The maximum velocity in shotcrete or concrete lined channels or swales shall not exceed 10 fps.

E. Natural Waterways. 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.

F. Channel Side Inlets. 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. This will often require constructed side inlets and collector ditches to carry side flow to inlets.

G. Fencing Requirements. For all open-conduit drainage facilities, the following requirements shall apply:

1. Constructed channels or swales with side slopes five to one (5:1) or flatter do not require fencing, unless determined necessary by the Department for public safety.

2. Natural channels need not be fenced, except where special hazards exist.

3. For minor channels or swales with depths less than 3.0 feet and for localized areas steeper than five to one (5:1) on other channels or swales, the Department may allow the fence requirement to be waived.

4. Any required fence shall be located no more than four inches within the required easement lines and shall provide sufficient room for maintenance vehicles as set out, or as specified by the Department.

5.2.4 CULVERTS

All culverts shall be shown on the improvement plans and shall conform to the requirements of the State Specifications and State Standard Drawings unless otherwise specified by the Department.

A. Types. Culverts shall be of either cast-in-place or precast reinforced concrete pipe, corrugated steel pipe, or HDPE corrugated pipe with smooth interior walls as specified below in Section 5.2.9. PVC pipe shall not be used for culverts in public improvements. Aluminum pipe shall not be used if concrete structures such as headwalls or future storm drain inlets are ever to be constructed upon them. HDPE pipe, when used, shall be completely buried to avoid degradation from ultraviolet radiation.

B. Minimum Diameter. Minimum pipe diameter allowable on any storm drain which will be maintained by the County shall be 18 inches. A lesser size may be used for down drains on fill slopes, or for privately-maintained facilities, if approved by the Department. If smaller pipes are approved for use, they shall include cleanouts, with maximum 100-foot spacing and at all junctions, as required.

C. Hydraulic Design Requirements. Waterways placed in culvert systems may be designed for full conduit capacity and pressure flow. The hydraulic entrance condition at a culvert minor waterway shall be such that the Primary Design Storm discharge will have the specified freeboard in the upstream channel or waterway and that the 100-year discharge will be contained within the banks of the upstream waterway or drainage easement. The entrance to the culvert conveying a minor waterway may be

submerged provided that the above criteria are satisfied, and that there is no damage from backwater inundation.

D. Velocity Requirements. Culverts shall comply with the following requirements:

1. Minimum design velocity in culverts shall be two feet per second (2 fps) when conduit is flowing at design discharge.

2. Maximum design velocity shall not exceed 15 fps when culvert is flowing at design discharge.

E. Preformed Flared End Sections. On all culverts, preformed concrete, metal or plastic end sections shall be utilized, unless greater protection is required.

F. Cover Requirements. Minimum cover shall be two (2) feet within the full width of the traveled way. At locations where the general minimum cover requirements cannot feasibly be obtained, the conduit shall be encased in concrete per Standard Drawing U-4b, with prior approval by the Department.

G. Subsurface Drainage. Where a road section will retain subsurface drainage within cut slopes of newly-constructed roads, the Department may require the installation of a subsurface drainage system, minimum four (4) inches in diameter, with cleanouts as shown in the State Standard Plans.

5.2.5 OUTFALLS

A. Improvement Plans. All drainage outfalls shall be shown both in plan and profile on the improvement plans until a definite "daylight" condition is established.

B. Accommodation for Future or Phased Development. When improvements have more than one unit or phase, the drainage outfall shall be designed to extend to the property boundary, and beyond if required. All outfalls, whether temporary or final, shall be shown both in plan and profile on improvement plans, and shall be designed to operate safely even if future units or phases are never completed. Necessary easements and agreements shall be provided prior to approval of improvement plans.

C. Culvert Energy Dissipaters. Energy dissipaters shall be designed in accordance with the provisions of the State Highway Design Manual Chapter 870, Channel and Shore Protection Erosion Control. The following items shall be determined and shown on the plans:

- Stable rock size (weight)
- Rock Slope Protection (RSP) class
- Dissipater trench dimensions
- Rock placement method
- RSP fabric type

Culvert energy dissipaters shall be designed for the flow from the Primary Design Storm. Rock slope protection gradation shall conform to Section 72 of the State Standard Specifications.

5.2.6 DRAINAGE PUMPS

The use of drainage pumps shall be avoided whenever possible. They shall be used only with the approval of the Department.

A. Gravity Outfall during Summer. 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 stage gravity outfall is impossible or impracticable, a pump of smaller capacity for low stage flow may be used. Additional improvements may be required to handle adverse impacts downstream. Approval must be granted by the Department.

B. Standby Equipment. Drainage pumps shall be equipped with standby equipment for power and pumps. Pumps shall have alternating operation characteristics.

C. Floodgates. When specified by the Department, the outfall shall be equipped with floodgates of an approved design.

D. Design Storm. Pumping installations shall be so designed as to accommodate a design storm as specified by the Department.

E. Pump Design. Pumping stations shall be designed so that gravity flow does not flow through the pump pit. Each pumping installation shall receive separate approval, including all machinery, electrical system, piping system, housing installation and other miscellaneous design features.

F. Maintenance. Maintenance of all drainage pumps shall be the responsibility of the developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

5.2.7 INSTALLATION REQUIREMENTS

A. Backfill. Structure Backfill shall conform to the requirements of Section 19-3.06, "Structure Backfill," of the State Specifications and the following requirements:

1. Inspection Required. Structure backfill shall not be placed until the structure footings or other portions of the structure or facility have been inspected and approved for backfilling as directed by the Department.

2. Suitable Material Required. When the material from the structure excavation is unsuitable for use as structure backfill, it shall be disposed of as directed by the Department, and shall be replaced by suitable material approved by the Department.

B. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3.2.2 F of these Standards for sawcut and pavement replacement.

5.2.8 MATERIALS

All drainage items shall be of the material and construction methods required in accordance with the applicable portions of the State Specifications as herein noted, specified or modified.

A. Pipe. Culvert pipe shall comply with the following requirements:

1. Reinforced Concrete Pipe (RCP) shall conform to the specifications of Section 65 of the State Specifications.

   Excavation for RCP shall conform to Section 6.2.2 of these specifications except that where tongue and groove pipe is utilized excavation need only be to one inch below the outside diameter of the pipe in uniform material and three inches below the outside of the pipe in rocky material.

   Laying of RCP shall conform to the specifications of Section 65-1.07 of the State Specifications.

Jointing of RCP shall conform to the specifications of Section 65-1.06 of the State Specifications.

2. Non-reinforced Concrete Pipe shall conform to the specifications of ASTM Designation C-14. The construction method shall conform to the method specified for reinforced concrete pipe.

3. Corrugated Steel Pipe shall conform to the material and construction methods of Section 66 of the State Specifications. Wall thickness shall be specified. Attention is directed to the backfill requirements of Section 19-3 of the State Specifications and Section 5.2.8 of these Specifications, except that pea gravel or other suitable gravel material may be utilized for bedding and backfill.

4. High-Density Polyethylene (plastic) smooth-inner-wall pipe shall conform to the provisions of Section 64 of the State Specifications and to AASHTO M-294-03. Installation and backfill shall conform to the requirements of Section 64-1.05 of the State Specifications.

B. Concrete. 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.

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

D. Portland Cement Concrete. Shall conform to the compressive strength requirements found in the Appendix.

E. Geotextile Lined Channels and Swales. Adequate vegetative cover shall be established throughout all geotextile channel and swale linings. The Project Engineer shall demonstrate that a proposed geotextile lining is adequate for the velocity and shear stress that will be experienced in the Primary Design Storm. Additional guidelines for selection of geotextiles can be found in the Appendix.

F. Concrete Lined Channels. Concrete lined channels shall be constructed of the materials and in accordance with Section 72-4 of the State Specifications.

Weep Holes - shall be provided at intervals of ten feet midway between contraction joints. The holes shall be backed by a minimum of one cubic foot of concrete aggregate tied in a burlap bag to insure proper operation of the weep hole. The aggregate shall extend at least 0.5 foot above the weep hole.

All weep holes shall be two inches in diameter and be placed at an elevation of one foot above the flow line of the channel.

G. 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 2-½ inch diameter galvanized iron pipe shall be placed through the grouted rock rip rap along both sides of the channel approximately one foot 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 ten feet.

H. Fencing. Fencing required for drainage channels or basins, as determined above, shall comply with the following requirements:

1. Chain link fence for drainage channel enclosure shall be six-foot chain link as specified in Section 80-1.01 of the State Specifications, with or without extension arms and barbed wire as specified on the plans.

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 Department for the purpose of maintenance vehicles and personnel.

4. Other fencing materials may be considered for facilities which are not to be maintained by the County, and will require approval by the Department prior to improvement plan approval.

I. Landscaping. Where landscaping is required by project conditions of approval for any constructed drainage facility, the following requirements shall apply:

1. Plants shall be selected to be appropriate for the climate zone where they are to be installed, and shall be drought-tolerant.

2. On the bottom and sides of drainage basins, landscaping shall be limited to grass or other ground cover. No shrubs or trees shall be permitted.

3. The Project Engineer shall submit a landscape plan for approval. The Department of Public Works shall coordinate this approval with the Department of Planning & Building.

4. Maintenance of all landscaping and irrigation shall be the responsibility of the developer, unless the maintenance responsibility is assumed by a public entity or a property owners' association.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

6. WATER SUPPLY

Water lines and appurtenances within County-operated special districts shall be constructed in accordance with the details shown on plans and specifications approved by the Department.

Where a water system in the unincorporated area of the County is to be operated and/or maintained by any public agency other than the County, or other purveyor regulated by the State of California, the plans and specifications and construction must be approved by both the Department and by that entity. In the event of any discrepancy or conflict between these Public Improvement Standards and the requirements of said water purveyor, that entity's requirements shall take precedence.

Water mains connecting existing publicly regulated water distribution systems shall be installed to serve each lot in subdivisions containing lots of one acre or less. Any agency serving water for human consumption or for domestic uses shall hold a permit as provided by the Health and Safety Code of the State of California and shall comply with all applicable laws and regulations of the State of California and the County Department of Public Health/Environmental Health Services. Installation of water mains and all appurtenances thereto will be installed to grades, location, design and sizes approved by the Department for the public or private water and fire agencies, the governing bodies thereof and the Department as defined in this document.

When connection to an existing publicly regulated water system is not available, the developer shall provide water service by the establishment of a public water agency, or of a private water company which is subject to the regulations of the State Public Utilities Commission except as provided elsewhere for subdivisions containing lots of one acre or more.

6.1 DESIGN STANDARDS

6.1.1 QUANTITY OF WATER

The quantity of water delivered to the distribution system from all sources must be sufficient to supply adequately, dependably and safely the total requirements of all customers (including fire hydrants) under maximum consumption. The distribution system must be capable of adequately delivering this water supply to all the customers. Storage facilities must be provided to care for the minimum sanitary and fire fighting requirements during breakdowns and repair of wells and pumps. Storage may also be required to store water during off-peak periods for use during peak demand periods. Formulas are presented below as a guide in determining the adequacy of proposed water systems in meeting the above requirements.

Prior to submittal of plans for Small Public Water Systems to the Department for review, the Project Engineer shall consult with the Department of Public Health/Environment Health Services, and with the local fire protection agency. Public Works shall require written clearance from each of these agencies, indicating their approval of design parameters including, but not limited to:

- Minimum daily flow rate (gallons per minute)
- Fire flow (gallons per minute)
- Water pressure (psi)
- Storage volume (gallons)
- Hydrant spacing (feet)
- Hydrant type

As a guide, the supply available at a given point in the system is required to be no less than 1000 gpm at a residual pressure of 20 psi. The Project Engineer shall provide calculation of the Q required in each of the scenarios described in this section. Whichever calculation shows the greatest quantity shall govern the design.

A. Number of Customers. For calculating supply and storage requirements, the number of customers shall be determined as follows:

1. In residential areas, each single family home or lot will be counted as one (1) customer. Each unit of a multi-family dwelling will be counted as one-half (½) customer.

2. In commercial and industrial areas, each acre (including storage and parking area) will be counted as a minimum five (5) customers.

3. In parks and landscaped areas, each acre of land will be counted as two (2) customers, except where specific design indicates otherwise.

4. In a mobile home subdivision, each unit or space will be counted as three-quarters (3/4) customer.

B. Average Demand. To meet customer demand for water in residential and commercial areas, water supply sources must be capable of producing a minimum of 400 gallons per day per customer served. Industrial and agricultural area requirements are determined for the industries and agriculture involved and added to the residential and commercial demands. Average demand rate shall be increased to equal peak demand rate times the specified period over which peak demand is used.

(1) Average Demand (gallons per day) = + 400L + DI

L = number of residential and commercial customers served by the system (excluding industrial areas)

I = industrial or agricultural areas (in acres) served by the system

D = demand (in gallons per day per acre) for the industrial or agricultural areas served by the system

C. Peak Hourly Demand. To meet customer and fire protection demand the combination of well pump capacity, well capacity, firm surface water supply and system storage must be capable of delivering five gallons per minute (5 gpm) per customer for metered systems; nine gallons per minute (9gpm) per customer for flat rate systems; plus fire flow requirements dependent on the type of development in the area. The customer requirement is to be modified by a factor of (f) varying from 2.00 to 0.33, dependent on the number of services in the system. (See Table below.) The system must be capable of delivering this flow for from two to four hours depending on the number of services in the system. Pipeline size can also be computed from the formula below by using factors for the portion of the system served by the pipeline whose size is to be determined. In doing this, the required fire flow must always be capable of being taken from any one hydrant in the system. Under certain conditions the engineer of the Fire District having jurisdiction may require a larger minimum size of pipeline in certain locations.

(2) Peak hourly demand (gallons/minute) = Ncf + F + X + Y

N = number of residential and commercial services in the system

c = 5 gallons per minute (metered service) or 9 gallons per minute (flat rate service)

Table 6-1 Customer Requirement Modification factor (f)

number of services	value of "f"
5 or less	2.00
25	1.33
40	1.00
80	0.75
200	0.50
500	0.33
Intermediate values may be interpolated.	

Table 6-2 Fire Requirements (F)

Fire flow requirements are determined by the adopted fire code and by the local fire protection authority.

building density	F = flow from hydrant (gallons per minute)
Residential areas The minimum flow requirement for residential development F = 1,000 gpm for a two-hour duration, at 20 to 150 psi.	
Commercial areas The minimum flow requirement for commercial and industrial development are based on the size and type of construction and buildings served. Flow shall not be less than F = 1,500 gpm at 20 to 150 psi.	

X = peak agricultural demand on system (gallons per minute)

Y = peak industrial demand on system (gallons per minute)

D. Master Planning. For master planning for new or expanding community water distribution systems, the following will be a guide:

- Residential: 1,500 gpm
- Commercial/Industrial*: 2,500 gpm
- Urban downtown development/Heavy industrial: 4,500 gpm

* Will require more fire flow for hazardous buildings.

E. Storage. To meet minimum sanitary demands and the necessary quantity of water for fire protection during periods of pump breakdown, there must be the following minimum quantities of water stored per acre served. However, in no case shall the storage for any new subdivision be less than 30,000 gallons. The storage requirement may be increased due to the inability of the source to produce water at the peak demand rate.

Table 6-3 Required Storage Capacity

Lot size (acres)	Required storage capacity (gallons per acre served)
less than ½	1,000
1	800
2	650
3	500
4	350
5	200

The above requirements are not applicable in subdivisions with lots of one acre or larger where the water supply may be from wells or some other source on individual lots.

F. Required Residential Supply. In addition to meeting the above requirements, the system must also meet the following requirements in approving all water systems for adequate source and storage capacities.

1. The peak hourly residential flow, or the sum of the minimum fire flow plus one-half (½) of the peak hourly residential flow, whichever is greater, shall be maintained for the period of time shown below:

Table 6-4 Required Residential Supply

number of services	length of time
less than 100	2 hours
100-250	3 hours
greater than 250	4 hours

With the most critical well or pump inoperative, a minimum of 2/3 of the above flow shall be maintained for the time specified. This requirement may be met by drawing from both well pumping and storage.

2. The minimum residential flow shall be equal to one-half (½) of the peak hourly residential flow and shall be maintained for a period of three days. This requirement may be met from a combined source of the wells and storage.

3. The average daily residential flow for the maximum month shall be equal to one-third (1/3) of the peak hourly residential flow and shall be maintained continuously from the well pumping only.

4. If the original source of the water is not from a well, then requirements will be developed by the County Engineer on an individual project basis. It is the intent that the supply of water and fire protection provided be equivalent to that noted above when the original source is from a well; this may require a larger storage facility.

6.1.2 AREAS OF CONFLICT BETWEEN WATER AND SEWER LINES

In the interest of public health and to minimize the possibility of contamination of the public water supply, the construction requirements included in Standard Drawing Series U-3 shall be met at any time that the separation between water and sewer lines is less than the basic separation standards contained in State regulations. These requirements apply to construction of a water main, sewer main, sewer lateral, or any other type construction causing the separation to be less than that indicated. All special construction required herein is to be discussed thoroughly with the Department of Public Works, and the Department of Public Health/Environmental Health Services, prior to starting any work and is subject to Department of Public Works approval.

6.1.3 DISTRIBUTION SYSTEM

A. Operating Pressure. Water distribution system mains shall be designed to maintain normal operating pressures of not less than 25 psig at the service connection, except that during periods of hourly maximum demand as defined above, the pressure may be not less than 20 psig with the storage tank at the low end of its operating storage level, and may not be more than 150 psig. Computations shall be submitted to demonstrate that these maximum and minimum pressures will be met. Variations in pressures under normal operations shall not exceed 5.0%.

B. Size of Water Mains. Water mains shall be not less than eight (8) inches inside diameter unless otherwise specified. Water mains of six (6) inches shall be limited to cul-de-sacs less than 400 feet long. All dead-end mains shall be provided with a standard blow-off, hydrant or other acceptable means of flushing. Mains shall be equipped with blow-off valves at low points, and air relief valves at high points.

C. Layout of Mains. The distribution system, wherever possible, shall be in grid form so that pressures throughout the system tend to become equalized under varying rates and locations of drafts.

1. Primary feeders, also known as "arterial mains," form the skeleton of the distribution system. They shall be located so that large quantities of water can be carried from the pumping plant to and from the storage tanks and distribution system.

2. Primary feeders shall be arranged in several interlocking loops to allow continuous service through the primary mains, even when one portion is shut down temporarily. Looping will also allow supply from two directions for large fire flows. The primary mains shall not be further than 3,000 feet apart.

3. Secondary feeders carry water from the primary feeders to points in the system. They should form smaller loops within the loops of the primary mains, by running from one primary feeder to another. Secondary feeders shall be placed only a few blocks apart.

D. Dual Mains. Dual mains (one pipeline on each side of the street) shall be installed in streets with 20-year forecast Average Daily Traffic (ADT) 16,000 or greater, if required by the Department. In those streets classified for dual mains, the minimum size shall be eight (8) inches. The distribution system shall be grid-ironed as necessary to provide the flows and pressures specified in Section 6.1.1.

E. Valves. The distribution system shall be equipped with a sufficient number of valves so that no single shutdown will result in shutting down a transmission main, or necessitate the removal from service of a length of pipe greater than 500 feet in high-value districts or greater than 800 feet in other sections. In no case shall valves be so located that any section of main can be shut down without going to more than three locations to close valves. Valves shall not be located in gutters, spandrels or cross-gutters. Existing valves shall be relocated insofar as practical.

F. Hydrants. Fire hydrants shall be placed at street intersections whenever possible, and shall be located to minimize the hazard of damage by traffic. In addition, hydrant spacing shall conform with the following requirements:

1. Residential areas: Maximum spacing 500 feet, except on dead-end streets it shall be no more than 400 feet. The maximum distance from any street or road frontage shall be 250 feet.

2. Commercial/industrial areas: Maximum spacing 250 feet. Hydrants shall be within 150 feet of the exterior of any building.

G. Service Lines. Service lines from the water main to the property line shall normally be installed at the time the main is constructed, to avoid frequent cutting of the street. Single and double service lines shall be 3/4-inch and one (1) inch, respectively, in inside diameter.

H. Thrust Blocks. Concrete thrust blocks shall be installed to properly restrain and protect pipeline, as shown in the Standard Drawings. Thrust blocks shall conform with the compressive strength requirements found in the Appendix, and shall be cast in place at all bends of 22 ½ degrees or more, at the end of plugged mains, behind each tee, or each cross which is valved in such a manner that they can act as a tee, and at the back of fire hydrants. The thrust block shall extend from the fitting to undisturbed soil, and shall be of such bearing area as to assure adequate resistance to the force to be encountered. Prior to pouring concrete, all fittings shall be wrapped in minimum 8-mil polyethylene plastic sheet to protect bolts from being covered with concrete. In lieu of the above, movement may be prevented by the use of restraining joints, where thrust blocks are not feasible due to limited space or other reasons, subject to the prior approval of the Department.

I. Valve Anchors. Concrete valve anchors shall be provided at all in-line valves and shall be installed in accordance with Standard Drawing W-3. Prior to pouring concrete, all fittings shall be wrapped in plastic to protect bolts from being covered with concrete.

J. Air and Vacuum Release Valves. Air and vacuum release valves shall be installed in the water system at all points where it is indicated that air pockets may form. The design shall be such as to insure the release of air automatically from the water main. These valves may also insure the entrance of air into the water main when the pressure inside the line is below atmospheric pressure. All valves shall be designed for a minimum of 150 psi operating pressure. The inlet to each valve shall be provided with a gate valve or corporation stop to provide a positive closure between the main pipeline and the air and vacuum release valve, and the air and vacuum release vent outlet shall be installed above ground in such a manner as to preclude backflow. They shall be located outside the "Clear Zone" as defined in Chapter 4 of these Standards.

K. Blowoffs. A blowoff or fire hydrant shall be installed in the water system at all dead-ends and low points.

L. Sampling Stations. Sampling stations shall be installed according to the requirements established by the water purveyor. At a minimum, they shall comply with the following requirements:

1. There shall be at least one sampling station for each pressure zone in a system.
2. Sampling stations shall be located at least 100 feet from a fire hydrant.
3. Sampling stations shall not be placed past the last service connection on a dead-end main.
4. If a system has more than one service loop, there shall be at least one sampling station in each service loop.
5. For each water source, there shall be one sampling station located where raw (untreated) water from the source can be sampled.

6.1.4 CROSS CONNECTIONS

A. Backflow Prevention Required. Backflow prevention devices shall be installed on all service connections that pose a potential threat to health and safety of the community. At a minimum, the following service connections shall require backflow prevention:

1. Landscape irrigation
2. Medical and health care facilities
3. Areas served by private wells
4. Restaurants and other food-preparation facilities
5. Private fire-protection lines, including fire sprinkler systems

6. Laboratories
7. Commercial and industrial facilities that use water for other than domestic purposes

B. Backflow Prevention Devices. The type of backflow prevention device shall be in accordance with the California Department of Health Services regulations relating to cross-connections (California Code of Regulations, Section 7604). The type of device and the method of installation shall also be subject to review and approval of the County Department of Public Health/Environmental Health Services, and where such devices are proposed to be installed on lines and appurtenances within its jurisdiction, the County Department of Public Works as well.

C. Location of Backflow Prevention Devices. Backflow prevention devices shall be located as close as practical to the point of connection. In addition, backflow devices shall be located in accordance with Section 7603 of the California Code of Regulations.

D. Ownership and Maintenance. The property owner where any service connection requiring a backflow prevention device is located, shall be responsible for operation and maintenance of said device. The County shall not be responsible for operation and maintenance of these devices.

6.2 CONSTRUCTION SPECIFICATIONS

6.2.1 MATERIALS

A. Pipe. Pipe used in construction of water distribution systems shall be either ductile iron, steel pipe, or plastic pipe (PVC) and shall meet the standards of the American Water Works Association (AWWA) where applicable. The use of steel pipe shall be limited to those areas where an engineering evaluation indicates that galvanic (or soil) corrosion is not a problem, or provision is made for suitable cathodic protection. The Department may specify which types shall be used in any instance. The supplier shall furnish a certificate, stating that all pipe, valves, fittings, protective coatings and all other materials comply with the specifications of this manual.

1. Ductile Iron Pipe. Ductile iron pipe shall be centrifugally cast, ductile iron pipe, with ends joined by a method approved by the Department which employs a single elongated rubber gasket to effect the joint, such as "Tyton Joint" or an approved equal. The pipe shall be minimum pressure Class 150 with bituminous coating of coal tar 1 mil thick outside, and lined inside with seal-coated cement lining of

1.6 mm minimum thickness, all conforming to applicable ASA and AWWA Specifications. Ductile iron pipe shall be encased in polyethylene material. Above-ground piping shall have flanged joints, be factory-applied epoxy-coated and blue in color.

2. Steel Pipe. Shall conform to and meet the requirements of AWWA Specifications C200, with cement mortar lining and coating in accordance with AWWA Specification C205. The method used for coupling the ends of the pipe, whether mechanically couple welded, bell-and-spigot ends with rubber gasket or any other type, shall be approved by the Department prior to any use of the pipe.

3. Plastic (PVC) Pipe. Shall be unplasticized Poly Vinyl Chloride (PVC) plastic class water pipe with integral bell and spigot joints or plain-end designed for joint assembly using elastomeric-gasket standard PVC couplings. The pipe shall meet the requirements of AWWA C900 "Poly Vinyl Chloride" (PVC) Pipe, and shall be furnished in cast iron (CI) equivalent outside diameters (OD). All Class 150 pipe shall meet the requirements of DR 18, and all Class 200 pipe shall meet the requirements of DR 14. All pipe shall be suitable for use as pressure conduit. Provision must be made for expansion and contraction at each joint with an elastomeric ring. The bell shall consist of an integral wall section with a solid cross-section elastomeric ring which meets the requirements of ASTM D-1869 and E-477. The bell section shall be designed to be at least as strong as the pipe wall. Sizes and dimensions shall be as shown in this specification. Standard laying lengths shall be twenty (20) feet for all sizes. Random lengths shall not be less than ten (10) feet in length. At least 85% of the pipe used shall be standard laying length. Each standard length and random length of pipe shall be factory-tested to four (4) times the class pressure of the pipe for a minimum of five (5) seconds. The integral bell shall be tested with the pipe.

B. Fittings. Bends, elbows, tees, crosses and special fittings for water mains shall be cast iron or ductile iron conforming to AWWA C-110, C-153 or approved equal.

1. Reducers. When changes in pipe size are required, eccentric reducers shall be used where appropriate to minimize air pockets.

2. Inside Lining. Fittings shall be cement-mortar lined in accordance with AWWA C-104. Fittings lined in the field will not be considered as conforming to AWWA C-104 and will not be accepted.

3. Outside Coating. The outside of cast iron or ductile iron fittings shall have a bituminous coating of coal tar approximately 1 mil thick, unless specified otherwise. The finishing coat shall be continuous and smooth. It shall be neither brittle when cold nor sticky when exposed to the sun, and shall adhere strongly to the pipe.

C. Valves and Valve Boxes.

1. Valves. Valves shall open in counter-clockwise direction and shall meet the requirements of AWWA Specification C500 for gate valves and AWWA Specification C504 for butterfly valves. All valves shall be epoxy coated inside and out. The butterfly valve standard is not intended to cover valves for installation where service conditions exceed the shutoff pressures and line velocities stated in Table L of AWWA Specification C504. Gate valves shall be resilient-seated.

2. Air and Vacuum Release Valves. Valves shall meet or exceed the latest revision of ANSI/AWWA C512 Standard for Air Release, Air/Vacuum, and Combination Air Valves for waterworks service. All 2-inch valves shall incorporate stainless steel internal components and National Pipe Threaded (NPT) inlet. All 4-inch and 6-inch valves shall incorporate stainless steel internal components and flanged inlet. Floats, seats, and trim materials shall be inherently corrosion-resistant and have physical properties suitable for the application. The valve manufacturer shall provide a certification stating that the valve conforms to these Standards. Air and vacuum release valves shall be as follows:

Table 6-5 Air/Vacuum Release Valves

Pipe Diameter	Air/vacuum release valve
6-12 inches	2-inch
16-20 inches	4-inch
24-36 inches	6-inch

All air and vacuum release valves shall be a minimum outlet size of two (2) inches.

3. Check Valves. All check valves shall seat readily and completely to assure water tightness. The face of the closure element and valve seat shall be bronze, composition, or other non-corrodible material which will seat tightly under all prevailing conditions of field use. Slow-closing check valves shall be used where excessive pressures or water hammer may occur, and the static operating pressure is within 20% of the pressure class or rating of the pipe. All check valves, 4-

inch and larger in size, for use of distribution mains, shall be designed for a minimum of 175 psi working pressure.

4. Valve Boxes. Valve boxes shall be as shown on Standard Drawing No. W-3. The cover shall be marked "WATER" and shall have a loose fit in the box.

D. Hydrants. Fire hydrants shall be wet or dry barrel type, 30-inch bury, and shall meet the requirements of AWWA Specifications C502 and C503. They shall also meet the requirements set forth by the Fire District in which the improvement is located or by the Department in the absence of a Fire District. They shall also conform with the following requirements:

1. Outlets. In single-family residential areas, fire hydrants shall have not less than two (2) two-and-a-half-inch (2 ½") outlets which National Standard fire thread. In business, industrial, institutional, school and multifamily dwelling areas, fire hydrants shall have two (2) two-and-a-half-inch (2 ½") outlets with National Standard fire thread and one (1) four-inch (4") suction outlet with National Standard fire thread. An approved fire hydrant is the CLOW F-2060.

2. Painting Hydrants. All hydrant exteriors are to be painted chrome yellow. The tops and outlet nozzle caps are to be painted as follows, based on the results of fire flow testing specified in Section 6.2.3 C:

Table 6-6 Painting Fire Hydrants Tops and Nozzle Caps

Hydrant Class	Color
AA (>1,500 gpm)	light blue
A (1,000-1,499 gpm)	green
B (500-999 gpm)	orange
C (<500 gpm)	red

Within private property, hydrant marking is to be at the discretion of the owner, as approved by the local fire protection agency.

All ferrous metal parts of the hydrant shall be thoroughly cleaned, and all surfaces inside and outside shall be coated with two coats of paint. Paint used on the interior shall be compatible with potable water and shall at a minimum conform to the requirements of Federal Specification TT-C-494b. Paint used on the exterior top section shall at a minimum conform to the requirements of Federal Specification TT-P-664.

3. Installation. Break-away bolts shall be used to join the hydrant body to the buried section. The bolts shall conform to ASTM A307, Grade

B, and shall have a tensile strength less than the shear force required to break the hydrant body. Bolts shall be filled with silicon. When installing hydrants on PVC mains, the hydrant lateral shall be made of the same material as the main. This will help protect the main from damage if the hydrant is hit during a collision and the break-away bolts do not function properly. If dry-barrel type hydrants are installed, they shall have plugs pulled and leach rock installed.

E. Blowoffs. All blowoffs shall be a minimum outlet size of two inches and shall be designed for a minimum operating pressure of 150 psi.

F. Water Service Connections.

1. Materials. The following materials are acceptable for 3/4" and 1" service connections:

- Polyvinyl Chloride, Schedule 40, ASTM D-1785-68
- Polyethylene tubing, ASTM D-2239-67 P.E. 3306 - Type II - Grade 3 (Flarable)

The following materials are acceptable for 1 ½" and larger service connections:

- All of the materials listed above for 3/4" and 1" services
- Brass Pipe - shall be seamless red brass conforming to ASTM B-43-58

2. Sizes. Single service connections shall be minimum 3/4" inside diameter. Double service connections shall be minimum 1-inch inside diameter. (Note that Polyethylene tubing is normally specified in outside diameter.)

3. Corporation Stops. All corporation stops shall be bronze, round, with iron pipe standard (I.P.S.) thread for steel pipe, and outlet for the type of service pipe used.

4. Meter Stops. All 3/4 inch and 1 inch (curb) meter stops shall be bronze, with inlet for the type of service pipe used, and outlet for the type of service pipe or meter coupling used.

For 1 ½ inch and 2 inch service, a bronze curb stop valve, straight ground key curb stop, or bronze gate valve (minimum of 200 psi rated working pressure) may be used. Both inlet and outlet shall be appropriate for the type of service pipe or meter flange used. All valves shall be factory hydro-tested to 300 psi or air-tested to 100 psi under water.

5. Bronze Gate Valve. All 1 ½ inch through 3 inch gate valves shall be all bronze and comply with AWWA Standard C500.

6. Standard Service Clamps. All service clamps and straps shall be in accordance with AWWA Standards and the pipe manufacturer's recommendations.

7. Repair Service Clamps. Where no service clamp is required, and the corporation stop does not seal properly, a repair service clamp shall be used.

G. Concrete Thrust Blocks. Portland cement concrete, conforming with the compressive strength requirements found in the Appendix, for thrust blocks shall be produced from commercial-quality aggregate and cement and shall contain not less than five (5) sacks of cement per cubic yard. Hand mixing of this concrete shall not be permitted. Plastic wrap shall be used to protect fitting connections.

H. Storage Facilities and Pumps.

1. Storage. All steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with AWWA Standard D100 and also meet all foundation and seismic requirements of the Building Code. Safety systems including roof railings and anti-fall equipment for ladders shall be installed as required by Cal OSHA. Where limited service life is satisfactory for a particular situation, the Department may approve steel tanks meeting the standards of the American Petroleum Institute (A.P.I.). All inspection, repairing, painting and repainting of steel tanks, standpipes, reservoirs and elevated tanks for water storage shall comply with AWWA Specification D102.

2. Water Production or Pumping Facilities. All special potable water production or pumping facilities, such as groundwater wells/pump stations (including booster pump stations), along with their associated treatment and disinfection systems, and their associated electrical switchgear, supplies and communications equipment shall require special considerations and approval by the Department. The design shall meet all requirements of the Regional Water Quality Control Board, State and County Health Departments, CDF/County Fire and the Department of Public Works. Adequate source capacity shall be demonstrated as required by the Department. The design of all such facilities and structures shall provide for access by maintenance vehicles.

6.2.2 INSTALLATION

A. Lines and Grades. The pipe shall be laid true to line, with no visible change in alignment at any joint, unless curved alignment is shown on the plans. When curved alignment is shown on the plans, the maximum deflection at any joint shall not exceed the manufacturer's recommendation for the type of pipe and joint being used.

B. Trench Widths. The minimum trench width shall be the nominal diameter of the pipe plus twelve (12) inches, for all pipes 36" in diameter or less. All pipes greater than 36" diameter need special consideration and approval by the Department. The maximum trench width shall be the nominal pipe diameter plus sixteen (16) inches. However, in any case the width shall be ample to permit the proper installation of the pipe and appurtenances. Refer to Standard Drawing Series U-4 for trenching and backfill requirements.

C. Excavation.

1. Depth. Water mains shall be installed at a depth which will provide a minimum cover of 36 inches over the top of the pipe measured from the finished grade.

2. Excavation. Unless otherwise specified, the excavation for water mains shall be an open trench, excavated to six (6) inches below the bottom of the pipe. The excavations for bells, collars, valves and fittings shall be performed by hand and the bedding material shall be hand-shaped so that the bottom segment of the pipe is firmly supported. It is the intent of these requirements to provide firm, uniform bearing for the pipe. 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 for bedding material. The Department shall determine the suitability of the native material.

   If soft, spongy, unstable or similar other material is encountered upon which the bedding material or pipe is to be placed, additional material shall be removed below the normal trench bottom to a minimum depth of one (1) foot, or as directed by the Department. The resulting sub-trench shall be backfilled with sand bedding material suitably densified, and be true to the designed line and grade.

Upon approval of the Department, horizontal boring or tunneling for short distances under roads, sidewalks, other utilities, etc., will be permitted.

3. Preparation of Pavement. When the trench is in an existing paved area, refer to Section 3.2.2 for sawcut and pavement reconstruction requirements.

4. De-Watering. When water is encountered, the trench shall be kept free of water until the laying and jointing of the pipe, and placing of the bedding material has been completed, inspected, and approved. No concrete footings, foundations, anchors or thrust blocks shall be laid in water, nor shall water be allowed to rise over them until the concrete has set at least 12 hours. All water accumulating in the trench from any source whatsoever shall be removed. Waste water shall be disposed of in such a manner as will not cause any damage to public or private property and will not be a menace or inconvenience to the public. The manner employed to dispose of water pumped from an excavation shall be subject to the approval of the Department.

5. Excavated Material. 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 and lighted.

6. Other Pertinent Regulations. All safety orders, rules, or recommendations of the Occupational Safety and Health Administration (OSHA) and the Division of Industrial Safety of the Department of Industrial Relations of the State of California, applicable to this work, shall be obeyed and enforced.

7. Bracing and Shoring. Trench walls shall be vertical, unless permitted otherwise by the Department in writing. Adequate shoring, as required by the Division of Industrial Safety of the State of California, to protect personnel, adjacent property and roadway areas shall be installed through unstable material to limit trench width to the amount specified in these Standards. If any damage does result to such improvements, the necessary repairs or reconstruction required shall be made, as directed by the Department.

The sheeting, shoring and bracing shall be so arranged as not to place any stress on portions of the completed work until the general construction thereof has proceeded far enough to provide ample strength. Any damage to structures occurring through settlement,

water or earth pressure, slides, caves or other causes due to failure or lack of sheeting or bracing or improper bracing, or through negligence or fault in any other manner shall be repaired immediately to the approval of the Department.

Where timber sheeting extends below the invert of a pipe, it shall be cut off at the top of the pipe and the upper portion removed without harming the support conditions. This requirement will not be necessary where steel sheeting is used for shoring below the invert of the pipe.

Care shall be exercised in the drawing or removing of sheeting, shoring, bracing, and timbering to prevent the caving or collapsing of the excavation faces which are being supported.

D. Laying Pipe. Pipe shall be laid in accordance with the manufacturer's specifications. All PVC pipe and fittings for water mains shall be installed in accordance with AWWA C-900. The following sequence shall be used:

1. Each section of pipe and each fitting shall be thoroughly cleaned before it is installed. All pipe, fittings, valves, etc., shall be carefully lowered into the trench by suitable tools or equipment, in such manner as to prevent damage to the pipe, lining, coating, fitting, or other appurtenances. Under no circumstances shall pipe or accessories be dropped into the trench.

2. Whenever pipe laying is discontinued for short periods, or when work is stopped at the end of the day, the open ends of all mains shall be closed with water-tight plugs or bulkheads. The plug or bulkhead shall not be removed unless or until the trench is dry.

3. Gate valves shall be set plumb, supported on a concrete base in accordance with Standard Drawing W-3, and properly fitted to the adjacent sections of main. A valve box shall be installed over each valve.

4. Fire hydrants shall stand plumb, with the steamer nozzle, if any, facing the street and in accordance with Standard Drawing W-2.

5. Ductile Iron Pipe. All ductile iron pipe shall meet the requirements of AWWA Standard C151. Any defective, damaged, or unsound pipe shall be rejected. Each section of ductile iron pipe shall be lowered into the trench by means of approved slings, and the pipeline assembled piece by piece. Where necessary to properly locate valves and fittings, the pipe shall be neatly and squarely cut to length. Field

repair of cement-mortar lining shall be required. After the pipe or fitting has been lowered into the trench, all foreign matter shall be completely brushed from the bell and spigot end before assembly.

E. Bedding Material. Bedding material shall be approved by the Department and meet the minimum standards for sand equivalent and gradation listed below:

- Sand Equivalent = 20

Table 6-7 Gradation Requirements for Bedding Material

Sieve Size	Percentage Passing Sieve
1"	100
No. 4	80-100
No. 200	0-15

The sand equivalent of 20 shall also be required outside of the roadway. Imported sand bedding shall be used the full length of the buried pipe.

Bedding material shall be placed and compacted to 90% relative compaction on the sides and to the minimum of six (6) inches above the pipe. Water consolidation by flooding or jetting shall only be used by written permission of the Department. Hand tamping may be supplemented by the use of vibratory or other compaction equipment, provided that the equipment used is approved by the Department and does not strike, move or damage the pipe while in the process of compacting.

F. Trench Backfill. Trench backfill shall comply with the following requirements:

1. Tracer Wire. Fourteen (14) gauge insulated copper tracer wire shall be laid in the trench above the pipe and branched to all water service laterals, fire hydrants, and air relief valves. The tracer wire shall be brought to finish grade through all meter boxes and valve access boxes. At fire hydrants, the tracer wire shall be brought to six inches above finish grade and secured to the hydrant bolt flange.

2. Warning Tape. In addition to the tracer wire, non-detectable warning tape shall be placed above the pipe and tracer wire to alert workers to the presence of the pipe and/or tracer wire during future trenching operations. The tape shall be three-inch (3") wide polyethylene, APWA uniform color coded blue, permanently printed "CAUTION BURIED WATER LINE BELOW."

3. Placement. The tracer wire and warning tape shall be located as shown on Drawings series U-4, or as directed by the Department. Tracer wire and/or warning tape shall be replaced if damaged by any subsequent trenching operation.

4. Minimum Cover for Water Lines. The minimum cover of the pipe shall be thirty-six (36) inches. All trenches shall be backfilled for the full width of the trench, including joints, after pipe, fittings, appurtenances and bedding material have been installed, and before the required pressure and leakage tests are performed.

5. Other Requirements. Trench backfill for water line installation shall also comply with the requirements of Section 5.2.7 of these Public Improvement Standards.

F. Connection to Existing Mains. Existing mains shall not be shut down after 10:00 a.m. for the purpose of tie-ins. No tie-ins shall be performed on standard holidays. Prior to any shutdown for a tie-in the following must be performed:

1. All encroachment permits and rights-of-entry shall be obtained.
2. Three (3) working days' prior notice shall be given to the water service agency and affected customers.
3. All necessary materials shall be on site and fully assembled.
4. The point of the tie-in shall be fully exposed.

Direct connection to the existing water system shall not be permitted until the newly-installed portion has passed bacteriological testing. Separation may be achieved by the installation of a blind flange or "pancake" inserted between the new and existing piping, per Standard Drawing W-8.

G. Service Lines. The water main shall be tapped at the service location shown on the approved plans, and a service line extended to the property line. Each service line shall be equipped with a corporation stop at the main and curb stop at the property line. The service line may be either laid in open cut or placed by boring or jacking. If installed by the open cut method, the trench shall be in accordance with these Standards and shall be completely backfilled with sand. The water service line shall be considered as part of the main for the purpose of the hydrostatic test as specified below. When a new water main is being installed, all new water services shall be installed at that time.

6.2.3 TESTING

Pressure and leak tests shall be performed at the same time. Pressure testing against valves shall not be allowed. Separation may be achieved by the installation of a blind flange or "pancake" inserted between the new and existing piping per Standard Drawing W-8. The contractor shall give the Department two (2) working days' notice prior to testing.

A. Pressure and Leak Testing. After the pipeline has been laid, it shall be filled with water for a minimum of 24 hours and then subjected to a hydrostatic pressure test. Unless otherwise specified, the test pressure shall be 200 psi, or 50 psi greater than the rated pressure of the pipe (measured at the lowest elevation of the system), whichever is greater. The pressure test will be conducted after backfilling has been completed, but before placement of permanent paving. A test shall be conducted only after all backfilling has been completed, and at least 36 hours after the last concrete thrust block or reaction backing has been cast with high-early-strength concrete, or at least seven days after the last concrete thrust block or reaction backing has been cast with standard concrete. The duration of the test shall be two (2) hours unless otherwise directed by the Department. All pressure gauges shall be approved by the Department.

During the filling of the pipe and before the application of the specified test pressure, all air shall be expelled from the pipeline – if necessary, by means of taps at points of highest elevation, and, after completion of the test, the taps shall be tightly plugged, unless otherwise specified. During the test, all exposed pipe, fittings, valves, hydrants, and PVC couplings shall be carefully examined. Any joint at which the accumulated leakage exceeds the allowable rate specified in the table below shall be rejected. All cracked or defective elements shall be removed and replaced immediately. The test shall then be repeated until the results are satisfactory to the Department.

Table 6-8 Allowable Leakage per 1,000 feet or 50 joints (U.S. Gallons per hour)

Nominal Pipe Size (inches)	Average Test Pressure (psi)		
	150	200	250
6	0.50	0.57	0.64
8	0.66	0.76	0.85
10	0.83	0.96	1.07
12	0.99	1.15	1.28

No pipe installation shall be accepted until or unless the leakage for the section of the line being tested is less than the rate of leakage specified in the table. In calculating the leakage, the Project Engineer will allow for the number of joints added to the pipeline, owing to the use of pipe lengths smaller than 20 feet, for which the data in the table applies. If the test leakage in any section is greater than that permitted, the defective joints shall be located and repaired until the leakage is within the permitted allowance.

B. Flushing and Disinfecting. After the pressure test, the system should be thoroughly flushed out and disinfected in accordance with AWWA Standard C651 and the requirements of the Public Works Department Procedural Memorandum O-3, a copy of which is in the Appendix.

Direct connection to the existing water system shall not be permitted until the newly-installed portion has passed bacteriological testing. Separation may be achieved by the installation of a blind flange or "pancake" inserted between the new and existing piping, per Standard Drawing W-8.

A disinfection plan shall be submitted to the Department for approval. Alterations or modifications of the sterilization procedures set forth herein shall be approved in writing by the County Water Quality Manager before they are implemented.

All flushing water shall be disposed of outside of the County right-of-way, or as approved by the Department, in conformance with Public Works Department Procedural Memorandum O-3.

C. Fire Flow Testing. Fire flow testing shall be conducted by the Project Engineer, in coordination with the applicable fire protection agency.

6.2.4 REPLACEMENT OF ROAD SURFACES

A. Timing of Pavement Replacement. Paving replacement shall not proceed until the full requirements of Installation and Testing, above, have been met to the satisfaction of the Department, but in no less than ten (10) days after backfilling has been completed.

B. Pavement Replacement Requirements. The replacement of all pavement and shoulder surfaces shall be in conformance with Section 3.2.2 of these Public Improvement Standards, as to materials and methods of construction.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

7. WASTEWATER DISPOSAL

Sanitary sewer lines and appurtenances within County-operated special districts shall be constructed in accordance with the details shown on plans and specifications approved by the Department.

Where a sewer system in the unincorporated area of the County is to be operated and/or maintained by any public agency other than the County, or other purveyor regulated by the State of California, the plans and specifications and construction must be approved by both the Department and by that entity. In the event of any discrepancy or conflict between these Public Improvement Standards and the requirements of said wastewater service purveyor, that entity's requirements shall take precedence.

7.1 DESIGN STANDARDS

7.1.1 QUANTITY OF FLOW

A. Average Flow Rate. An average flow of 100 gallons per person per day shall be used for design purposes, with the peak flow double the average flow. Pipes shall be sized to handle peak flows with the pipe flowing half full for sewers up to fifteen (15) inches in diameter. Larger sanitary sewers shall be designed to flow three-quarters full.

B. Number of Persons Served. Accurate population estimates will be required to determine the quantity of flow. Multiply the future population by the average per capita wastewater flow, given in (A) above. Estimates of the number of visitors associated with recreational uses, which experience high seasonal fluctuation, can be converted to equivalent full-time residents by multiplying the number of visitors by the appropriate multiplier below:

- Day-use visitor 0.1-0.2
- Seasonal visitor 0.5-0.8

The number of persons shall be determined for a 50-year period, which is the length of time that the capacity of the sanitary sewer will be adequate. Day-use visitors are those who do not stay overnight (for example, boating or picnicking), and seasonal visitors are those who stay for short multi-day stays during peak recreational seasons (for example, camping or cabins).

7.1.2 COLLECTION SYSTEM

A. Minimum Velocity. Sanitary sewer grades shall be designed to provide a minimum velocity of two (2) feet per second when flowing at peak discharge as determined in section 7.1.1 A, above. The minimum velocity requirement is necessary to prevent the deposition of solids. The following table indicates the slopes which will provide that velocity, and these shall be used as the minimum standard for design.

Table 7-1 Minimum Slope for Sanitary Sewer

Diameter	Slope in Feet/Foot
6 inch	0.0050
8 inch	0.0035
10 inch	0.0025
12 inch	0.0020
15 inch	0.0015
18 inch	0.0012
House service line	0.02

Sewers larger than 18 inches diameter shall be designed to the approval of the Department.

B. Change in Pipe Size or Angle Point. 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 foot above the flowline of the pipe flowing from the manhole, or an amount necessary to match the inside crowns of the pipe, whichever is greater.

C. Maximum Velocity. Unless special provisions for erosion protection have been provided, and approved by the Department, design velocities for sanitary sewers shall not exceed ten (10) feet per second at peak flow. 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.

D. General Location. Sewer lines shall be installed in accordance with Standard Drawing U-1 where possible. See Standard Drawing series U-3 for special construction requirements when sewer lines are to be placed in close proximity with water lines.

E. Locate Sewers Within Streets and Roads. All sanitary sewers designed for the collection and conveyance 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 Department. The location of the sanitary sewers installed in any street or road not having frontage roads shall normally be six (6) feet southerly or easterly of the centerline of the street.

F. Sewer Lines Within Easements. Where sewer lines are located within easements, the easements shall be offered for dedication to the public.The minimum width of any easement for sanitary sewer purposes shall be ten (10) feet. 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.

G. 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 under the following conditions:

- All curve data shall be shown on the plans.
- Minimum radius of curvature and joint deflections shall be as recommended by the pipe manufacturer and approved by the Department.
- All deflections shall be at the pipe joints or by specially mitered pipe sections.

H. Depth. The normal design depth of a sanitary sewer system shall be such as to obtain a cover of 36 inches above the top of pipe for the house service lateral at the property line.

I. Size. The normal minimum sewer main size shall be eight (8) inches inside diameter.

7.1.3 AREAS OF CONFLICT BETWEEN WATER AND SEWER LINES

In the interest of public health and to minimize the possibility of contamination of the public water supply, the construction requirements included in Standard Drawing Series U-3 shall be met at any time that the separation between water

and sewer lines is less than the basic separation standards contained in State regulations. These requirements apply to construction of a water main, sewer main, sewer lateral, or any other type construction causing the separation to be less than that indicated. All special construction required herein is to be discussed thoroughly with the Department of Public Works, and the Department of Public Health/Environmental Health Services, prior to starting any work and is subject to Department of Public Works approval.

7.2 STANDARD SPECIFICATIONS

7.2.1 MATERIALS

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 Department that the material being incorporated into the work has met the requirements as specified. Approval of the Department shall be required for use of material not listed in these standards.

A. Pipe. All sanitary sewer lines shall be ductile iron pipe, plastic PVC pipe or approved by the Department. All pipe 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. Additionally the following requirements apply for specific kinds of pipe:

1. Ductile Iron Pipe. All ductile iron pipe and fittings for main sewers shall conform to AWWA Standards C151 and C153. Joints shall be approved type mechanical joints. No lead joints will be allowed.

2. Polyvinyl Chloride (PVC) Pipe. PVC pipe must meet at least ASTM Standard D-3034/SDR 35. Deflection tests shall be required as prescribed by the Department.

7.2.2 FACILITIES

A. Manholes. Normal maximum spacing for manholes shall be 400 feet. 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 shall have manholes spaced at a maximum of 300 feet, or adjusted to fit the individual case. The maximum spacing of manholes on trunk sewer lines shall be as follows:

Table 7-2 Maximum Spacing of Sewer Manholes

Size of Trunk Sewer Line	Maximum Spacing
12" to 24" diameter	500 feet
27" to 36" diameter	600 feet

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

B. Drop Manholes. Whenever the vertical distance between the inverts of sewer lines coming into a manhole exceeds thirty (30) inches, a standard drop manhole shall be constructed. Designs requiring the use of drop manholes shall be avoided, and shall require prior approval by the Department where they cannot be avoided.

C. Other Facilities. Other wastewater facilities shall conform to the following requirements:

1. Stub Lines. A flusher branch may be used in lieu of a manhole for any stub line with a length of 200 feet or less. Any line more than 200 feet in length shall have a manhole at the end.

2. Extension Lines. Lateral sewers installed to a subdivision line for future extension shall have a flusher branch at the end, if there are any house service lines attached to it, and if it is not over 200 feet in length. Lines longer than 200 feet shall terminate in a manhole with a stub for future extension.

3. 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 four (4) inches inside diameter. Actual size of laterals larger than four (4) inches shall be determined by fixture unit requirements as per the current edition of the Uniform Plumbing Code.

D. Special Facilities. All special facilities such as lift stations, force mains and treatment plants shall meet all requirements of the State Regional Water

Quality Control Board, State and County Health Department and the Department of Public Works. Special structures, such as pump stations and pressure lines, shall require special considerations and approval by the Department. The design of all such facilities and structures shall provide for access by maintenance vehicles.

1. Lift Stations. The minimum distance from a lift station to any residence shall be 50 feet, except with advance approval of the Department. No lift station shall be constructed with bypasses which will bypass any effluent into any stream or watercourse. An alarm system, which meets the approval of the Department, shall be provided on all sewage lift stations. In addition, all lift station controls shall be approved by Public Works' Utilities Division operations staff. All lift stations shall have emergency power connections.

2. Lift Station and Force Main. Whenever the design of a sanitary sewerage system includes the necessity of a sewage lift station and a force main, the following data shall be submitted for tentative approval before plans are submitted: Design computations for the pumps or ejectors, the type to be used, and a plot plan showing the dimensions of the site and its location with respect to homes or other structures.

3. Force Mains. Pipe used in the construction of force mains shall be either ductile iron pipe or C200 (DR14 per AWWA C900) plastic pipe.

7.2.3 INSTALLATION

A. Lines and Grades. All lines and grades will be set by the Project Engineer, and the Department 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 set, shall be fully protected and preserved. Flow line elevations shall be established at all changes in grade and at 50-foot intervals.

B. Trench Widths. The maximum width of trench, measured at the top of pipe, shall be governed in all cases by the size of the pipe to be installed therein. Refer to Standard Drawing series U-4 for trenching and backfill requirements. For pipe 36 inches in diameter or less, the trench width shall be the outside diameter of the pipe, plus 12 inches (6" each side of pipe). For pipe diameters greater than 36 inches, the trench width shall be the outside diameter of the pipe, plus 16 inches (8" each side of pipe).

The sides of the trench shall be as nearly vertical as possible in the material through which it is passing. If the width of the trench at the ground surface becomes excessive, the Department may require solid sheeting and bracing.

C. Excavation. Unless otherwise specified, the excavation for sewer mains shall be completed in the same manner as described for water mains in Chapter 6.

D. Laying Pipe. Pipe shall be laid in accordance with the manufacturer's specifications. All PVC pipe and fittings for underground gravity sewers shall be installed in accordance with the requirements of ASTM Standard D2321 (as amended to date), Recommended Practice for Installation of Flexible Thermoplastic Sewer Pipe. The following sequence shall be used:

1. 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 Department. In addition, a string line shall be used in the bottom of the trench to insure proper alignment and grade.

2. 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.

3. 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.

4. 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.

5. 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 for, 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. This work consists of placing cast iron pipe or other pipe of approved material, usually in a conductor pipe, under a paved roadway 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 Department before proceeding with the work, and shall meet the following requirements:

1. 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 workers and the roadway or railroad.

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

3. 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. Sand, or other approved material, shall then be pumped into the conductor pipe to completely fill the annular space around the pipe for its full length.

F. Trench Bedding and Backfill. Trench bedding and backfill shall be placed in the same manner as described for water mains in Chapter 6, including use of tracer wire and warning tape, except as follows: The non-detectable warning tape shall be three-inch (3") wide polyethylene, APWA uniform color coded green, permanently printed "CAUTION BURIED SEWER LINE BELOW."

G. Manholes. Manholes shall be watertight structures constructed by placing precast concrete sections on a poured concrete base. Poured-in-place manholes shall not be used unless specifically called for in the Special Provisions. The following requirements shall apply:

1. Temporary covers of 3/8" steel plate of sufficient size to adequately cover the opening shall be placed on the cone until the pavement is completed. Suitable locating ribs shall be welded to the underside of the cover to hold it in place during the grading and paving operations.

2. 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 inches, 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.

3. Manholes shall be tested for water tight integrity either jointly with testing of sewer line or as separate units, in accordance with the Testing specifications, in section 7.2.4 below. The allowable leakage for one manhole shall not exceed one (1) gallon during a two-hour test period.

H. Connection to Existing Manholes. Connections to existing manholes shall conform to the requirements of Standard Drawing S-1, and shall be made by coring a hole in the wall of the manhole, inserting the end of the pipe through the opening, flush with the inside wall, and packing the opening around the pipe with a non-shrink grout, thoroughly compacted to form a watertight connection. The grout shall be troweled smooth and flush with the interior surface of the manhole. A manhole adapter or water stop shall be placed on the pipe prior to placement in hole, and the pipe shall be installed as specified by the manufacturer. Channelizing of the flow through the manhole shall conform to the details shown on the Standard Drawings for new manholes. The Contractor shall notify the Department, 24 hours in advance, before any connection is made to existing structures. The Contractor shall schedule the work so that interruption of flow is held to a minimum.

I. House Service Laterals. House service laterals shall be constructed as shown on the Standard Drawing S-3 and S-3a, and shall conform to the following requirements:

1. If it becomes necessary to locate a house service lateral less than 100 feet from a well, it shall be constructed of a suitable material approved by the Public Works Department and the Public Health Department/ Environmental Health Services. Approved construction materials for sewer lines in critical zones are listed in Section 7.1.3 above.

2. 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.

3. 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.

4. All house service laterals shall be considered as part of the lateral sewers for purposes of the hydrostatic test as set forth in Testing, below.

5. The location of house service laterals shall be permanently indicated by embedding the letter "S" in the curb 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, a 2" x 2" x 36" construction grade redwood stake shall be driven in the ground to within two inches of the surface, directly above the service line at the property line and an "S" stamped in the top. Every house service lateral shall be so marked before final acceptance will be given of any job.

7.2.4 TESTING

Prior to final approval, all sewer lines shall be cleaned and tested for leakage by standard hydrostatic or low pressure air test, for deflection by mandrel test, and for standing water/other debris by TV inspection. All cleaning and testing shall take place after all utilities are installed, and up to, but not including the final paving is completed. Any damage to the system during final paving and cleanup shall be corrected prior to final approval.

A. Cleaning. Prior to acceptance of any sewer line by the Department, the sewer line shall be cleaned with a Wayne-type sewer cleaning ball under hydrostatic pressure. Any stoppage, dirt or foreign matter shall be removed from the lines. All materials and debris removed shall be collected and vacuumed out of the system at a manhole selected by the Department, and no debris shall be washed or otherwise deposited into the system.

B. Hydrostatic Test Procedure. A section of sewer line shall be prepared for testing by plugging the upper side of the downstream manhole and all openings in the upstream manhole except the downstream opening. Where grades are slight, two or more sections between manholes may be tested at once. Where grades are steep, and excessive test heads would result by testing from one manhole to another, test tees the full size of the main shall be installed at intermediate points so the maximum head on any section under test will not exceed 12 feet. The following sequence shall be used:

1. The section of sewer line prepared as above shall be tested by filling with water to an elevation five feet above the top of pipe at the upstream end of the test section, or five feet above the existing

ground water elevation, whichever is greater. The water should be introduced into the test section four hours in advance of the official test period to allow the pipe and joint material to become saturated. The pipe shall then be refilled to the original water level.

2. At the beginning of the test, the elevation of the water in the upper manhole shall be carefully measured from a point on the manhole rim. After a period of four hours, or less with the approval of the Department, the water elevation shall be measured from the same point on the manhole rim and the loss of water during the test period calculated. If this calculation is difficult, enough water shall be measured into the upper manhole to restore the water to the level existing at the beginning of the test, and the amount added taken as the total leakage.

3. Should an initial test show excess leakage in a section of line, it is permissible to draw the water off and test the manholes that contained water. This test shall be made by plugging all the openings in the manholes and filling with water to the same elevation as existed during the test. The leakage from the manhole may be deducted from the total leakage of the test section in arriving at the test leakage. After the testing is complete, the manhole shall be waterproofed by grouting. Other approved waterproofing methods may be used if satisfactory to the Department.

4. The allowable leakage in the test section shall not exceed 500 gallons per mile, per 24 hours, per inch diameter of pipe tested at the five-foot test head.

5. If it is necessary or desirable to increase the test head above five feet, the allowable leakage will be increased at the rate of 80 gallons for each foot of increase in head.

6. Test sections showing leakage in excess of that allowed shall be repaired or reconstructed as necessary to reduce the leakage to that specified above, and the line retested, after a minimum period of 24 hours during which no additional water shall be introduced into the line.

C. Air Test Procedure. Each section of sanitary sewer between two successive manholes shall be tested by plugging all pipe outlets with suitable test plugs. Air shall be slowly added until the internal pressure is raised to 4.0 pounds per square inch gauge (psig). The compressor used to add air to the pipe shall have a blowoff valve set at 5 psig to assure that at no time the internal pressure exceeds 5 psig. The internal pressure of 4 psig shall be

maintained for at least two minutes to allow the air temperature to stabilize, after which the air supply shall be disconnected and the pressure allowed to decrease to 3.5 psig. The time in minutes that is required for the internal pressure to drop from 3.5 psig to 2.5 psig shall be measured and the results compared with the values tabulated below.

Table 7-3 Air Test Procedure

Pipe Diameter (inches)	Test Time (minutes)	Minimum Distance Between Manholes (feet)
8	4	340
10	5	260
12	6	230
15	7	170
18	9	150
21	10	120
24	11	110
27	13	100
30	14	90
33	16	80
36	17	70
39	18	60
42	19	50

The above tabulated values shall be used for the respective diameter pipes except where the distance between successive manholes is less than the above tabulated values, or the pipe diameter is less than eight inches, in which case the following formula will be used to determine the test time:

(1) $$T = 0.000183\ d^2\ L$$

T = test time (minutes)
d = inside diameter of pipe (inches)
L = distance between successive manholes (feet)

If the pressure drop from 3.5 psig to 2.5 psig occurs in less time than the above tabulated or calculated values, the pipe shall be repaired and, if necessary, replaced and relaid at the Contractor's expense until the joints

and pipe shall hold satisfactorily under this test. The Contractor shall furnish all labor, air test equipment, and all other materials for making the required air test at his or her own expense. After the sewer lines have been properly backfilled to a depth where additional backfilling will not disturb the position of the pipe, all or any sections that the Department may select may be tested. In no case shall the required minimum backfill be less than four feet above the top of the pipe before subjecting the line to the test. The Contractor shall supply all equipment, material and perform all tests as required prior to final approval.

D. Deflection Test. Following the placement and densification of backfill, and prior to the placing of permanent pavement, all pipe shall be cleaned and then mandrel measured for obstructions (deflections, joint offsets, and lateral pipe intrusions). A rigid mandrel, with a circular cross-section having a diameter of at least 95% of the specified average inside diameter, shall be pulled through the pipe by hand. The minimum length of the circular portion of the mandrel shall be equal to the nominal diameter of the pipe. Unless otherwise permitted by the Department, any over-deflected pipe shall be uncovered and, if not damaged, reinstalled. Damaged pipe lengths shall not be reinstalled, but shall be removed from the work site. Any pipe subjected to any method or process other than removal, which attempts – even successfully – to reduce or cure any deflection, shall be uncovered, removed from the work site, and replaced with new pipe.

The mandrel used shall be:

- rigid, nonadjustable, with an odd number of legs (9 legs minimum)
- effective length not less than its nominal diameter
- fabricated of steel
- fitted with pulling rings at each end
- stamped or engraved, on some segment other than a runner, indicating the pipe material specification, nominal size, and mandrel OD
- furnished in a suitable carrying case labeled with the same data as stamped or engraved on the mandrel

E. TV Inspection. TV inspection shall be required if leakage or deflection tests fail.

F. Force Mains. Each section of pipe to be tested shall be slowly filled with water and all air expelled from the pipe. After the pipe has been filled, it shall be allowed to set for a period of not less than 24 hours. The pipe shall then be refilled to the original water level and subjected to a pressure of not less than 150 pounds per square inch, or the service pressure plus 50 pounds, whichever is greater, for a period of two hours. All exposed joints, bends, angles, and fittings shall be closely examined during the test. Any

part of the line which proves to be defective shall be replaced and the line retested. The maximum allowable leakage shall not exceed 100 gallons per mile, per 24 hours, per inch of nominal diameter.

7.2.5 REPLACEMENT OF ROAD SURFACES

A. Timing of Pavement Replacement. Paving replacement shall not proceed until the full requirements of Installation and Testing, above, have been met to the satisfaction of the Department, but in no less than ten (10) days after backfilling has been completed.

B. Pavement Replacement Requirements. The replacement of all pavement and shoulder surfaces shall be in conformance with Section 3.2.2 of these Public Improvement Standards, as to materials and methods of construction.

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8. UTILITIES

8.1 DESIGN STANDARDS

8.1.1 GENERAL PROVISIONS

A. Improvements Required. In accordance with Section 21.03.010 (h) of the San Luis Obispo County Code, subdivision improvements shall include electrical, telephone, gas and cable television (where applicable). Other public improvements, as defined in this document, shall include utility improvements where required by conditions of approval or as determined necessary by the Department for reasons of public safety. Utility improvement requirements shall be based on the ultimate density determined from the general plan.

B. Plan Requirements. The plans shall show the following utility information as a minimum:

1. Show all utilities in detail on the typical street sections. Include trench dimensions, depth, number of lines, and description of lines (line material, size, etc.)

2. Show complete utility layout. Include line location, road crossings, junction boxes, manholes, service connections or stubouts, etc.

3. The typical section shall be in accordance with Standard Drawing U-1.

4. The following notes shall be placed in an appropriate location relative to the utility improvements:

All wire and gas utility connections, distribution lines, and service locations shown on these plans are for information only and should not be considered final design. Utility purveyors may need to alter their design from what is depicted herein based upon future design modifications or during construction. However, no revisions to what

is depicted herein shall be constructed without the prior approval of County Public Works. No above-ground facilities shall be located where they block the accessible path of travel or intersection or driveway sight distance.

Prior to final project acceptance it will be the owner's responsibility to verify final utility alignments and ensure that adequate easements for such facilities are provided.

The intent of these requirements is that sufficient utility detail be shown to permit the Department, or other appropriate agency, to locate all utilities when maintenance to the roads and other utilities in the public right-of-way or easements becomes necessary.

C. Underground Installation Required. Section 21.03.010 (h) requires that all public utilities, including cable television systems, shall be placed underground for all parcel maps and tract maps located within urban and village areas (as defined in the land use element of the county general plan). The requirement to place utilities underground shall apply to all new facilities, as well as all existing facilities interior to the property being developed. Existing facilities on the perimeter of a development site shall be placed underground, as determined feasible by the Department.

D. Sawcut and Pavement Replacement. Any installations requiring trenching or excavation into existing paved areas, shall comply with the requirements of Section 3.2.2 F of these Standards for sawcut and pavement replacement.

E. Service Extensions Required. All utilities shall be installed with service laterals to serve all new lots being created in any subdivision project.

F. Acceptance by Utility. Utility improvements shall not be accepted as complete by the County, until written correspondence has been received from each utility providing service to the subdivision or land use permit project, indicating that their respective facilities are completed to their satisfaction and "ready for service," or that sufficient financial arrangements have been made to assure same.

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9. TRAFFIC CONTROL

9.1 DESIGN STANDARDS

9.1.1 WORK ZONE TRAFFIC CONTROL

The requirements which follow shall be implemented by the encroachment permit which is issued to the Contractor for each public improvement construction project within existing County road rights-of-way. The intent is to have the requirements clearly depicted on the improvement plans before the work begins.

A. Traffic Control Plan Requirements. Each improvement plan which involves any activity within existing County road rights-of-way shall indicate a proposed traffic control plan, consisting of the following items:

1. The plan shall include a schematic diagram indicating the proposed placement of all construction zone signs, including required distances for proper placement of each sign. See Appendix J for a summary of construction zone sign designations.

2. The plan shall reference a standard work zone traffic control plan from the State Manual on Work Zone Traffic Control.

3. The plan shall include the County's standard Traffic Control Notes, shown below.

B. Significant Work Zone Traffic Control Requirements. Any construction work that requires lane closure on arterial and collector streets within any Urban Reserve Line (as defined by the Circulation Element of the General Plan), or on any arterial road in rural areas, will require the preparation of a traffic control plan, which shall provide details on all signage, delineation, flaggers and other proposed traffic control methods. This type of plan shall also be prepared, when required by the Department, in the following settings:

1. Any project affecting traffic signal operations shall have a traffic control plan which provides for temporary detection of traffic during construction. The method of temporary detection must be approved by the County Traffic Engineer.

2. Urban settings with a high concentration of side streets and driveways, such as a Central Business District as defined in the Land Use Element of the County General Plan.

3. Urban/rural interface locations with a sudden speed transition of 20 mph or greater.

4. Locations with unusual sight distance considerations.

5. Any road closure requiring a detour. The plan shall include provisions for notification of the following affected agencies and service providers:

- law enforcement
- fire protection
- emergency medical service
- postal service
- waste collection
- public transit

Other notifications shall be provided as determined necessary by the Department.

6. Any situation that does not match the standard layouts in the Work Zone Traffic Control Manual.

7. Complex project phasing.

8. Transit stops, bicycle lanes or sidewalks which are proposed to be closed or relocated during construction.

9.1.2 PERMANENT TRAFFIC CONTROLS

Permanent traffic controls include signs, signals, lighting, roadway striping, and any other devices which are installed by the developer and which will remain in place following the construction phase. The following requirements apply to all permanent traffic controls which are required in conjunction with any public improvement, as defined in this document.

A. Design Criteria. All permanent traffic control devices shall conform with the requirements of the Manual on Uniform Traffic Control Devices, including the California Supplement, State Traffic Manual and State Standard Plans.

B. Signals and Lighting. Improvement plans for installation or modification of any traffic signal or lighting systems shall conform to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD) and California Supplement. These plans shall be reviewed by the County Traffic Engineer, in addition to the standard review by the Development Services Division. Additionally, the following requirements shall apply:

1. Signal installations and modifications shall be fully compliant with the pedestrian access requirements of the Americans with Disabilities Act (ADA) at all corners of the intersection.

2. Signal controllers shall be Type 170E, using software specified by the County Traffic Engineer.

3. Signal heads shall be LED.

4. Street name signs on signal mast arms shall use high-intensity sheeting and shall be legible on both sides.

5. All signal installations shall have a battery backup system installed. No backup batteries shall be placed in the controller cabinet.

6. All conduits shall be a minimum 3-inch diameter, except for DLC which shall be 1½-inch.

7. Signal standard coatings shall be hot-dipped galvanized.

8. Signal and lighting plans shall include the following note:

Special Inspection shall be required by a Certified Traffic Signal Inspector for all phases of the signal and lighting installation. A Schedule of Inspections shall be provided to the Department prior to commencing work. The Inspector's daily reports shall be provided to the Department prior to acceptance of the work and scheduling a turn-on of the new signal and lighting facility.

C. Striping Plans. Whenever any road widening work involves the present or future need to modify existing lane striping, two striping plans shall be prepared, as follows:

1. An ultimate striping plan shall assume completion of widening fronting all properties on both sides, for the full length of a block between major intersections, as determined by the Department. This plan shall be used to determine placement of the curb line and any other roadway appurtenances. Passing zones shall be established based on road design speeds.

2. An interim striping plan shall assume only the completion of the project, and no other improvements in the block. This plan shall be used to determine the transitions that will be required as a function of constructing the project before other work occurs.

D. Striping Modifications. Whenever the change of position of any existing pavement striping will be greater than two (2) feet, the existing striping shall be completely obscured by use of a Chip Seal. This work shall be depicted on the improvement plans. The Chip Seal shall extend the full width of the roadway.

9.2 CONSTRUCTION SPECIFICATIONS

9.2.1 MATERIALS

A. Signs. All signs, signals, flares, barricades, or other warning devices necessary for the protection and convenience of the public during the construction phase and for permanent installation shall be furnished, installed, and maintained by the Contractor, until final acceptance by the County or other maintenance entity. Signs and other traffic warning devices must be in accordance with the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD), including the California Supplement prepared by Caltrans. If approved by the Department County signs and other equipment for warning traffic may be loaned to the Contractor.

B. Pavement Markings. Pavement markings and delineation shall be thermoplastic, and shall conform to the layouts shown in the State Standard Plans. All pavement markings shall be installed by the developer. Pavement markings and delineation may be paint, where approved by the Department, in locations where additional modification is anticipated in less than 10 years.

9.2.2 INSTALLATION

A. Standard Traffic Control Requirements. The following requirements shall apply to the construction of all public improvements:

1. The Project Engineer shall be responsible to assure that the appropriate existing traffic controls remain in place and functional during all construction phases. The Contractor shall cover any conflicting signs that exist along the roadway.

2. No work shall commence without the Construction Signs installed and other necessary traffic control devices on site. Stationary mounted construction area signs shall be fluorescent orange, using materials from the Caltrans "Prequalified Products List" for Signing and Delineation Materials. The list is available at the website of the Caltrans Office Engineer:

   www.dot.ca.gov/hq/esc/approved_products_list/

3. No lane closure shall be permitted during the times shown on the Department's "Lane Closure Restriction" list (see Appendix). Affected streets will be shown in the encroachment permit.

4. At the conclusion of each work day, all paved traveled-way surfaces shall be restored to an all-weather, traversable condition. There shall not be a drop-off along the edge of traveled way >0.15 feet. "Low Shoulder" signs shall be placed along the traveled way where there is any drop-off. Drop-offs >0.15 feet shall require either:

   A. Backfilling the drop-off to a minimum 4:1 slope;
   B. Providing appropriate steel plates over excavation;
   C. Providing temporary concrete railing along the work zone in conformance with the State Standard Plans and Specifications.

   Excavations beyond eight (8) feet from the edge of traveled way may utilize portable delineators at appropriate spacing, along with "Open Trench" signs.

5. Where steel plates are used, they shall be pinned, and have a cold-mix slope of 12:1 placed on all sides. They shall be friction-coated for traction. Appropriate warning signs shall be placed.

6. Pedestrian access shall be afforded through the work area on County Roads in urban areas, either by providing necessary facilities for safe and viable access, or by providing appropriate advance warning to

pedestrians to use alternate routes. Bicycle routes and lanes, when impacted by construction, shall be signed to afford safe passage through the work zone or to designated alternate routes. For both pedestrians and bicycles, surfaces shall be maintained free of loose debris and gravel.

7. No construction equipment or materials shall be parked or stored within six (6) feet of the edge of the traveled way. When construction equipment or materials are stored within the right-of-way, further than six (6) feet from the edge of the traveled way, the shoulder area shall be signed as closed, and portable delineators shall be used to mark a taper in advance of the material or equipment.

8. Removal of existing pavement striping or markings shall be by sandblasting, hydroblasting, or grinding. When the change of position will be greater than two (2) feet, the removed striping shall be further obscured by use of a Chip Seal, as required by Section 9.1.2 D. The Chip Seal shall extend the full width of the roadway.

9. Parking restrictions shall be posted 24 hours before any work starts. Posting shall be done by the Contractor.

10. All private driveways and side streets shall be kept open at all times, except when construction takes place immediately in front of the driveway or side street.

11. Any work that disturbs normal traffic signal operations shall be coordinated with the Traffic Engineer at least three (3) business days prior to beginning the work involving the signal. The Contractor shall replace all traffic signal loop detectors, damaged during construction, within five (5) days of the completion of construction involving the signal.

12. All delineators shall be equipped with nighttime reflective bands, and spaced no greater than 50-foot intervals along tapers, lane control, and/or edge of work zone.

13. The operator of any transit operation affected by the work shall be notified two (2) working days prior to work commencing.

14. All flaggers shall hold current certifications. All workers within the roadway shall wear Type 2 CAL-OSHA high-visibility vests.

B. Maintenance of Traffic Control Devices. All existing County signs, or other traffic control devices, which will be disturbed by the work shall be

removed, stored in an appropriate position, and reset; or maintained in place by the Contractor; as directed by the Department. Any damage to such signs or other devices as a result of the work shall be paid for or replaced at the Contractor's expense.

C. Signs. Signs shall be connected to 4x4 wooden posts, or 2-inch diameter metal posts, by use of a "through bolt." When a metal post is used, a "sign saddle bracket" shall be used, and no "U-bolts" shall be permitted. Refer to Standard Drawing M-4.

D. Chip Seal. When Chip Seal is required as noted above, it shall conform to the following requirements:

1. Seal Coat: Seal Coat shall be "Fine" and shall conform to the provisions of Section 37-1 of the State Standard Specifications.

2. The Seal Coat shall consist of two separate applications of asphaltic emulsion and one application of screenings applied in the following manner. The initial application of asphaltic emulsion (LMCRS-2 or LMCRS-2h) shall be applied, after which the screenings are spread and rolled. When the rolling is completed, a second application of asphaltic emulsion (CSS-1h), diluted 50% with water, is applied. Prior to the second application, all unevenly spread rock or chip piles will be removed to the satisfaction of the Project Engineer.

3. The first coat of bituminous binder shall be asphaltic emulsion conforming to Section 94, "Asphaltic Emulsions," of the State Standard Specifications. The latex-modified asphaltic emulsion shall conform to the following requirements when tested in accordance with the specified test method:

Cationic: LMCRS-2h LMCRS-2

Table 9-1 Asphaltic Emulsion Tests

Test on Emulsion	Test Method	Requirement
Viscosity @122°F	AASHTO T-59	75-300 sec
Settlement, 5 days		5% max
Sieve		0.3% max
Demulsibility		40% min
Particle charge		positive
Ash content	ASTM D3723	0.2% max

Table 9-2 Emulsion Tests by Drying

Tests Residue by Drying	Test Method	Requirement
Percent residue	CAL-331	65% min
Penetration @ 77°F	AASHTO T49	40-90 100-200
Ductility @ 77°F	AASHTO T51	40 cm min
Torsional recovery	CAL-332	18% min

3. The rubber latex shall be added to either the asphalt or the emulsion at their locations of manufacture.

4. The rubber may be either neoprene or a blend of butadiene and styrene.

5. The temperature of the latex-modified asphaltic emulsion at the time of application shall be between 130°F and 180°F.

6. The rates of application of screenings and the asphaltic emulsions shall be as follows:

Table 9-3 Rates of Application

Type	Size	Screenings	1st Application	2nd Application
Fine	1/4" x #10	21-22 lb/sq.yd.	0.29 gal/sq.yd.	0.22 gal/sq.yd.

7. The approximate rate of application of the asphaltic emulsion shall be as directed by the Project Engineer. The temperature at the time of application shall not be less than that which is necessary for proper operation of the oil distribution system.

8. The contractor, pursuant to Section 22651-M of the California Vehicle Code, shall be responsible for notifying and making arrangements with owners of vehicles parked within the work area, for removal of those vehicles. Notification and posting of signs shall be made a minimum of 24 hours in advance of doing the work. The contractor shall be responsible for posting and marking on the signs the day the work is scheduled.

9. A pickup broom shall be used for preliminary cleaning. The contractor shall control any dust with water, as directed by the Project Engineer.

10. The contractor shall temporarily cover any existing utility manhole covers, valve box covers or survey monument vault covers, to prevent seal coat materials from being applied to these covers.

11. Spreading of screenings shall conform to Section 37-1.06 "Spreading Screenings" of the State Standard Specifications.

12. The contractor shall have a standby vehicle containing rock chip screenings available at all times for repairing the surface of the seal coat at locations where it is damaged by traffic before it sets up, and/or at locations where full width coverage of the existing roadway surface has not been obtained to the satisfaction of the Project Engineer.

13. Brooming shall be required in the event the surface oil application (CSS-1h) is not placed within a suitable time after the screenings have been placed and traffic has disrupted their original distribution, as determined by the Project Engineer.

14. All excess chips shall be removed within four (4) days, in accordance with the provisions of Section 37-1.07 of the State Standard Specifications. If the contractor does not remove the excess chips to the satisfaction of the Department within the allotted time, no further construction will be permitted on the subject public improvements until said removal operations are completed and accepted by the Department.

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10. PROJECT COMPLETION

10.1 CONSTRUCTION PHASE

10.1.1 BEFORE CONSTRUCTION

A. Pre-Construction Conference. A Pre-Construction Conference is required prior to commencing the work shown on the approved improvement plans. The Project Engineer shall arrange this, and notify the Department. The conference shall include the Developer, the Project Engineer, the Contractor, the Soils Engineer, representatives of all affected utility providers and the Department. Representatives of other County agencies, such as General Services/Parks or Public Works/Utilities, shall be invited to the Pre-Construction Conference by the Project Engineer, where there has been significant involvement by those agencies, depending on the characteristics of the project. At least one working day advance notice of the time and location of the conference shall be provided to the Department.

B. Contractor's Requirements. Contractors performing the work under these Standards shall possess a valid State license to perform such work. The Contractor or his/her 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, the work shall be stopped at the direction of the Department.

C. Trench Safety. All work shall be performed in accordance with the requirements of the State of California Division of Industrial Safety. The Contractor shall conform to the permit requirements of the Division of Industrial Safety and shall obtain any necessary trenching permit directly from the Division of Industrial Safety. The Contractor's attention is directed to the provisions of Section 6705 of the Labor Code concerning trench excavation safety plans. Excavation for any trench five (5) feet or more in depth shall not begin until the Contractor has obtained a trenching permit from the California Division of Industrial Safety.

D. Temporary Improvements. The installation of temporary improvements for a winter shutdown, in order to make building sites accessible, shall be approved by the Department on an individual basis. In such cases, it shall be expressly understood that such improvements are of a temporary nature only, and that they will be removed and replaced with permanent improvements during the construction season immediately following the season in which the temporary installation was made. It shall be further understood that the approval of the installation of temporary improvements in no way obligates the County for any maintenance of such improvements. These understandings shall be documented, in writing, and signed by the developer and a representative of the Department.

10.1.2 DURING CONSTRUCTION

A. Inspection by Project Engineer. The Project Engineer shall have the primary responsibility for inspection during the construction of all improvements which are regulated by these Standards. The Project Engineer, at a minimum, shall inspect the following milestones during construction, and provide a written inspection report to the Department:

- Substantial completion of roadway subgrade excavation/fill placement
- Trench bedding and compaction
- Concrete form work
- Initiating the placement of the roadway base course
- Substantial completion of roadway base placement and compaction
- Asphalt paving operations

Other required inspections may be determined necessary by the Department, and will be listed during the Pre-Construction Conference.

If the Project Engineer's place of business is not within the boundaries of San Luis Obispo County, or northern Santa Barbara County, he or she shall provide local contact information for someone that can be immediately available to respond to any problems that arise during construction.

B. Inspection by Department. In addition, each phase of improvements must first be inspected and approved by the Department prior to the Contractor's proceeding with subsequent phases. Each phase shall be inspected as the Department considers necessary, but in any case the Department shall make an inspection within two working days after receiving a request for inspection from the Contractor.

The Department may inspect, as considered necessary, any public improvements as defined in this document. Any improvements constructed without approval as provided above, or constructed contrary to the approved plans, will be deemed as not complying with these Standards and will not be accepted.

C. Bond Reduction. For subdivision projects only, it is possible to request a reduction of the Performance Bond following completion of a substantial portion of the work, under the provisions of the Subdivision Map Act. No reduction may be made of the Payment & Materials Bond, nor of the Guarantee Bond. More information about this procedure is available from the Department.

D. Clean Up. During the progress of the work, the Contractor shall keep the entire job site in a clean and orderly condition. Excess or unsuitable backfill material, broken pipe, or other waste material shall be removed from the job site. Spillage resulting from hauling operations along or across existing streets or roads shall be removed immediately by the Contractor. All gutters and roadside ditches shall be kept clean and free from obstructions. Any deviation from this practice shall have prior approval from the Department.

10.1.3 PROJECT COMPLETION

Once the work on the project site is complete, including site cleanup, dressing and hydroseeding graded slopes, completion of all utility and drainage facilities and removal of temporary traffic control devices from public roads, the Project Engineer may initiate the final processing of the improvements.

A. Clean Up. Before final acceptance of the work, the Contractor shall carefully clean up the work and premises, remove all temporary structures built by or for him or her, remove all surplus construction materials and rubbish of all kinds from the grounds which he or she has occupied and leave them in a neat condition.

B. Request for Final Processing. The Project Engineer shall make a Request for Final Processing, in writing to the Department. This request shall include the following components:

- Record Drawings which show all changes which were made during construction

- "Ready-to-Serve" letters from all utility providers
- Core sample, R-value, structural section and compaction reports
- Manufacturers' certificates of compliance for AC, base, concrete and other materials as needed
- Engineer's certification

If the Request for Final Processing does not include all the information listed above, it shall be returned to the Project Engineer and will not be reviewed by the Department.

C. Preliminary Inspection. The Department shall conduct a Preliminary Inspection within five (5) business days of receiving a complete Request for Final Processing. A list will be generated of any defects or deficiencies which need to be remedied. If it appears during this inspection that substantial items of work are incomplete, the Department will terminate the inspection and no further review will be conducted.

D. Final Inspection. The Project Engineer works with the developer to correct the items on the list from the Preliminary Inspection. When all items have been addressed, the Project Engineer shall request a Final Inspection. The Department shall conduct a Final Inspection within two (2) business days of receiving this request.

E. Record Drawings. During the progress of the work, the Project Engineer shall maintain one set of prints of the improvement plans showing all as-built changes. Each as-built change shall be approved by the Department before being made. This set shall be available on the job for inspection by the Department at any time. Upon completion of the work, the Project Engineer shall make as-built changes on the original plans, and return them to the Department prior to the County's acceptance of the project.

F. Improvements to be Accepted for County Maintenance. For any public improvement which is to be accepted for County maintenance, the Project Engineer shall submit records of the improvements to be accepted, in Microsoft Excel format, along with Autocad files of all construction drawings. Each new street shall have postmile control established, beginning at zero, based on increasing from west to east or from south to north. Existing streets shall be based on current postmile data provided by the Department. All intersections, culverts, bridges and drainage inlets shall be referenced to the postmiles. The required data format is included in the Appendix.

G. Relationship with Building Permits. Public improvements required as conditions of approval for subdivisions or land use permits shall either be completed or bonded for, prior to issuance of permits for construction of any new structures.

All public improvements shall be completed prior to occupancy of any new structures.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS

PUBLIC IMPROVEMENT STANDARDS
2006 UPDATE

APPENDIX

The items listed below are contained in this Appendix:

A. Concrete Compressive Strengths

B. Erosion and Sedimentation Control

C. Geotextile Selection

D. Policy and Procedure for Addressing Unanticipated Tree Impacts/Removal – Inland Portions of SLO County

E. Recommendations for Installing Marked Crosswalks

F. Policy and Procedure Establishing Clearance Requirements for County Rights-of-Way

G. "n" Values for Manning's Formula

H. Waterline Disinfection Procedures

I. Lane Closure Restriction List

J. List of California Temporary Traffic Control Signs

K. Public Improvements Acceptance for County for County Maintenance: Inventory Data Requirements

L. Street Design Considerations - from Framework for Planning

APPENDIX A. **CONCRETE COMPRESSIVE STRENGTHS**

A.1 MINIMUM CONCRETE COMPRESSIVE STRENGTHS

All Portland Cement Concrete shall conform to Section 90 of the State Standard Specifications, May 2006; Minor Concrete shall conform to Section 90-10. Concrete shall be proportioned such that the concrete will conform to the minimum compressive strengths in Table 1, or as described in the project Special Provisions for County Public Works contracts.

Table A-1 Minimum (28-day) Concrete Compressive Strengths

Type of Construction		Compressive Strength at 28-days (PSI), Minimum
Street Surface Improvements		
Concrete Pavement (not integral with curb)		2,500
Curb, Integral Curb and Pavement, Gutter, Walk, Alley Aprons	Minor	2,500
Extruded Curb, Curb and Gutter	Minor	2,500
Sewer & Storm Drainage Facilities		
Pipe Collars, Pre-Cast Manhole Components, Catch Basins, Sidewalk Culverts		3,250
Sidehill Surface Drainage Facilities	Minor	2,500
Pipe Bedding and Encasement Anchors, Thrust Blocks, Wall Support for Pipe	Minor	2,000
Trench Backfill Slurry (Controlled Low-Strength Material)	Minor	100
Reinforced Structures		
Retaining Walls (Footings)	Critical	3,250
Channels and Boxes		3,250
Miscellaneous		
Street Light and Traffic Signal Foundations, Survey Monuments		3,250
Fence and Guardrail Post Foundations	Minor	2,500
Concrete Not Otherwise Specified		3,250
Air Placed Concrete		3,250
Coarse Masonry Grout		2,000

A.1.1 Materials. All portland cement concrete materials shall comply with the provisions of Section 90-2 of the State Standards, May 2006.

A.1.2 Pre-Qualification of Materials. For the Construction Types presented in Table 1, pre-qualification of materials, mix proportions, equipment or procedures will not be required. For additional Construction Types, see Table 201-1.1.2 (A), Standard Specifications for Public Works Construction ("Greenbook"), Associated General Contractors of California.

A.2 COMPRESSIVE STRENGTH TESTING OF CONCRETE

A.2.1 Public Works Contracts. For County Public Works contracts, compressive strengths and production methods shall be required in accordance with the State Construction Manual, the project Special Conditions and the provisions of Section 90-9 of the State Standards, May 2006.

A.2.2 Public Improvements Constructed by Development Projects. For public improvements constructed by development projects, the prescribed compressive strengths may be verified by standard cylinder tests in accordance with Section 1903 of the California Building Code. The Contractor shall maintain copies of test reports at the job site, which shall be available for review and inspection.

Testing of portland cement concrete used for pavement shall be in accordance with the CalTrans Construction Manual, the project Special Conditions and the provisions of Section 90-9 of the State Standards, May 2006.

a. Projects of 50 CY or More. One set of standard cylinders shall be collected from each day's run volume, for every lot and class of concrete. Additional cylinder sets shall be collected not less than once for every 150 CY of each concrete class. Concrete quality, mixing, frequency of testing, placement, curing and low-strength evaluations shall conform to the provisions of Section 1905 of the California Building Code.

b. Projects Less than 50 CY. When the daily lot or class of concrete is less than 50 CY, a Certificate of Compliance, signed by the manufacturer, may be submitted in-lieu of standard cylinder tests. The Certificate of Compliance shall state the average compressive strength of each lot, and that it complies in all respects with the requirements of the specifications. The Certificate of Compliance shall also attest to evidence of satisfactory average compressive strengths, based on production facility test records as required in Section 1905.3 of the California Building Code. As is required in section 6.1 of the State Standards, Certificates of Compliance for Portland cement concrete shall be furnished prior to use or placement of the material.

A.2.3 Curing Concrete. Curing concrete shall comply with the requirements of Section 90-7 of the State Standard Specifications, May 2006 edition.

APPENDIX B. EROSION AND SEDIMENTATION CONTROL

B.1 Plan Requirements. Each ***Erosion & Sedimentation Control Plan*** shall provide General Notes and reference specific details pertaining to the topics listed below. The information provided may reference Caltrans *or* California Stormwater Quality Association (CASQA) *or* other sources, if approved by the Department.

B.1.1 TEMPORARY SOIL STABILIZATION (EROSION CONTROL)

reference the typical standard(s) used, by number	Caltrans	CASQA
Scheduling	SS-1	EC-1
Preservation of Existing Vegetation	SS-2	EC-2
Hydraulic Mulch	SS-3	EC-3
Hydroseeding	SS-4	EC-4
Soil Binders	SS-5	EC-5
Straw Mulch	SS-6	EC-6
Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	SS-7	EC-7
Wood Mulching	SS-8	EC-8
Earth Dikes/Drainage Swales & Lined Ditches	SS-9	EC-9
Outlet Protection/Velocity Dissipation Devices	SS-10	EC-10
Slope Drains	SS-11	EC-11
Streambank Stabilization	SS-12	EC-12
Polyacrylamide	-	EC-13

B.1.2 TEMPORARY SEDIMENT CONTROL

reference the typical standard(s) used, by number		
Silt Fence	SC-1	SE-1
Sediment/Desilting Basin	SC-2	SE-2
Sediment Trap	SC-3	SE-3
Check Dam	SC-4	SE-4
Fiber Rolls	SC-5	SE-5
Gravel Bag Berm	SC-6	SE-6
Street Sweeping and Vacuuming	SC-7	SE-7
Sandbag Barrier	SC-8	SE-8
Straw Bale Barrier	SC-9	SE-9
Storm Drain Inlet Protection	SC-10	SE-10
Chemical Treatment	-	SE-11

B.1.3 WIND EROSION CONTROL

reference the typical standard(s) used, by number		
Wind Erosion Control	WE-1	WE-1

B.1.4 TRACKING CONTROL

reference the typical standard(s) used, by number		
Stabilized Construction Entrance/Exit	TC-1	TC-1
Stabilized Construction Roadway	TC-2	TC-2
Entrance/Outlet Tire Wash	TC-3	TC-3

B.2 Maintenance. The plans shall include a General Note discussing the maintenance schedule of the devices specified in #1-4 above.

B.3 Post-construction or Permanent Erosion Control. The plans shall include measures that are proposed to prevent erosion and sedimentation in the completed condition of the project. This may include, but is not limited to, hydroseeding or planned landscaping treatments.

B.4 Cost Estimate for Bonding for Erosion Control Measures. A figure of 2% - 15% shall be used for estimating the cost of implementing erosion control measures (including permanent erosion control).

B.5 For More Information. The references cited above are available with more detail and explanation at the following websites:

Caltrans: http://ruralits.org/hq/construc/stormwater/manuals.htm

CASQA: http://www.cabmphandbooks.com/Construction.asp

APPENDIX C. **GEOTEXTILE SELECTION**

Topsoil with soil amendments, fertilizer and seed is required beneath all blanket liners. Seed shall be watered regularly until there is 80% successful coverage over the area planted. Additional seeding, watering and amending, as needed, shall be completed immediately if, at any point during the rainy season, the initial planting fails, or is removed or disturbed.

Geotextile blanket installation shall conform to the following requirements:

1. Temporary blankets shall be used only on mild to moderate slopes (less than 5%) and where Primary Design Storm flow velocities (intermittent) are less than 2.5 feet per second (fps).

2. Extended-term blankets shall be used on steep slopes (5 to 10%), where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel, and where the establishment of adequate vegetation is delayed.

3. Permanent blankets shall be used on steep to severe slopes (greater than 10%), where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel.

4. Trapezoidal or parabolic channel cross-sections are preferred over V-sections. V-sections shall not be used where intermittent flow velocities exceed 2.5 fps in sand, or 4.0 fps in gravel.

5. Geotextile blankets shall be installed in firm and continuous contact with the soil.

6. Blankets shall be longitudinally lapped or anchor trenched, and installed according to the manufacturer's detailed installation requirements.

7. Blankets shall be inspected, maintained and repaired until they have become vegetated and stable.

APPENDIX D. POLICY AND PROCEDURE FOR ADDRESSING UNANTICIPATED TREE IMPACTS/REMOVAL INLAND PORTIONS OF SLO COUNTY

No additional impact to trees over 5" in diameter, beyond that which was considered in the Environmental Determination for the project, shall be permitted without approval from the project manager from the Department of Planning & Building. Impact is defined as removal, grading under the canopy, or trimming. The number of trees approved to be impacted can be found in the Mitigated Negative Declaration and/or the Conditions of Approval for the project, both of which are included in the project Staff Report from the public hearing on the project.

Per Department of Public Works policy, trees within the County-maintained road right-of-way which are leaning 15 degrees or more, and are rotted and/or dying, may be removed.

In the event that **any** unanticipated impact to trees is necessary, the Public Works representative shall contact the project manager from Planning & Building. If that individual is not available, another individual from the Environmental and Resource Management Division of Planning & Building shall be contacted at (805) 781-5600.

The project manager from Planning & Building will determine if the additional impacts can be found in substantial conformance with the approved project and mitigations, or whether additional environmental review or permit modifications are necessary. It is important to contact the project manager to make this determination because each project has been legally noticed and approved with specific tree mitigations. Any substantial change to the approved mitigations has to meet legal criteria.

APPENDIX E. RECOMMENDATIONS FOR INSTALLING MARKED CROSSWALKS

The table for determining appropriate locations for marking crosswalks and other pedestrian improvements appears on the following page.

Table 1. Recommendations for installing marked crosswalks and other needed pedestrian improvements at uncontrolled locations.*

Roadway Type (Number of Travel Lanes and Median Type)	Vehicle ADT ≤ 9,000			Vehicle ADT > 9000 to 12,000			Vehicle ADT < 12,000 - 15,000			Vehicle ADT > 15,000		
	Speed Limit**											
	≤ 30 mph	35 mph	40 mph	≤ 30 mph	35 mph	40 mph	≤ 30 mph	35 mph	40 mph	≤ 30 mph	35 mph	40 mph
2-Lanes	C	C	P	C	C	P	C	C	N	C	P	N
3-Lanes	C	C	P	C	P	P	P	P	N	P	N	N
Multi-Lane (4 or More Lanes) With Raised Median†	C	C	P	C	P	N	P	P	N	N	N	N
Multi-Lane (4 or More Lanes) Without Raised Median	C	P	N	P	P	N	N	N	N	N	N	N

* These guidelines include intersection and midblock locations with no traffic signals or stop sign on the approach to the crossing. They do not apply to school crossings. A two-way center turn lane is not considered a median. Crosswalks should not be installed at locations which could present an increased safety risk to pedestrians, such as where there is poor sight distance, complex or confusing designs, substantial volumes of heavy trucks, or other dangers, without first providing adequate design features and/or traffic control devices. Adding crosswalks alone will **not** make crossings safer, nor necessarily result in more vehicles stopping for pedestrians. Whether marked crosswalks are installed, it is important to consider other pedestrian facility enhancements, as needed, to improve the safety of the crossing (e.g., raised median, traffic signal, roadway narrowing, enhanced overhead lighting, traffic calming measures, curb extensions). **These are general recommendations; good engineering judgment should be used in individual cases for deciding where to install crosswalks.**

** Where speed limit exceeds 40 mph, marked crosswalks alone should not be used at unsignalized locations.

C = Candidate sites for marked crosswalks. Marked crosswalks must be installed carefully and selectively. Before installing new marked crosswalks, an engineering study is needed to show whether the location is suitable for a marked crosswalk. For an engineering study, a site review may be sufficient at some locations, while a more in-depth study of pedestrian volumes, vehicle speeds, sight distance, vehicle mix, etc. may be needed at other sites. It is recommended that a minimum of 20 pedestrian crossings per peak hour (or 15 or more elderly and/or child pedestrians) exist at a location before placing a high priority on the installation of a marked crosswalk alone.

P = Possible increase in pedestrian crash risk may occur if crosswalks are added without other pedestrian facility enhancements. These locations should be closely monitored and enhanced with other pedestrian crossing improvements, if necessary, before adding a marked crosswalk.

N = Marked crosswalks alone are not recommended, since pedestrian crash risk may be increased with marked crosswalks. Consider using other treatments, such as traffic signals with pedestrian signals to improve crossing safety for pedestrians.

† The raised median or crossing island must be at least 4 ft wide and 6 ft long to adequately serve as a refuge area for pedestrians in accordance with MUTCD and AASHTO guidelines.

APPENDIX F. POLICY AND PROCEDURE ESTABLISHING CLEARANCE REQUIREMENTS FOR COUNTY RIGHTS-OF-WAY

The policy and procedure establishing clearance requirements for County rights-of-way appear on the following pages.

A POLICY ESTABLISHING CLEARANCE REQUIREMENTS FOR COUNTY RIGHTS-OF-WAY

Policy. It is the policy of the Board of Supervisors of the County of San Luis Obispo, State of California, as follows:

I. Definitions.

a. County Trails Plan defined. The most recent update of the County Trails Plan, originally adopted by the Board of Supervisors November 26, 1991.

b. Lateral Clearance Area defined. On a paved County Road with concrete sidewalks, a horizontal dimension measured from edge to edge of a concrete sidewalk. On a paved County Road without concrete sidewalks, a horizontal dimension measured outward from the edge of pavement. On an unpaved County Road, a horizontal dimension measured outward from the edge of the traveled way. It is not the intent of this policy to address naturally occurring obstacles found within the right-of-way.

c. Vertical Clearance Area defined. A vertical dimension measured from the ground surface at any point within the width of the Lateral Clearance.

d. Right-of-Way defined. Property which the County has the right to use for street, road or related purposes pursuant to a dedication, deed, easement, resolution, deed or other legal means, and includes both the traveled and untraveled portions of said property. It is not the intent of this policy to expand any existing rights-of-way or to create any new rights-of-way.

e. Roadway defined. The traveled portion of the right-of-way.

II. Maintenance of Clearance Areas. The clearance areas, as defined in this Policy, shall be maintained free of all encroachments, including but not limited to landscaping or other vegetation, or fences or other obstructions which would restrict the passage of pedestrians and equestrians along the County right-of-way, unless an encroachment permit is issued under the provisions of Chapter 13.08 of the San Luis Obispo County Code. Property owners are allowed to plant ground cover, or cover the area with mulch or other material which will retard soil erosion, provided that said ground cover, mulch or other material can be walked or ridden upon.

III. Clearance Requirements established. Clearance requirements shall be established on all County rights-of-way as follows:

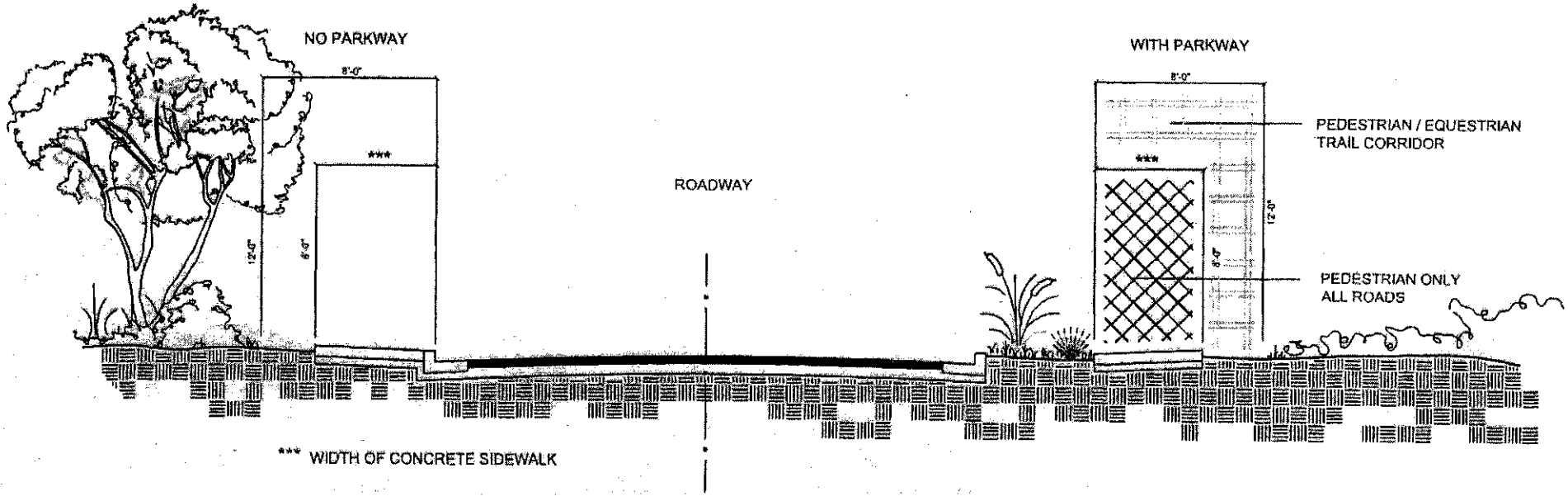
a. Minimum clearance requirements for all rights-of-way. There shall be a lateral clearance a minimum of four (4) feet in width, except where a greater width is required for concrete sidewalks in the Standard Improvement Specifications and Drawings. There shall also be a vertical clearance eight (8) feet in height. These clearance requirements shall apply to both sides of all County roadways. Under this policy, property owners may not place or maintain any obstructions within the clearance areas.

b. Minimum clearance requirements for rights-of-way within the County Trails Plan. There shall be a lateral clearance a minimum of eight (8) feet, and a vertical clearance twelve (12) feet in height. These clearance requirements shall apply to both sides of all such County roadways which are designated trail routes in the County Trails Plan. Under this policy, property owners may not place or maintain any obstructions within the clearance areas.

c. Applicability. In no case shall the requirement for lateral clearance, as defined in subsections (a) and (b) above, extend beyond the limits of the right-of-way of the County Road that has been accepted by the Board of Supervisors on behalf of the public.

d. Feasibility. The Director of Public Works and Transportation shall have the authority to determine whether it is feasible to apply the clearance requirements as defined in this Policy, in cases of severe terrain or other natural obstructions.

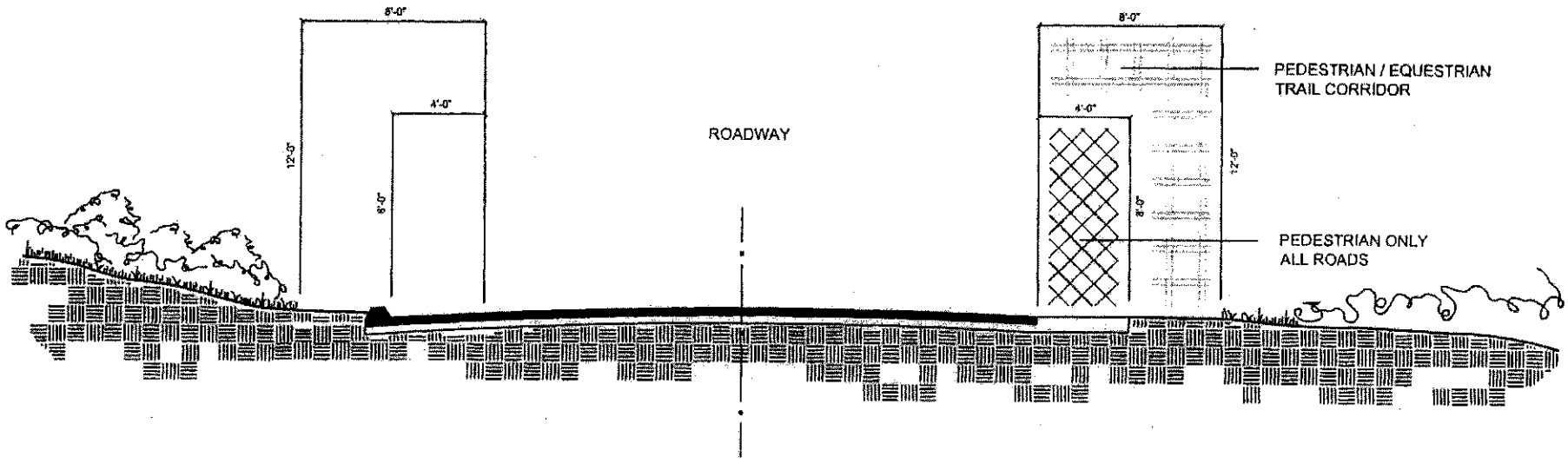
R/W CLEARANCE F-4



PAVED ROAD WITHOUT SIDEWALKS

DRAWING NOT TO SCALE

SHEET: 1 OF 1 SCALE: NTS CADD FILE: PLNR I/PRE/street_sections_safety_policy.dwg DATE: 2-13-03 BY: AKM	San Luis Obispo County Department of General Services PARKS DIVISION	SAFETY POLICY DRAWINGS	VERTICAL AND HORIZONTAL CLEARANCES FOR ATTACHED TRAIL CORRIDORS



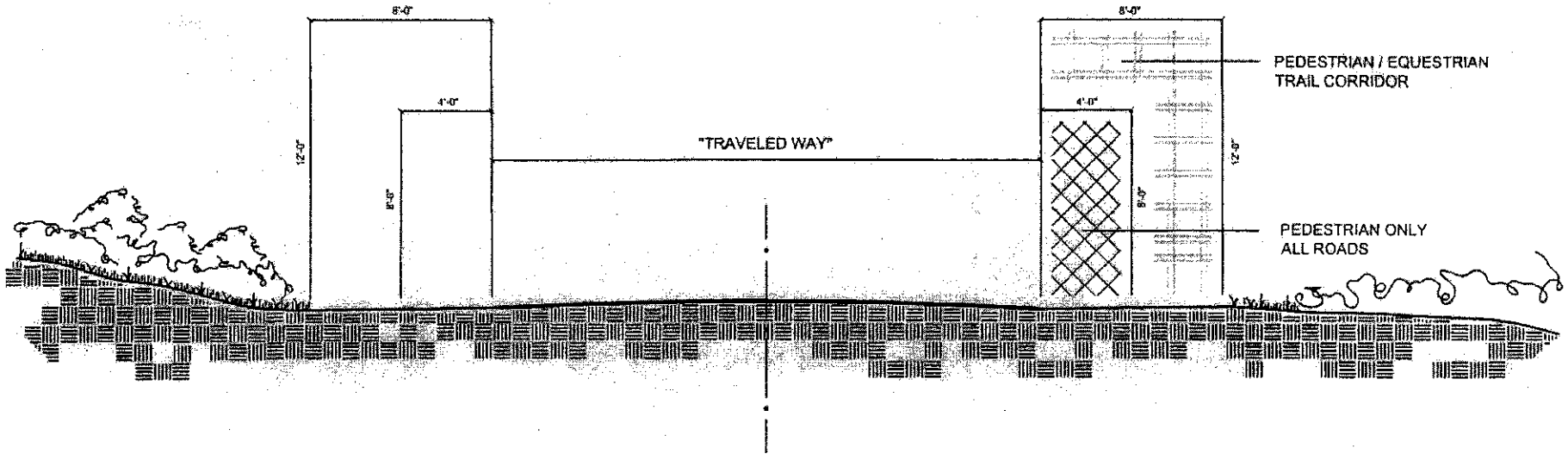
PAVED ROAD WITHOUT SIDEWALKS

DRAWING NOT TO SCALE

R/W CLEARANCE F-5

SHEET: 2 OF 3 SCALE: NTS CADD FILE: PLNR VPRE/street_sections_safety_policy.dwg DATE: 2-13-03 BY: AKM	San Luis Obispo County Department of General Services PARKS DIVISION	SAFETY POLICY DRAWINGS	VERTICAL AND HORIZONTAL CLEARANCES FOR ATTACHED TRAIL CORRIDORS

R/W CLEARANCE F-6



UNPAVED ROADS

DRAWING NOT TO SCALE

SHEET: 3 OF 3 SCALE: NTS CADD FILE: PLNR I/PRE/street_sections_safety policy.dwg DATE: 2-13-03 BY: AGH	San Luis Obispo County Department of General Services PARKS DIVISION	SAFETY POLICY DRAWINGS	VERTICAL AND HORIZONTAL CLEARANCES FOR ATTACHED TRAIL CORRIDORS

Exhibit B
PROCEDURE

Procedure. Following is the adopted procedure for implementing the Policy Establishing Clearance Requirements for County Rights-of-Way (hereafter, "Clearance Requirements Policy"):

1. Neighbors/community members experiencing obstructions which are in violation of the Clearance Requirements Policy may contact the property owner (where the obstruction is occurring) and request that the owner move or remove the obstruction. The neighbors/community members may offer their assistance.

2. If the property owner is agreeable, no correspondence with the County is necessary. If the owner refuses to move or remove the obstruction, the neighbors/community members contact the Public Works Department – Road Operations Division. A brief letter indicating the nature and location of the problem should be provided by the neighbors/community members.

3. The Public Works Department will review the situation (perform a site visit and determine the right-of-way width in this area). A letter is written to the property owner from the County Public Works Department (citing the safety issue and the Clearance Requirements policy) with a request that the property owner move or remove the obstruction by a certain date. The assistance of the neighbors/ community members may be offered.

4. If the Public Works Department determines there is no concern, a letter is sent to the neighbors/community members indicating the property in question has been reviewed and found not to be in violation of the Clearance Requirements Policy.

5. If the property owner does not remove the obstruction by the date requested, a second letter is sent to the property owner (from the Public Works Department), indicating the obstruction will be removed at the applicant's cost. The date this will occur is specified in the letter. The obstructions are then removed by County staff as designated in the County letter and the property owner is billed for this action. Prior to any obstructions being removed or the applicant billed, the applicant will have the ability to appeal Public Works' decision to the Board of Supervisors. (Reference: Sections 1480 *et seq.* Streets & Highways Code)

APPENDIX G. MANNING'S "N" VALUES

[Source: Urban Drainage Design Manual, FHWA-NH1-01-021]

The Project Engineer shall provide the source(s) for other "n" values used in situations not listed below.

Table G-1 Street and Pavement Gutters

Type of Gutter or Pavement	Manning's "n"
Concrete gutter, troweled finish	0.012
Asphalt pavement	0.016
Concrete gutter and asphalt pavement combination	0.015
Gutters with longitudinal slopes 0.5% or less, where sediment may accumulate increase above values of "n" by	0.02

Table G-2 Storm Drain Culverts

Type of Culvert	Roughness or Corrugation	Manning's "n"
Concrete pipe	smooth	0.012
Concrete boxes	smooth	0.013
Spiral rib metal pipe	smooth	0.013
Corrugated metal pipe, pipe-arch	2-2/3 by ½ in annular	0.025
	2-2/3 by ½ in helical	0.023
	6 by 1 in helical	0.024
	5 by 1 in	0.026
	3 by 1 in	0.028
	6 by 2 in structural plate	0.035
	9 by 2-1/2 in structural plate	0.035
Corrugated polyethylene	smooth	0.015
Corrugated polyethylene	corrugated	0.025
Polyvinyl chloride (PVC)	smooth	0.012

Table G-3 Open Channels

Lining Category	Lining Type	"n" for given depth ranges		
		0-0.5 ft	0.5-2 ft	>2 ft
Rigid	Concrete	0.015	0.013	0.013
	Grouted riprap	0.040	0.030	0.028
	Stone masonry	0.042	0.032	0.030
	Soil element	0.025	0.022	0.020
	Asphalt	0.018	0.016	0.016
Unlined	Bare soil	0.023	0.020	0.020
	Rock cut	0.045	0.035	0.025
Temporary*	Woven paper net	0.016	0.015	0.015
	Jute net	0.028	0.022	0.019
	Fiberglass roving	0.028	0.021	0.019
	Straw with net	0.065	0.033	0.025
	Curled wood mat	0.066	0.035	0.028
	Synthetic mat	0.036	0.025	0.021
Gravel riprap	1 inch D_{50}**	0.044	0.033	0.030
	2 inch D_{50}**	0.066	0.041	0.034
Rock riprap	6 inch D_{50}**	0.104	0.069	0.035
	12 inch D_{50}**	–	0.078	0.040

* Some "temporary" linings become permanent when buried.

** D_{50} = median aggregate diameter

APPENDIX H. WATERLINE DISINFECTION PROCEDURE

The procedure for waterline disinfection appears on the following pages.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS
Noel King, Director

County Government Center, Room 207 • San Luis Obispo CA 93408 • (805) 781-5252
Fax (805) 781-1229 email address: pwd@co.slo.ca.us

July 15, 2002

PROCEDURAL MEMORANDUM 0-3 (Revised)

TO: Division Heads
Hydraulics Personnel

FROM: Director of Public Works

SUBJECT: Waterline Disinfection Procedures

The following memorandum outlines the revised procedures to be followed by laboratory personnel, water operators, inspectors and contractors for the disinfection and testing of new waterline extensions and/or water mains. This procedure is an extraction from the American Waterworks Association (AWWA) Standards for Disinfecting Water Mains (C651-99) and the new drinking water requirements from the California Department of Health Services. **Note: This Memorandum should be included in specifications for all waterline projects.**

This standard presents essential procedures for disinfecting new and repaired water mains, including installation of fire hydrants. All new water mains shall be disinfected before they are placed in service. All water mains taken out of service for inspection, repair, or other activities that might lead to contamination of water shall be disinfected before they are returned to service. Additionally, steps shall be taken to prevent contaminated materials from entering the water main during storage, construction, or repair.

Any activity associated with this procedure that may disrupt or affect the overall water system in regard to: system pressure, water supplied to consumers, contamination of existing lines, or other major events must be cleared through the Water Quality Manager prior to commencing that activity.

BASIC DISINFECTION PROCEDURE

The basic disinfection procedure shall be:

1. Inspect all materials to be used to insure the integrity of the materials.

2. Prevent contaminating materials from entering the water main during storage, construction, or repair and noting potential contamination at the construction site.

3. Remove, by flushing, those materials that may have entered the water main.

4. Chlorinate any residual contamination that remains in the new water main using the "continuous-feed" method as described below. Note that "tablet/granule" and "slug" methods are no longer acceptable.

Before the main is chlorinated, it shall be filled to remove air pockets and flushed to remove particles. The flushing velocity in the main shall not be less than 2.5 ft/s.

Water supplied from a temporary backflow-protected connection to the existing distribution system or other approved supply source shall flow at a constant metered rate into the newly installed water main. The point of entry shall not be more than 5 feet from the beginning of the new line.

Liquid Sodium hypochlorite solution conforming to ANSI/AWWA B300 standards shall be fed at or before the entry point in an amount sufficient to produce not less than 25 mg/L of free chlorine residual throughout the new main and its appurtenances. Chlorine application shall not cease until the entire main is filled with the heavily chlorinated water.

The chlorinated water shall be retained in the main for a minimum of 24 hours, during which time all valves and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24 hour period, the treated water in all portions of the main shall have a free chlorine residual of not less than 10 mg/L.

FINAL FLUSHING

1. Clear the main of heavily chlorinated water. After a 24-hour retention period, heavily chlorinated water should not remain in prolonged contact with pipe. In order to prevent damage to the pipe lining or to prevent corrosion damage to the pipe itself, the heavily chlorinated water shall be flushed from the main fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is not higher than that generally prevailing in the distribution system or acceptable for domestic use (typically 2ppm).

2. Dispose of heavily chlorinated water. The environment to which the chlorinated water is to be discharged shall be inspected. If there is any question that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. Where necessary, Federal, State and local regulatory agencies should be contacted to determine special provisions for the disposal of heavily chlorinated water.

BACTERIOLOGICAL TESTS

1. **Standard conditions.** After final flushing and before the new water main is connected to the distribution system, two consecutive sets of acceptable samples, taken at least 24 hours apart, shall be collected from the new main. At least one set of samples shall be collected from every 1,200 ft of the new water main, plus one set from the end of the line and at least one set from each branch. All samples shall be tested for bacteriological (chemical and physical) quality in accordance with Standard Methods for the Examination of Water and Wastewater; and shall show the absence of coliform

organisms. A standard plate count and general physical analysis (odor, turbidity, color) are also required.

2. Sampling procedure. Samples for bacteriological analysis shall be collected by Water Treatment Operators or laboratory personnel in sterile bottles with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used in collection of samples. A combination blow off and sampling tap for mains up to including eight-inch diameter may be used as corporation stop that is installed in the main with a copper-tube gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use. Each sample site must be positioned so that it may be flushed for several minutes (during sampling) without contamination of the hose bib, sample bottles, etc. when samples are being taken.

3. **Notification procedure.** Initial arrangement for scheduling sampling of new/repaired main shall be made with the Water Quality Manager. The Water Quality Manager will arrange sampling dates and time with the Water System Operator in charge of the effected system. The Water System Operator shall notify the Engineering Inspector of the time and particular location that samples are to be taken. The Inspector shall insure that the Contractor in charge of the line has installed adequate sampling stations (see standard construction drawing W-9) on the days that samples are to be taken.

   Once it has been determined that all bacteriological and general physical analysis meet current requirements, the Water Quality Manager shall notify the in-charge Water System Operator of the same. The Operator shall in turn notify the Engineering Inspector in charge of the job. It shall be the Inspector's responsibility to notify the contractor/property owner of the test results.

   If the test results do not meet current requirements, the same notification procedure as outlined above shall be followed. Once the contractor/property owner has been notified it shall be his responsibility to perform the following (as determined by the Water Quality Manager): flush the line, re-chlorinate the lines (for a period of 24 hours), flush to an acceptable chlorine residual level, have the line re-sampled.

4. **Analysis Charges.** Unless otherwise stated in the construction contract, the cost of the initial sampling and analysis shall be paid by the contractor/property owner. In the event that follow-up analyses are required due to failed tests, the contractor/property owner will be liable for all costs associated with the follow-up sampling and analysis.

Attachment

File: Procedural Manual

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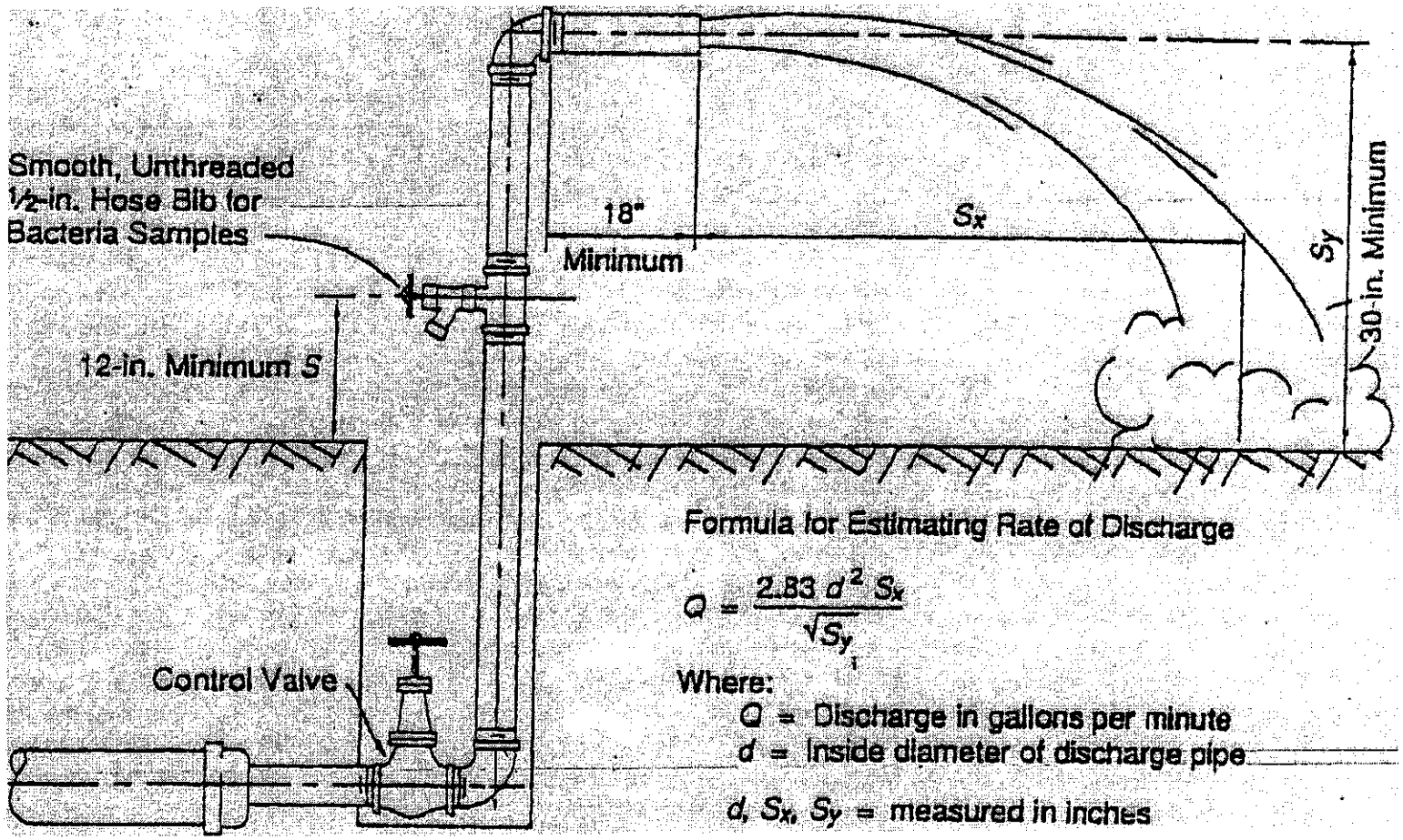


NOTE: This figure applies to pipes up to and including 8-in. (200 mm) diameter.

APPENDIX I. **LANE CLOSURE RESTRICTION LIST**

The Lane Closure Restriction List appears on the following page.

LANE CLOSURE RESTRICTIONS

ROAD	NO CLOSURES PERMITTED BETWEEN
Avila Beach Drive	0700 to 0830; 1500 to 1800
Burton Drive (Route 1 to Main St)	0700 to 0830; 1500 to 1800
Foothill Road	0700 to 0830; 1500 to 1800
Halcyon Road (A.G. City Limit to El Campo Road)	0700 to 0830; 1430 to 1800
Hutton Road (and Joshua Road)	0700 to 0800; 1600 to 1800
Las Tablas Road	0700 to 0830; 1600 to 1800
Los Berros Road	0700 to 0830; 1500 to 1800
Los Osos Valley Road	0700 to 0830; 1500 to 1800
Los Ranchos Road	0700 to 0830; 1430 to 1800
Main Street, Cambria	0730 to 0830; 1430 to 1730
Main Street, Templeton	0700 to 0830; 1600 to 1800
Nacimiento Lake Drive	0700 to 0830; 1600 to 1800
Orchard Avenue	0700 to 0830; 1600 to 1800
Pomeroy Road (Willow Road to Tefft Street)	0700 to 0830; 1600 to 1800
Price Canyon Road	0700 to 0830; 1600 to 1800
San Luis Bay Drive	0700 to 0830; 1430 to 1800
Santa Ysabel Avenue	0700 to 0830; 1700 to 1800
South Bay Boulevard	0700 to 0830; 1500 to 1800
South Frontage Road	0700 to 0800
Tank Farm Road	0700 to 0830; 1600 to 1800
Tefft Street	0700 to 0830; 1430 to 1800
Valley Road	0700 to 0830; 1500 to 1800
Vineyard Drive (Route 46 to Main Street)	0700 to 0830; 1430 to 1800

APPENDIX J. LIST OF CALIFORNIA TEMPORARY TRAFFIC CONTROL SIGNS

The List of California Temporary Traffic Control Signs, from the California Supplement to the Manual on Uniform Traffic Control Devices, appears on the following pages.

Table 6F-101. List of California Temporary Traffic Control Signs (Sheet 1 of 2)

California (CA) Code	MUTCD Code	Title of Sign	Supplement Section	MUTCD Section
C1	W20-2	DETOUR	6F.18	6F.18
C2	R11-2	ROAD (STREET) CLOSED	6F.08, 6F.28	6F.08
C3	R11-3a	ROAD CLOSED XX MILES AHEAD, LOCAL TRAFFIC ONLY	6F.09	6F.09
C3A	R11-4	ROAD (STREET) CLOSED TO THRU TRAFFIC	6F.09	6F.09
C4	W21-2	FRESH OIL (TAR)	None	6F.32
C5	M4-10	Detour Arrow	None	6F.53
C5A	M4-8	DETOUR	6F.53	6F.53
C6	W8-7	LOOSE GRAVEL	6F.102	None
C7	M4-8a	END DETOUR	None	6F.53
C8	W21-3	ROAD MACHINERY AHEAD	None	6F.33
C9A	None	Flagger Symbol	6F.29	None
C11	G20-1	ROAD WORK NEXT XX MILES	None	6F.51
C12	None	NARROW LANE(S)	6F.103	None
C14	G20-2	END ROAD WORK	6F.52	6F.52
C16	W20-4	ONE LANE ROAD	None	6F.20
C17	None	Road Work/Speed Limit	6F.104	None
C19	W20-3	ROAD (STREET) CLOSED	6F.19	6F.19
C20	None	RIGHT LANE CLOSED AHEAD	6F.21	None
C20A	None	LEFT Plaque	6F.21	None
C20B	None	Numeral Plaque	6F.21	None
C22B	W21-1a	Workers	None	6F.31
C22C	W21-1	WORKERS	None	6F.31
C23	W20-1	ROAD (STREET) WORK	6F.17	6F.17
C23B	None	ROAD (STREET) WORK Informational Plaque	6F.17	None
C24	W21-5b	SHOULDER WORK AHEAD	None	6F.35
C25	W21-6	SURVEY CREW	None	6F.36
C26	G20-4	PILOT CAR FOLLOW ME	None	6F.54
C27	None	OPEN TRENCH	6F.105	None
C28A	Not Assigned	STOP Paddle	6E.03, 7E.05	6E.03, 7E.05
C28B	Not Assigned	SLOW Paddle	6E.03	6E.03
C29	None	XXX FT	6F.49	None
C30	None	LANE CLOSED	6F.21	None
C30A	None	SHOULDER CLOSED	6F.35	None
C30B	W21-5b	RIGHT (LEFT) SHOULDER CLOSED XXX FT	None	6F.35

Table 6F-101. List of California Temporary Traffic Control Signs (Sheet 2 of 2)

California (CA) Code	MUTCD Code	Title of Sign	Supplement Section	MUTCD Section
C31	W8-9	LOW SHOULDER	6F.105	6F.42
C31A	None	NO SHOULDER	6F.41, 6F.105	None
C33	W22-1	BLASTING ZONE AHEAD	None	6F.39
C34	W22-2	TURN OFF 2-WAY RADIO AND PHONE	None	6F.40
C35	W22-3	END BLASTING ZONE	None	6F.41
C36	W3-4	BE PREPARED TO STOP	None	6F.29
C37	None	TRAFFIC CONTROL – WAIT AND FOLLOW PILOT CAR	6F.54	None
C38	None	USE NEXT EXIT	6F.28	None
C40	None	TRAFFIC FINES DOUBLED IN CONSTRUCTION ZONES	6F.106	None
C40A	None	TRAFFIC FINES DOUBLED IN WORK ZONES	6F.106	None
C42	R9-11a	SIDEWALK CLOSED, (ARROW) CROSS HERE	None	6F.13
SC3	None	DETOUR with Arrow	6F.53	None
SC5	None	SPECIAL EVENT AHEAD	6F.17	None
SC6A	None	Day/Month Plaque	6F.28	None
SC6B	None	Time Plaque	6F.28	None
SC6-3	None	RAMP CLOSED (Not more than one day)	6F.28	None
SC6-4	None	RAMP CLOSED (More than one day)	6F.28	None
SC7	None	RAMP CLOSED, USE RAMP AT ___	6F.28	None
SC8	None	___ EXIT – RAMP CLOSED	6F.28	None
SC9	None	FWY DETOUR with Arrow	6F.53	None
SC10	None	LANE CLOSED AHEAD	6F.107	None
SC11	None	LANE CLOSED	6F.107	None
SC12	W23-1	SLOW TRAFFIC AHEAD	6F.107	6F.27
SC13	None	DO NOT PASS	6F.107	None
SC15	None	CAUTION	6F.107	None
SC16	W8-12	NO CENTER STRIPE	6F.44	6F.44

APPENDIX L. STREET DESIGN CONSIDERATIONS

Street Design Considerations, from the Circulation Element chapter of Framework for Planning, appear on the following pages.

APPENDIX K. PUBLIC IMPROVEMENTS ACCEPTANCE FOR COUNTY MAINTENANCE: INVENTORY DATA REQUIREMENTS

For any public improvement which is to be accepted for County maintenance, the Project Engineer shall submit records of the improvements to be accepted, in the format listed below. Each new street shall have postmile control established, beginning at zero, based on increasing from west to east or from south to north. Existing streets shall be based on current postmile data provided by the Department. All intersections, culverts, bridges and drainage inlets shall be referenced to the postmiles.

1. Roads and Controls

Street Name	Postmile	Width (ft)	CG&SW	Intersection/Feature
*****	**.**	**.**	Yes/No	List each intersection

2. Drainage Systems

Size (inch)	Material	Inlet Postmile	Outlet Postmile	DI Type
*****	*****	**.**	**.**	C - 3, etc.

Type Basin	Capacity	Fence	Maintained By
*****	*****	*****	*****

3. Signs/Markings

Street Name	Sign Type	Marking	Postmile	Direction Facing
*****	*****	*****	**.**	N, S, E or W

4. Map

Autocad file with street centerline layouts and drainage layouts.

5. Permits

Copies of Facility Permits from the following regulatory agencies:

- Corps of Engineers
- Department of Fish & Game
- Regional Water Quality Control Board
- Other regulatory agencies as determined necessary by project characteristics

F. STREET DESIGN CONSIDERATIONS

The location and design of streets can have a major effect on adjacent land uses. The design of residential streets is particularly important since improper design of such routes can have a long-term adverse effect on residents using them. The following guidelines offer general design parameters for providing safe, convenient routes for movement of automobiles, bicycles and pedestrians within residential neighborhoods and local commercial areas.

General Design Guidelines

a. Street and pedestrian circulation patterns in newly developed areas should be compatible with the land use recommendations of the community plans for the planning areas.

b. Arterial roads and streets should be developed to provide appropriate service for local trips, to minimize traffic on principal arterials.

c. Pedestrian circulation should be expressly addressed in street designs so that walking is accommodated by various methods of implementation.

d. New street network designs should minimize the overall length of streets.

e. Driveway entrances should be avoided on arterials.

f. Local residential streets should generally be designed to serve limited, localized access needs, rather than through traffic.

g. All dwellings and structures should be readily accessible to emergency and service vehicles.

h. Street standards should be developed using the guidelines of the "Guide to Urban and Rural Street Design" published by the association of State and Highway Transportation Officials.

i. Horizontal and vertical street alignments should be located to minimize grading and to incorporate natural ground contours as much as possible without creating hazards to traffic, and should be consistent with other design objectives.

j. Street layouts should be planned to avoid adverse concentration of storm water runoff.

k. Street design should promote safe bicycling by considering the placement of bike lanes that will provide for the safety of the cyclist as well as the automobile driver with whom they share the streets.

Local Street Intersections

Residential street layouts should generally be designed to minimize the use of four-way local street intersections by avoiding conventional gridiron street layout patterns.

Parking

Adequate off-street parking for residents and guests, including spaces for recreational vehicles, should be provided in both urban and rural areas.

Street Landscaping

a. Street landscaping should be included in planned street designs to improve the appearance and aesthetic value of urban and village areas.

b. Landscaping should be planned for safety and beauty, to provide buffering to minimize conflicts between streets, parking, structures, and pedestrian paths.

c. New street development projects should include landscaping along with funding for its installation and maintenance, either through the county or other agencies such as community service districts.

d. The design and construction of new roads or the expansion of existing roads, to the degree that right-of-way and traffic safety allow, should incorporate and preserve natural features, such as native woodlands or significant mature trees, rock outcrops and other landmarks.

e. Implementation of street landscaping projects should occur after the assignment of departmental responsibilities for installation and maintenance and discussion of funding sources and methods by the Board of Supervisors. For example, the Public Works and General Services Departments may develop a coordinated program for design and a funding mechanism through the Public Works Department, and installation and maintenance by the General Services Department. These decisions should be made to avoid problems with inadequate staffing or financial capability to develop and maintain projects.

Alternative Street Design

Due to the considerations listed above, special street designs may be necessary in unique local situations, such as in developments where public roads are not a consideration. In such cases, special design standards or criteria may be utilized that do not conform to the County Standard Improvement Specifications and Drawings.

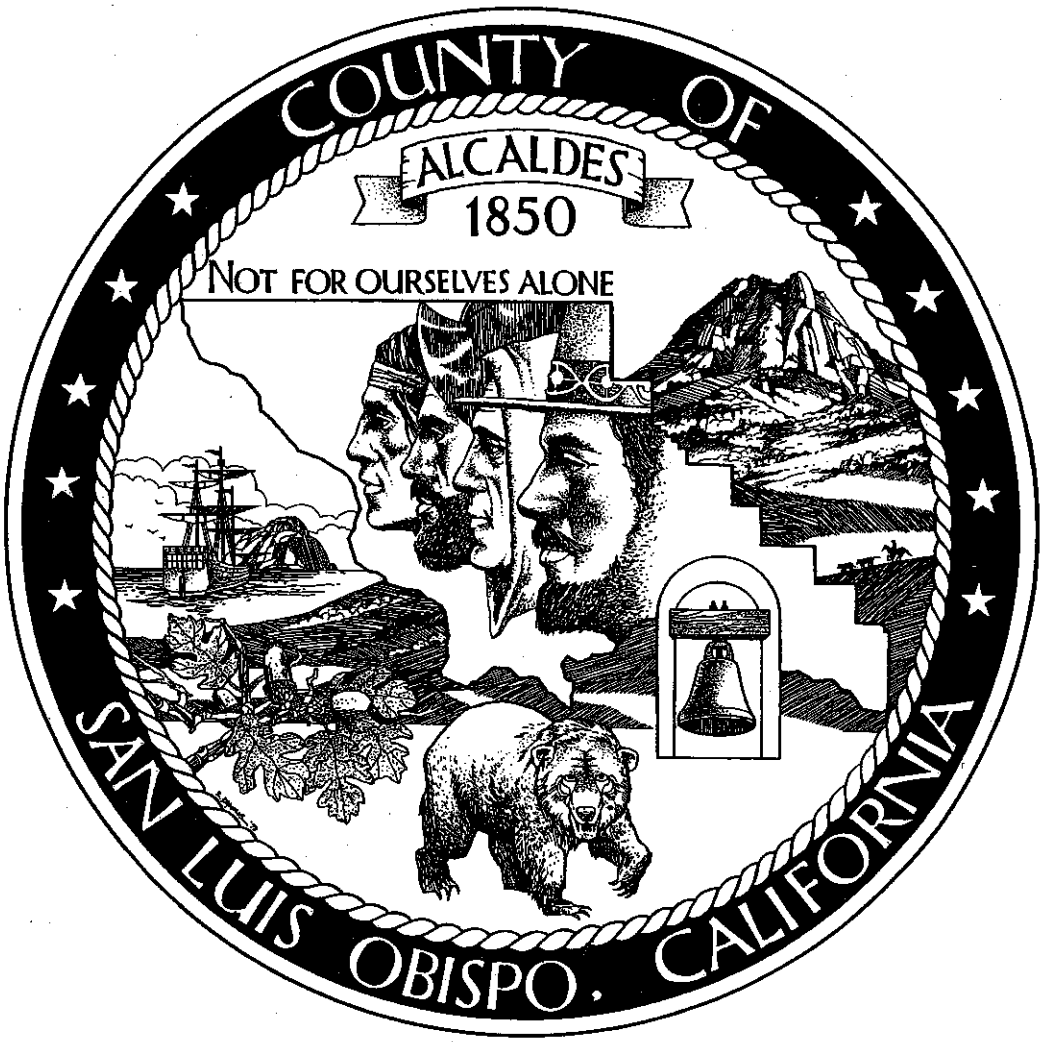
Some special design needs are noted in the Land Use Element area plans as guidelines in the Circulation chapter programs or as requirements in Article 9 of the Land Use Ordinance (Community Planning Standards). Special designs that are available in the "Guide to Urban and Rural Street Design," or other design guidebooks will be necessary to implement them. Other special design needs may come to light during review of applications for land use permits and subdivisions or capital improvement projects, for example to preserve a woodland or to create a paved pathway separate from a street. In such cases, streets should be designed to accommodate those needs if traffic safety can be assured.

Street Construction

Before the construction of new or expanded streets and roads, detailed plans must be developed. At that stage, engineering feasibility studies and geometric designs should carry out the guidelines listed in the previous sections with the coordination of Planning and Public Works Department staff as a general plan conformity report is prepared.

An environmental determination is then made for the preliminary design of each project. The Public Works Department prepares construction drawings based on the process of plan development and the environmental determination.

SAN LUIS OBISPO COUNTY
DEPARTMENT OF PUBLIC WORKS



PUBLIC IMPROVEMENT STANDARDS

Revisions					
Description	Approved	Date	Description	Approved	Date

CRITERIA	ADT <250	ADT 250-400	ADT 401-1000	ADT 1001-3000	ADT 3001-10000
DESIGN SPEED, MILES PER HOUR, (MINIMUM)					
FLAT	40	50	50	55	55
ROLLING	30	40	40	40	45
MOUNTAINOUS	20	20	30	30	35
CURVE RADIUS, FT. (MINIMUM)					
FLAT	510	830	830	1050	1050
ROLLING	275	510	510	510	670
MOUNTAINOUS	110	115	250	275	350
GRADE, PERCENT (MAXIMUM)					
FLAT	7	6	6	6	6
ROLLING	9	8	8	8	8
MOUNTAINOUS	12	12	10	10	10

NOTES:

1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. ADT IN EXCESS OF 10,000 WILL REQUIRE SPECIAL DESIGN REQUIREMENTS BY THE DEPARTMENT.
3. SUPERELEVATION MAY BE REQUIRED, SEE STANDARD DRAWING A-4b.
4. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
5. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.
6. FOR ADT <250 GRADES MAY BE INCREASED BY 150 % FOR RELATIVELY SHORT LENGTHS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL ROAD DESIGN CRITERIA

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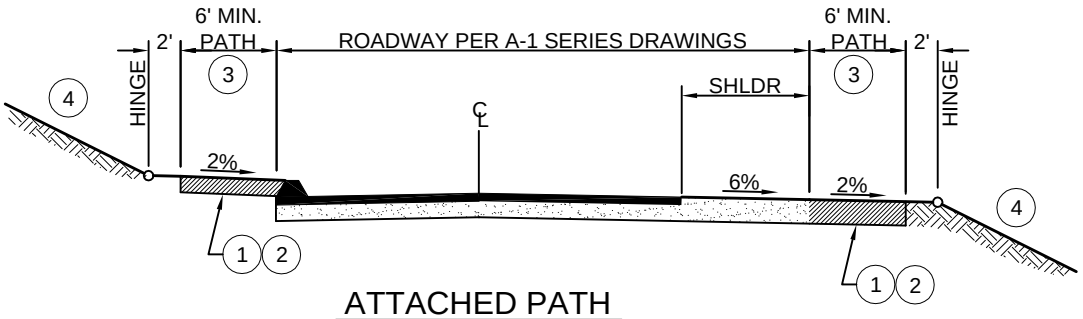
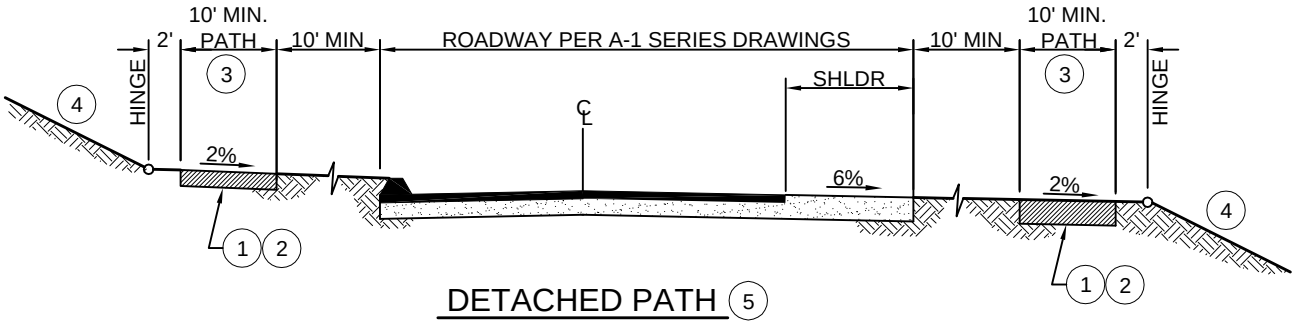
Drawing No:	A-1
Sheet No:	1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



ATTACHED PATH



DETACHED PATH (5)

NOTES:

1. MAXIMUM LONGITUDINAL GRADE ON THE DETACHED PATH SHALL BE 5%. HIGHER GRADES MAY BE ALLOWED BUT ONLY WITH PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION DEPARTMENT.
2. PATH MATERIAL SHALL BE: 6-INCHES MINIMUM DEPTH ANGULAR DECOMPOSED GRANITE WITH A MAXIMUM AGGREGATE SIZE OF 3/8-INCH OR LESS AND COMPACTED TO A MINIMUM OF 90%. NATIVE SANDY MATERIAL MAY BE USED IF IT IS CONFINED EITHER BY THE ROADWAY OR BY AN APPROVED ROOT BARRIER INSTALLED ON BOTH SIDES OF PATH, AND CONSTRUCTED TO A MINIMUM DEPTH OF OF 24-INCHES AND COMPACTED TO 90%. THE PATH SHALL BE TOLERANT TO NORMAL USE AND RESISTANT TO EROSION.
3. NO OBSTACLES OR AT-GRADE VAULTS SHALL BE LOCATED WITHIN THE LIMITS OF THE PATH. ADJACENT TO THE PATH THE FOLLOWING MINIMUM CLEARANCES TO OBSTACLES SHALL BE MAINTAINED:
   - MINIMUM OF 2' CLEARANCE ON EACH SIDE OF PATH.
   - MINIMUM OF 5' CLEARANCE FROM NEW TREES, SHRUBS AND OTHER OBSTRUCTIONS.
   - MINIMUM OF 10' CLEARANCE FROM UNFENCED DRAINAGE BASINS.
   - MINIMUM OF 12' CLEARANCE TO OVERHEAD BRANCHES, SIGNS, AND OTHER ABOVE GRADE OBSTACLES.
4. CUT AND FILL SLOPES BEYOND HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) AND SHALL BE STABILIZED WITH APPROPRIATE EROSION CONTROL.
5. ALL RURAL ROADS WITH PREVAILING SPEEDS OF 45 MPH OR GREATER AND AN ADT OF 3,000 OR GREATER SHALL REQUIRE A DETACHED PATH.
6. NO PORTION OF THE PATH SHALL BE USED AS PART OF A SURFACE DRAINAGE CONVEYANCE SYSTEM.
7. IF DRAINAGE FACILITIES ARE REQUIRED THEY SHALL BE EITHER STORM DRAIN PIPES WITH A MINIMUM COVER OF 1-FOOT OVER THE PATH OR A CONCRETE DRY CROSSING (DESIGN TO BE APPROVED BY THE DEPARTMENT).
8. PATH SIGNAGE SHALL BE REQUIRED AND MUST HAVE PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

MULTIUSE PATH

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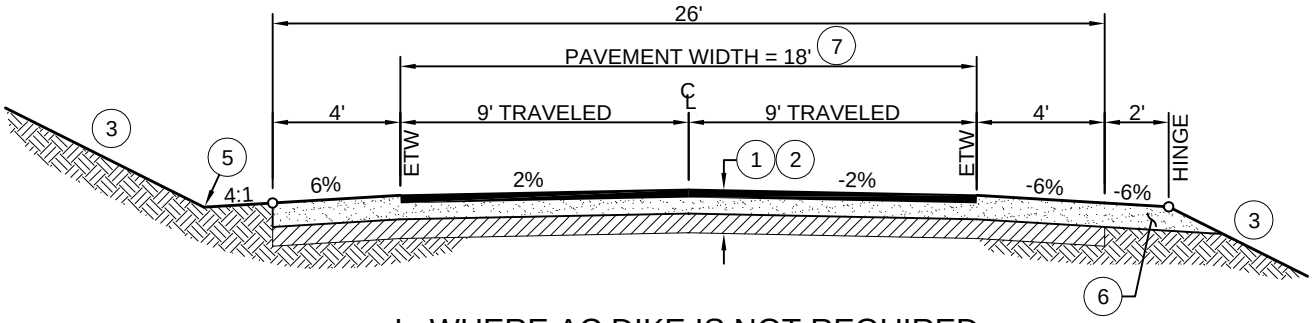
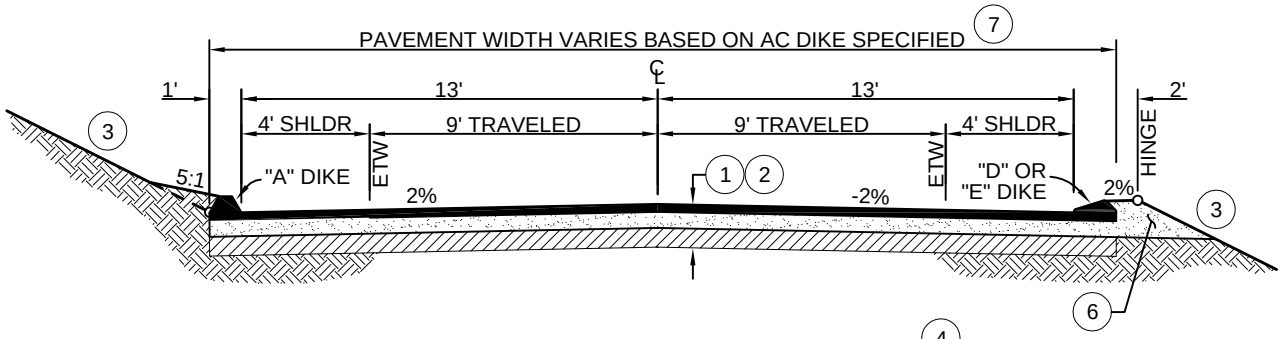
Drawing No: A-1a

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED 4

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

LESS THAN 250 FUTURE ADT

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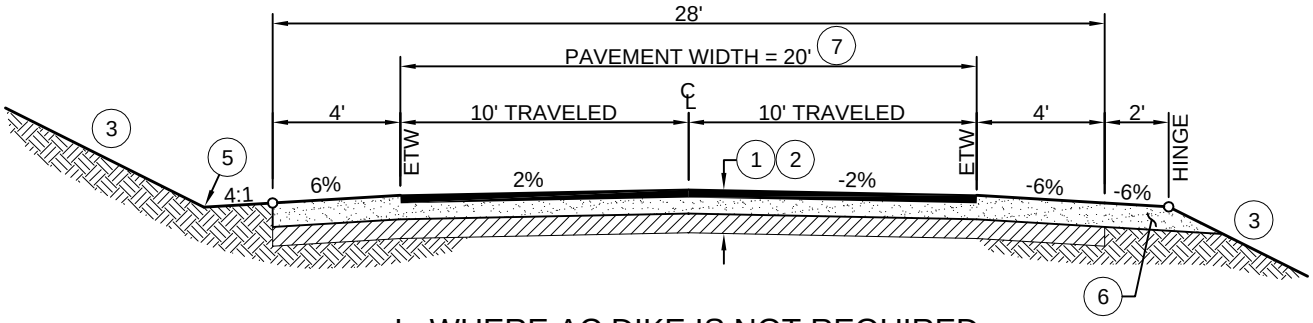
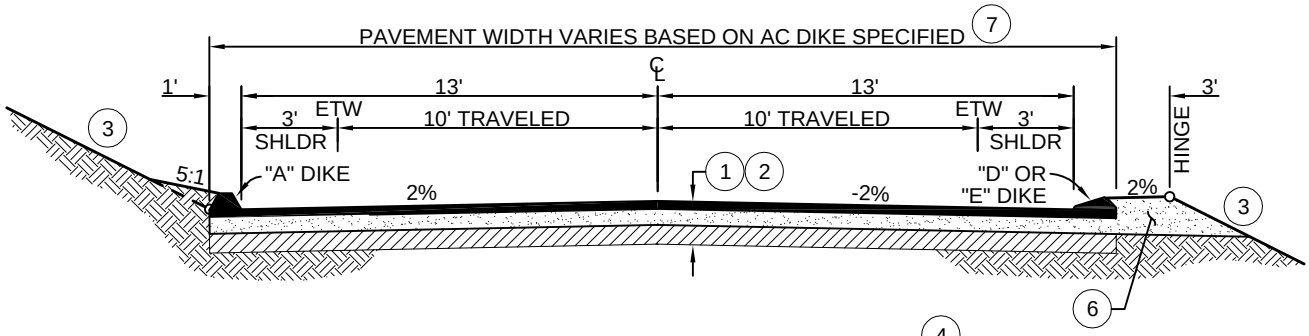
Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED 4

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

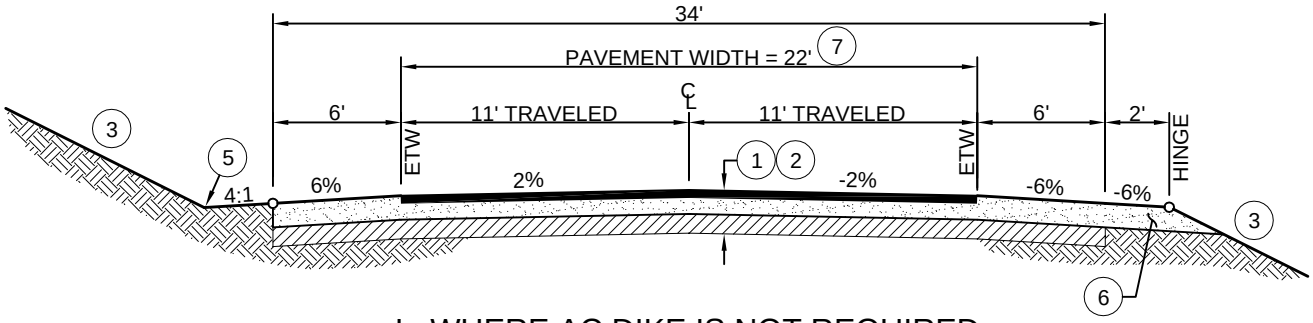
250 TO 400 FUTURE ADT

Scale:	Issued:
NTS	Aug. 2006

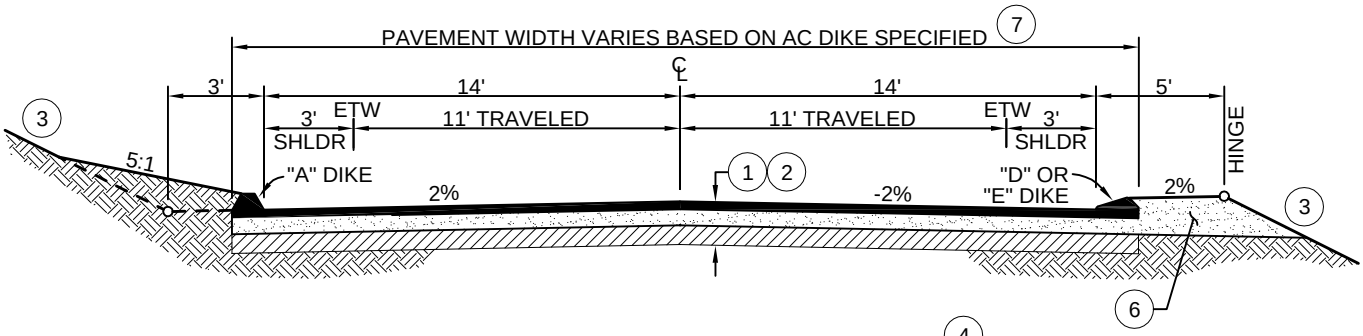
Drawing No: A-1c

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

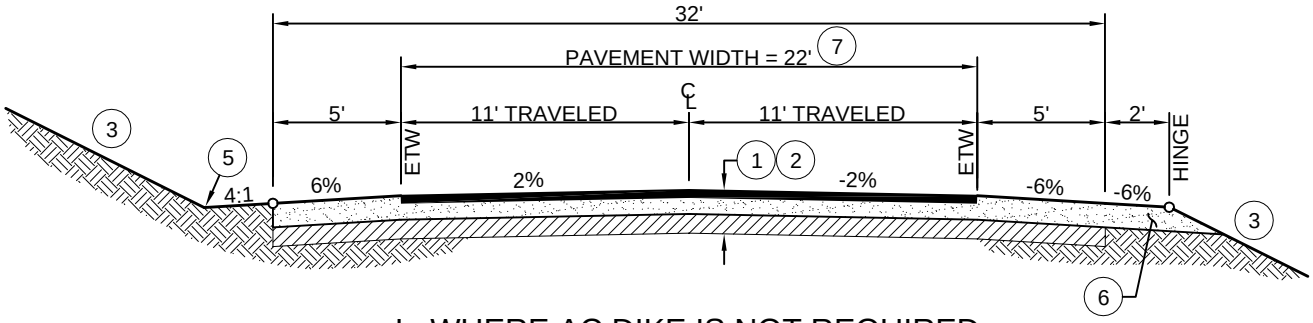
401 TO 1000 FUTURE ADT-FLAT & ROLLING

Scale:	Issued:
NTS	Aug. 2006

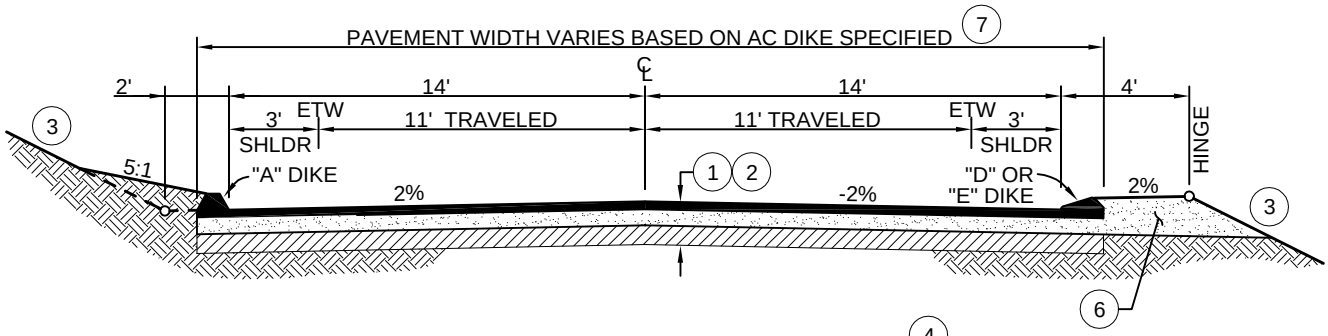
Drawing No: A-1d

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

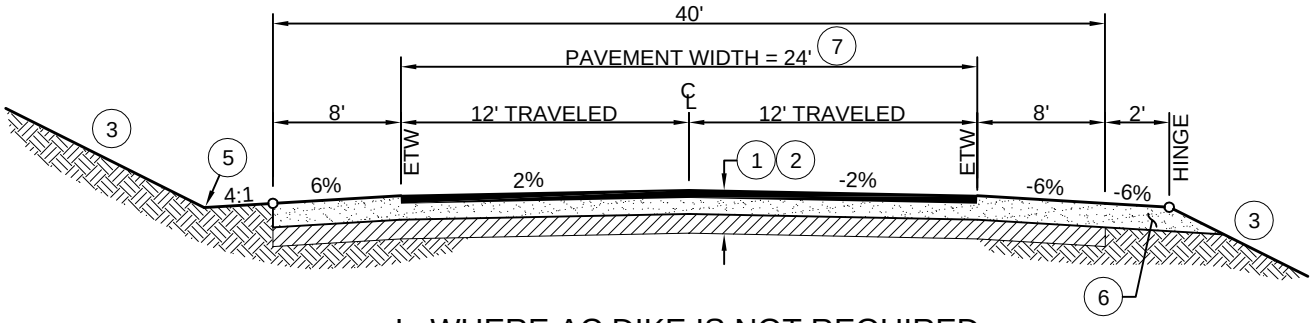
401 TO 1000 FUTURE ADT-MOUNTAINOUS

Scale:	Issued:
NTS	Aug. 2006

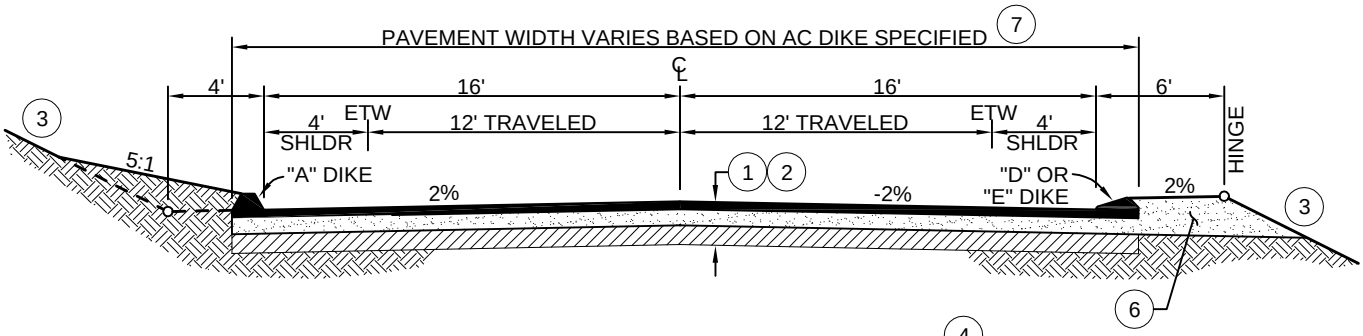
Drawing No: A-1e

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
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5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

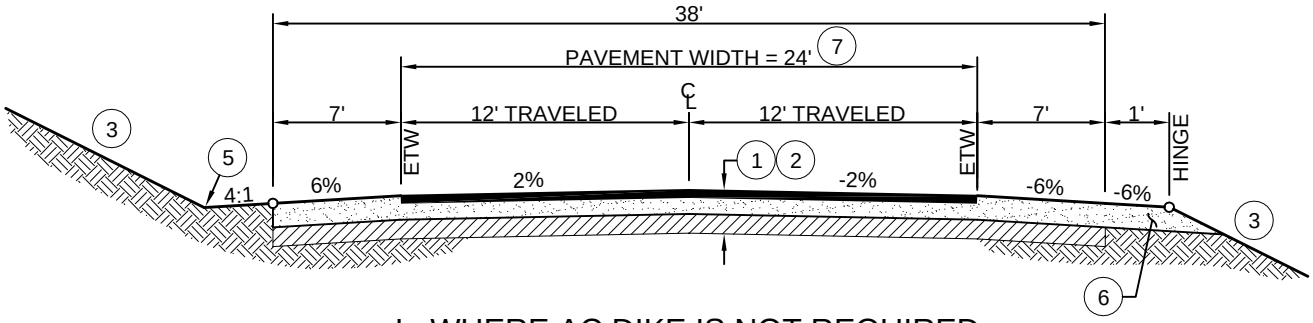
1001 TO 3000 FUTURE ADT-FLAT & ROLLING

Scale:	Issued:
NTS	Aug. 2006

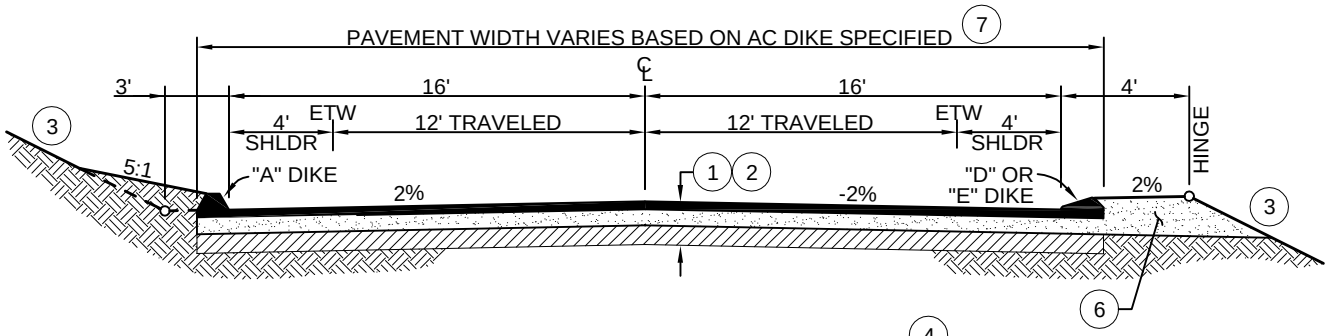
Drawing No: A-1f

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
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5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

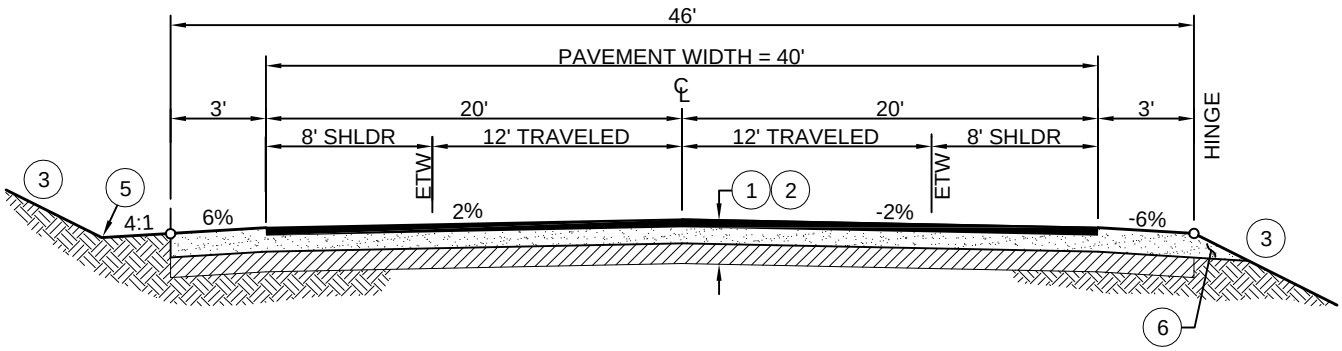
1001 TO 3000 FUTURE ADT-MOUNTAINOUS

Scale:	Issued:
NTS	Aug. 2006

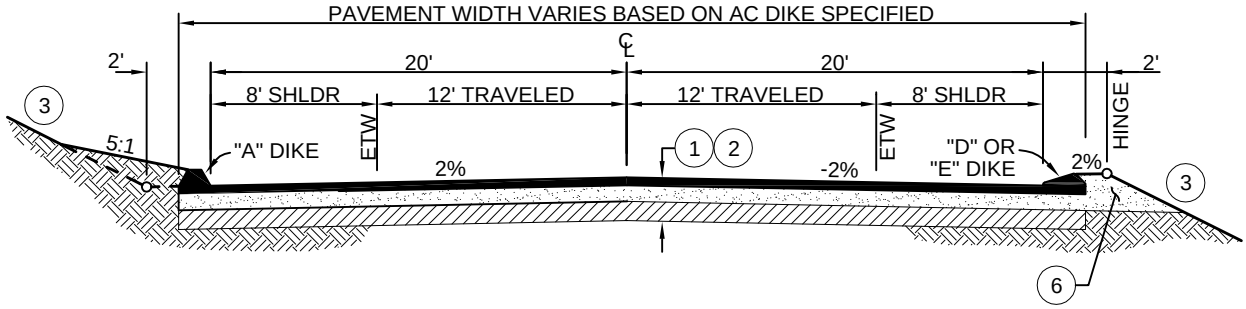
Drawing No: A-1g

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: WHERE AC DIKE IS NOT REQUIRED



II: WHERE AC DIKE IS REQUIRED (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

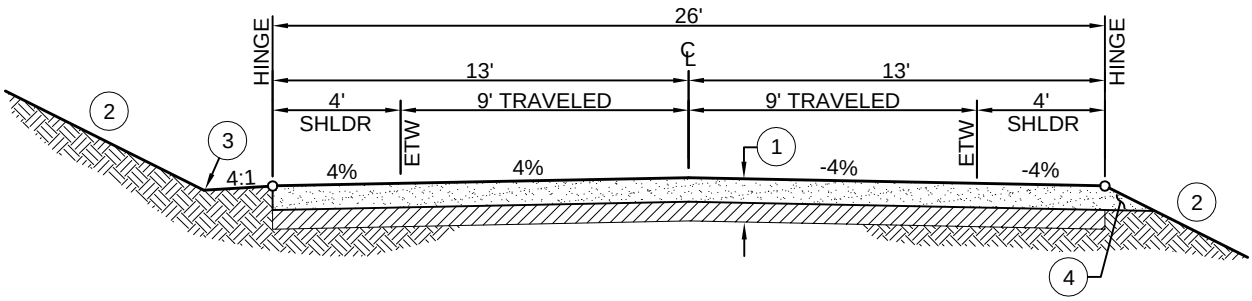
3001 TO 6000 FUTURE ADT

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-1h

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



NOTES:

1. TYPICAL SECTION SHALL BE:
   - 4" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R≥40, OR
   - 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION FOR R<40, OVER
   - 12" MINIMUM SUBGRADE COMPACTED TO 95% RELATIVE COMPACTION

2. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.

3. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.

4. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.

DESIGN CRITERIA

	MIN. DESIGN SPEED	MIN. CURVE RADIUS	MAX. GRADE
FLAT	30 mph	275 ft	7%
ROLLING	20 mph	130 ft	12%
MOUNTAIN	15 mph	75 ft	12%

DESIGN CRITERIA NOTES:

1. OPTION FOR USE IN RURAL AND AGRICULTURAL LAND USE CATEGORIES WHERE THE 20 YEAR PROJECTED ADT DOES NOT EXCEED 100.

2. MINIMUM LONGITUDINAL SLOPE SHALL BE 0.50%.

3. GRADES GREATER THAN 12% SHALL REQUIRE PAVED SURFACES PER DRAWING A-1b AND THE FIRE AGENCY STANDARDS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL RURAL ROAD SECTION

GRAVEL ROAD STANDARD

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-1j

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

CRITERIA	ADT <500	ADT 500-1500	ADT 1500-5000	ADT >5000
DESIGN SPEED, MILES PER HOUR, (MINIMUM)				
FLAT	25	35	45	45
ROLLING	25	35	40	40
MOUNTAINOUS	20	30	35	35
CURVE RADIUS, FT. (MINIMUM)				
FLAT	250	600	1100	1100
ROLLING	250	600	800	800
MOUNTAINOUS	125	400	600	600
GRADE, PERCENT (MAXIMUM)				
FLAT	7	6	4	3
ROLLING	12	9	6	5
MOUNTAINOUS	15	13	8	7

NOTES:
1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. SUPERELEVATION NOT PERMITTED ON URBAN ROADS.
3. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
4. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

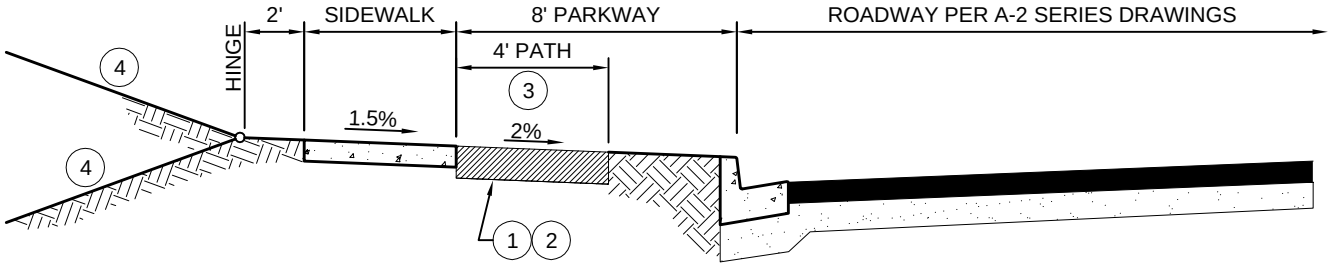
THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

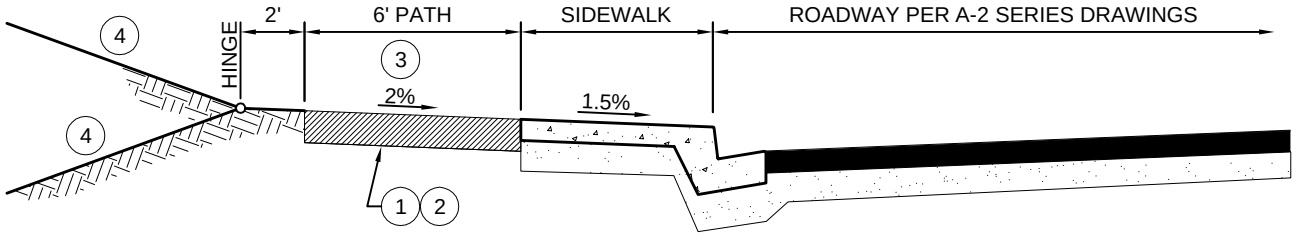
URBAN STREET DESIGN CRITERIA

Scale:	Issued: Aug. 2006
Drawing No:	A-2
Sheet No:	1 OF 1

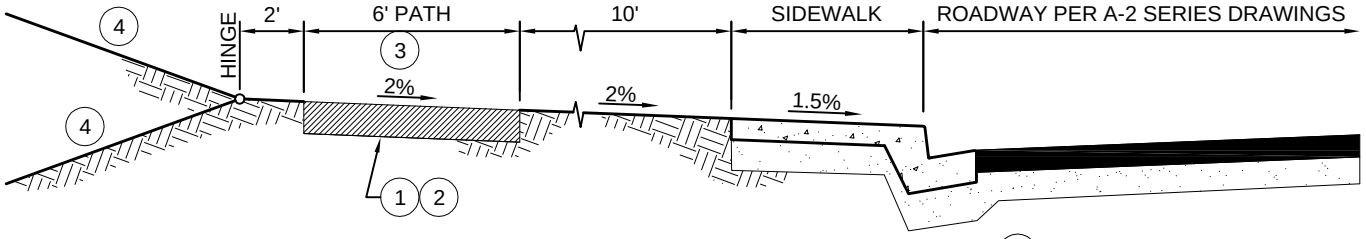
Revisions					
Description	Approved	Date	Description	Approved	Date



ATTACHED PATH



DETACHED PATH



DETACHED PATH - ≥45mph & 3,000 ADT (5)

NOTES:

1. MAXIMUM LONGITUDINAL GRADE ON THE DETACHED PATH SHOULD BE 5%. HIGHER GRADES MAY BE ALLOWED BUT ONLY WITH PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION DEPARTMENT.
2. PATH MATERIAL SHALL BE: 6-INCHES MINIMUM DEPTH ANGULAR DECOMPOSED GRANITE WITH A MAXIMUM AGGREGATE SIZE OF 3/8-INCH OR LESS AND COMPACTED TO A MINIMUM OF 90%. NATIVE SANDY MATERIAL MAY BE USED IF IT IS CONFINED EITHER BY THE ROADWAY OR BY AN APPROVED ROOT BARRIER INSTALLED ON BOTH SIDES OF PATH, AND CONSTRUCTED TO A MINIMUM DEPTH OF OF 24-INCHES AND COMPACTED TO 90%. THE PATH SHALL BE TOLERANT TO NORMAL USE AND RESISTANT TO EROSION.
3. NO OBSTACLES OR AT-GRADE VAULTS SHALL BE LOCATED WITHIN THE LIMITS OF THE PATH. ADJACENT TO THE PATH THE FOLLOWING MINIMUM CLEARANCES TO OBSTACLES SHALL BE MAINTAINED:
   - MINIMUM OF 2' CLEARANCE ON EACH SIDE OF PATH.
   - MINIMUM OF 5' CLEARANCE FROM NEW TREES, SHRUBS, AND OTHER OBSTRUCTIONS.
   - MINIMUM OF 10' CLEARANCE FROM UNFENCED DRAINAGE BASINS.
   - MINIMUM OF 12' CLEARANCE TO OVERHEAD BRANCHES, SIGNS, AND OTHER ABOVE GRADE OBSTACLES.
4. CUT AND FILL SLOPES BEYOND HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) AND SHALL BE STABILIZED WITH APPROPRIATE EROSION CONTROL.
5. ALL URBAN ROADS WITH PREVAILING SPEEDS OF 45 MPH OR GREATER AND AN ADT OF 3,000 OR GREATER SHALL LOCATE THE PATH 5-FEET FROM THE BACK OF SIDEWALK.
6. NO PORTION OF THE PATH SHALL BE USED AS PART OF A SURFACE DRAINAGE CONVEYANCE SYSTEM.
7. IF DRAINAGE FACILITIES ARE REQUIRED THEY SHALL BE EITHER STORM DRAIN PIPES WITH A MINIMUM COVER OF 1-FOOT OVER THE PATH OR A CONCRETE DRY CROSSING (DESIGN TO BE APPROVED BY THE DEPARTMENT).
8. PATH SIGNAGE SHALL BE REQUIRED AND MUST HAVE PRIOR APPROVAL FROM THE COUNTY PARKS & RECREATION DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL URBAN STREET SECTION

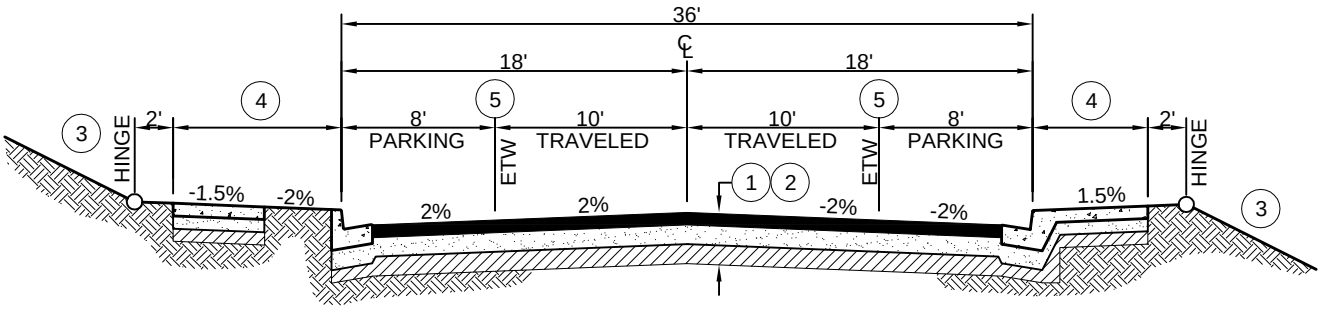
MULTIUSE PATH

Scale:	Issued:
NTS	Aug. 2006

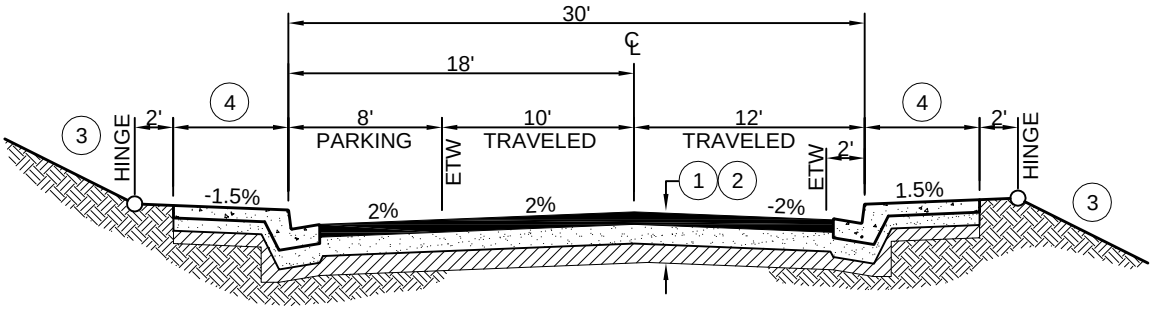
Drawing No: A-2a

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: LESS THAN 500 FUTURE ADT-FLAT & ROLLING



II: LESS THAN 500 FUTURE ADT-MOUNTAINOUS

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL URBAN STREET SECTION

LESS THAN 500 FUTURE ADT FLAT & ROLLING
LESS THAN 500 FUTURE ADT MOUNTAINOUS

Scale:	Issued:
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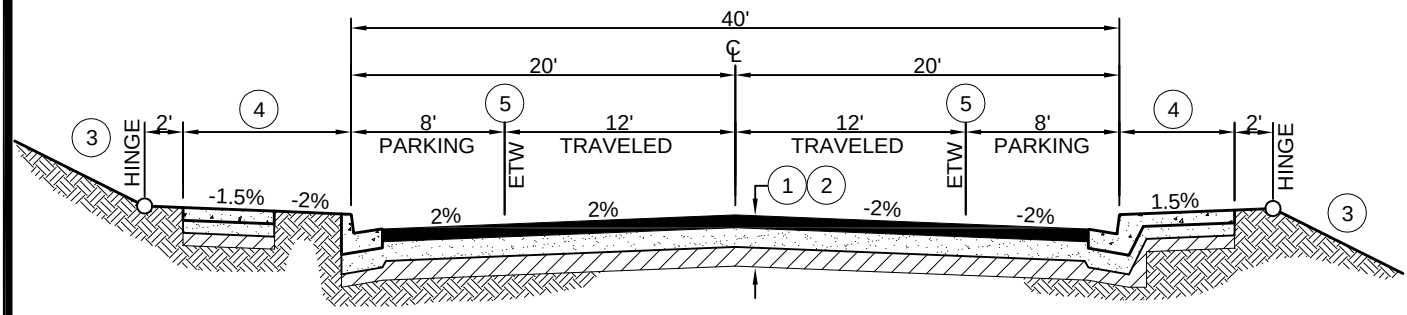
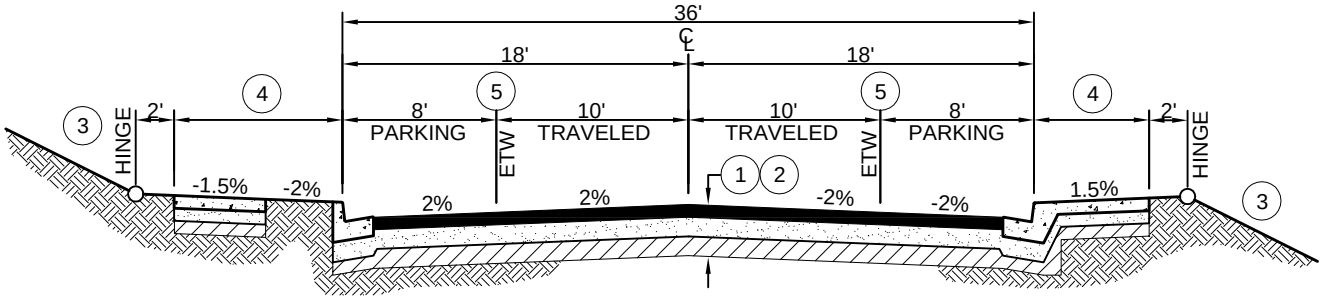
Drawing No: A-2b

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: 500 TO 5000 FUTURE ADT-FLAT



II: 500 TO 1500 FUTURE ADT-ROLLING & MOUNTAINOUS

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. ADDITIONAL WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL URBAN STREET SECTION

500 TO 5000 FUTURE ADT FLAT

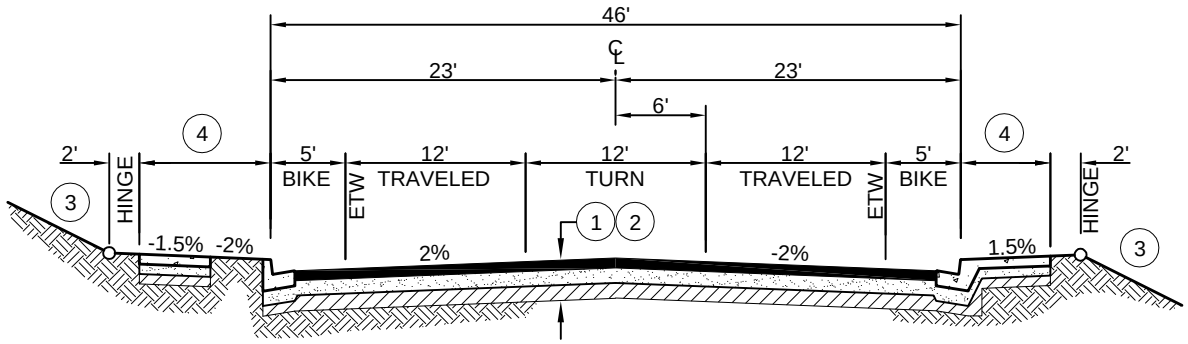
500 TO 1500 FUTURE ADT-ROLLING & MOUNTAINOUS

Scale:	Issued:
NTS	Aug. 2006

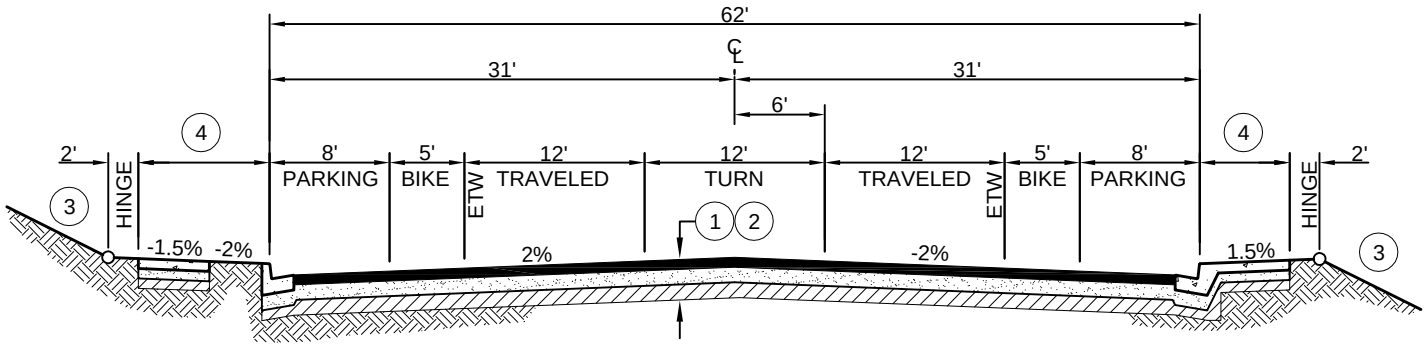
Drawing No: A-2c

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



I: 5001 TO 16000 FUTURE ADT WITHOUT PARKING



II: 5001 TO 16000 FUTURE ADT WITH PARKING

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL URBAN STREET SECTION

5,001 to 16,000 FUTURE ADT WITHOUT PARKING

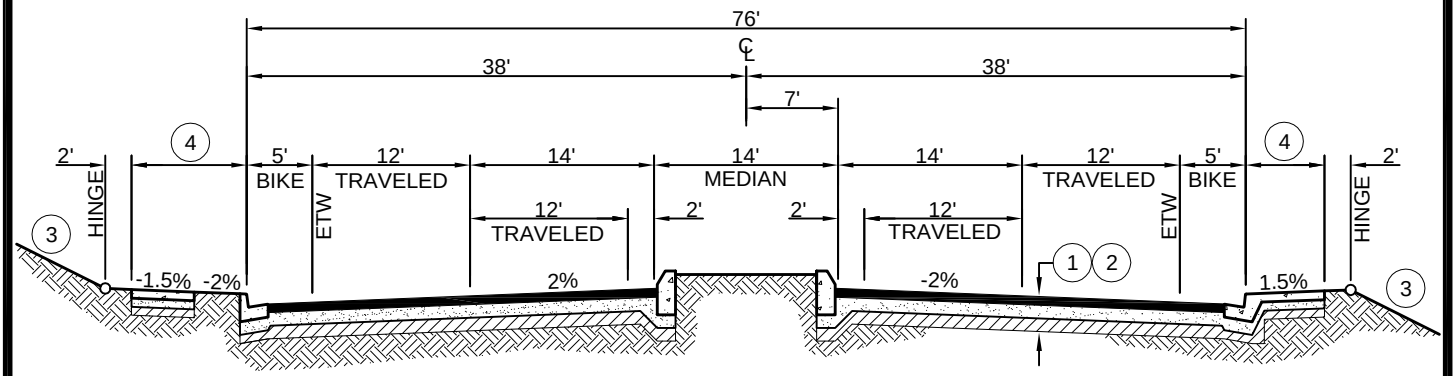
5,001 TO 16,000 FUTURE ADT WITH PARKING

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-2d

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



16,000 TO 24,000 FUTURE ADT

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. WHEN STREET PARKING IS REQUIRED A MINIMUM WIDTH OF 8-FEET SHALL BE PROVIDED.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL URBAN STREET SECTION

16,000 to 24,000 FUTURE ADT

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-2e

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

CRITERIA	ADT <500	ADT 500-1500	ADT 1500-5000	ADT >5000
DESIGN SPEED, MILES PER HOUR, (MINIMUM)				
FLAT	25	30	35	35
ROLLING	25	30	30	30
MOUNTAINOUS	20	25	25	25
CURVE RADIUS, FT. (MINIMUM)				
FLAT	250	400	600	600
ROLLING	250	400	400	400
MOUNTAINOUS	125	250	250	250
GRADE, PERCENT (MAXIMUM)				
FLAT	7	6	4	3
ROLLING	10	9	6	5
MOUNTAINOUS	10	9	8	7

NOTES:

1. ADT IS BASED UPON A 20-YEAR PROJECTION.
2. SUPERELEVATION NOT PERMITTED ON COMMERCIAL / INDUSTRIAL ROADS.
3. THE STRUCTURAL SECTION SHALL BE BASED ON THE TRAFFIC INDEX AS PROVIDED BY THE DEPARTMENT.
4. RIGHT OF WAY SHALL BE THE MINIMUM REQUIRED BY THE DESIGN STANDARDS.

FLAT ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE LITTLE OR NO TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE AND WHICH COULD BE CONSTRUCTED WITH MINOR CUTS AND FILLS.

ROLLING ROADWAYS ARE THOSE SECTIONS OF ROADWAY IN WHICH THERE ARE TOPOGRAPHIC RESTRAINTS ON VERTICAL AND HORIZONTAL SIGHT DISTANCE WHICH REQUIRE SOME MODERATE CUTS AND FILL.

MOUNTAINOUS ROADWAYS ARE THOSE SECTIONS OF ROADWAY WHICH REQUIRE MAXIMUM OR NEAR MAXIMUM GRADES AND MINIMUM CURVE RADII IN ORDER TO REDUCE THE CUTS AND FILLS TO PRACTICAL AND VISUALLY ACCEPTABLE HEIGHTS.

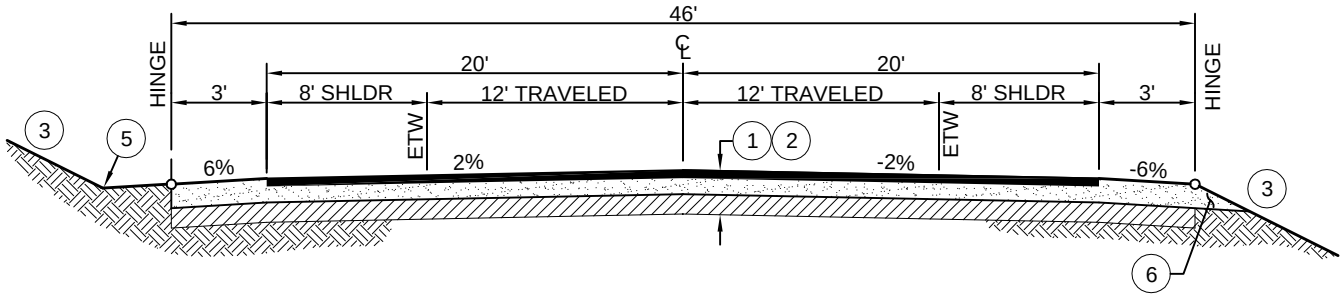
THE DETERMINATION OF FLAT, ROLLING, OR MOUNTAINOUS ROADWAYS SHALL BE UNIFORM OVER THE FULL LENGTH OF A ROADWAY EXCEPT WHERE THE DEPARTMENT DETERMINES THAT A SAFE TRANSITION MAY BE MADE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

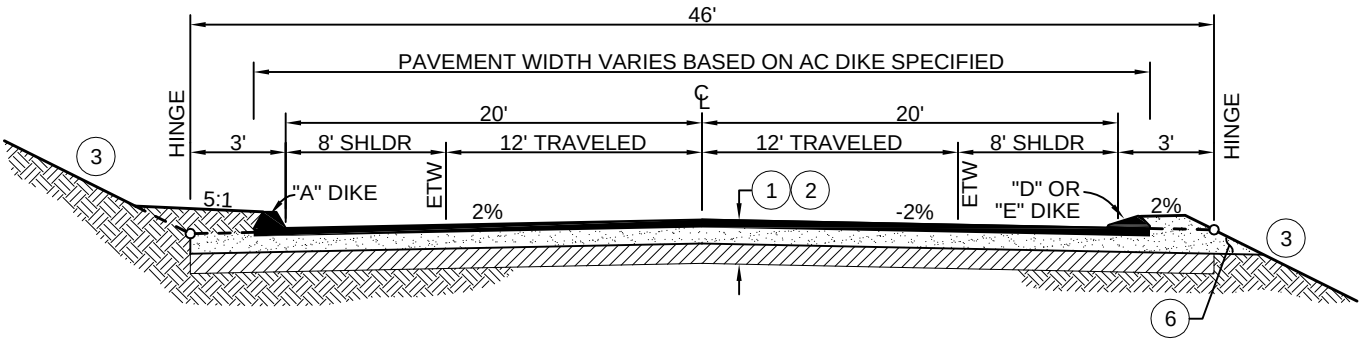
COMMERCIAL-INDUSTRIAL ROAD DESIGN CRITERIA

Scale:	Issued: Aug. 2006
Drawing No: A-3	
Sheet No: 1 OF 1	

Revisions					
Description	Approved	Date	Description	Approved	Date



I: LESS THAN 5000 FUTURE ADT WITHOUT AC DIKE - OUTSIDE URL



II: LESS THAN 5000 FUTURE ADT WITH AC DIKE - OUTSIDE URL (4)

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
5. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. THE SIDE SLOPE OF ANY DRAINAGE SWALE DIRECTLY ADJACENT TO THE EDGE OF ROADWAY SHALL NOT EXCEED 4h:1v. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
6. THE AGGREGATE BASE MATERIAL SHALL EXTEND TO THE EDGE OF THE FILL SLOPE (CHOKER) TO ALLOW FOR STRUCTURAL ROAD SECTION DRAINAGE.
7. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL COMMERCIAL-INDUSTRIAL

RURAL ROADS OUTSIDE URL

LESS THAN 5,000 FUTURE ADT

Scale:	Issued:
NTS	Aug. 2006

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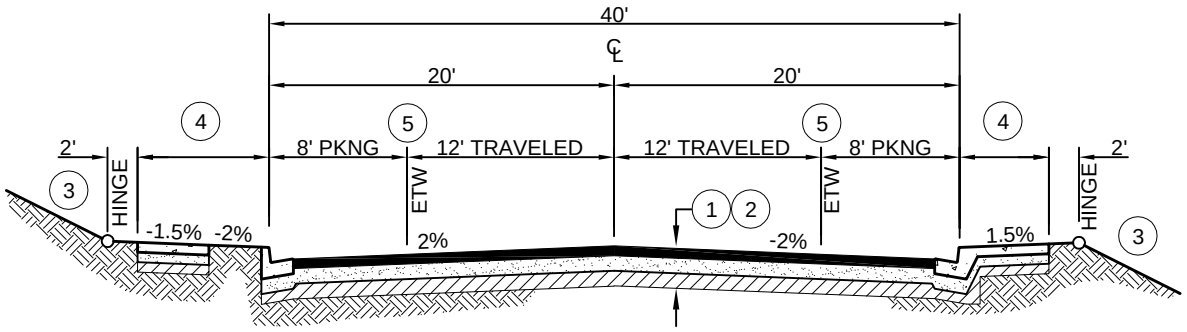
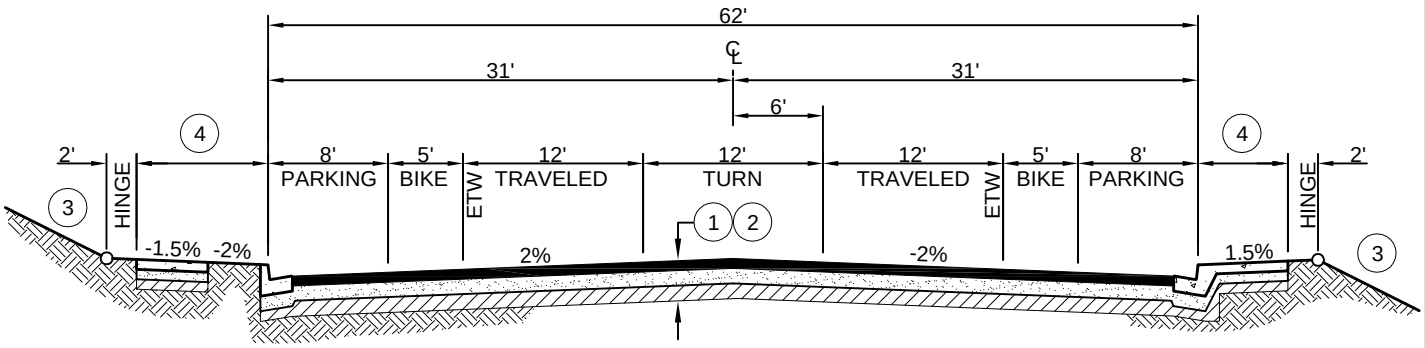


I: LESS THAN 5,000 FUTURE ADT - WITHIN URL



II: 5,000 TO 16,000 FUTURE ADT - WITHIN URL

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. ADDITIONAL 5-FOOT WIDTH SHALL BE PROVIDED WHERE BICYCLE LANES ARE REQUIRED BY THE DESIGN STANDARDS.
6. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
7. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
8. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
9. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL COMMERCIAL-INDUSTRIAL

URBAN STREETS WITHIN URL

LESS THAN 5,000 TO 16,000 FUTURE ADT

Scale:	Issued:
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Drawing No: A-3b

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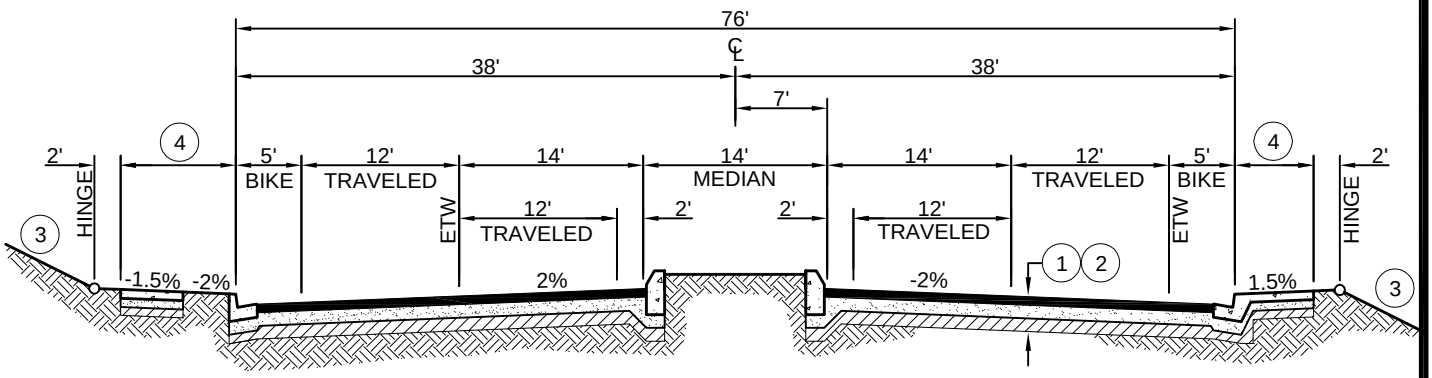
Description	Approved	Date	Description	Approved	Date



GREATER THAN 16000 FUTURE ADT - WITHIN URL

NOTES:

1. THE STRUCTURAL ROAD SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT, AND IN NO CASE SHALL THE ZONE OF COMPACTION BE LESS THAN 2.5-FEET IN THICKNESS. THE ROAD SECTION SHALL BE APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION.
2. TYPICAL SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
3. CUT AND FILL SLOPES SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
4. ATTACHED OR DETACHED SIDEWALK TYPE AND WIDTH PER STANDARD DRAWING C-4 OR AS REQUIRED BY THE PROJECT CONDITIONS OF APPROVAL OR AREA SPECIFIC PLAN.
5. OTHER FACILITIES SUCH AS LANDSCAPING, TRANSIT STOP FACILITIES, PEDESTRIAN, EQUESTRIAN, AND BICYCLE FACILITIES MAY BE REQUIRED BY THE DESIGN STANDARDS.
6. LANDSCAPE, IRRIGATION, AND MAINTENANCE OF MEDIANS AND PARKWAYS SHALL BE ADDRESSED IN THE APPROVED PROJECT PLANS. A LOCAL FUNDING SOURCE MUST BE IDENTIFIED.
7. WHERE APPLICABLE, ALL IMPROVEMENTS SHALL BE CONSISTENT WITH THE RESPECTIVE COMMUNITY DESIGN PLAN AS ADOPTED BY THE BOARD OF SUPERVISORS.
8. A STRIPING AND SIGNAGE PLAN SHALL BE REQUIRED BY THE DEPARTMENT WHEN BIKE LANES, NO PARKING ZONES, SIGNAGE, AND PAVEMENT MARKINGS ARE A REQUIRED COMPONENT OF THE IMPROVEMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL COMMERCIAL-INDUSTRIAL

URBAN STREETS WITHIN URL

GREATER THAN 16,000 FUTURE ADT

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-3c

Sheet No: 1 OF 1

Revisions					
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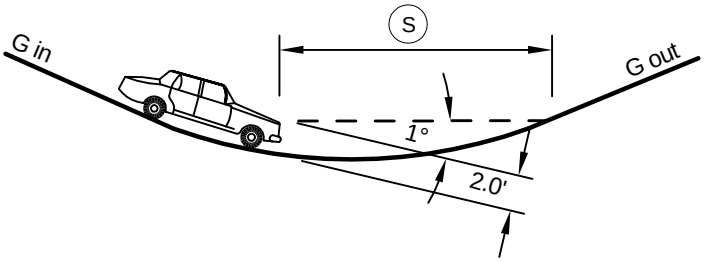


REFERENCE: 1988 STATE HIGHWAY DESIGN MANUAL FIGURE 201.5

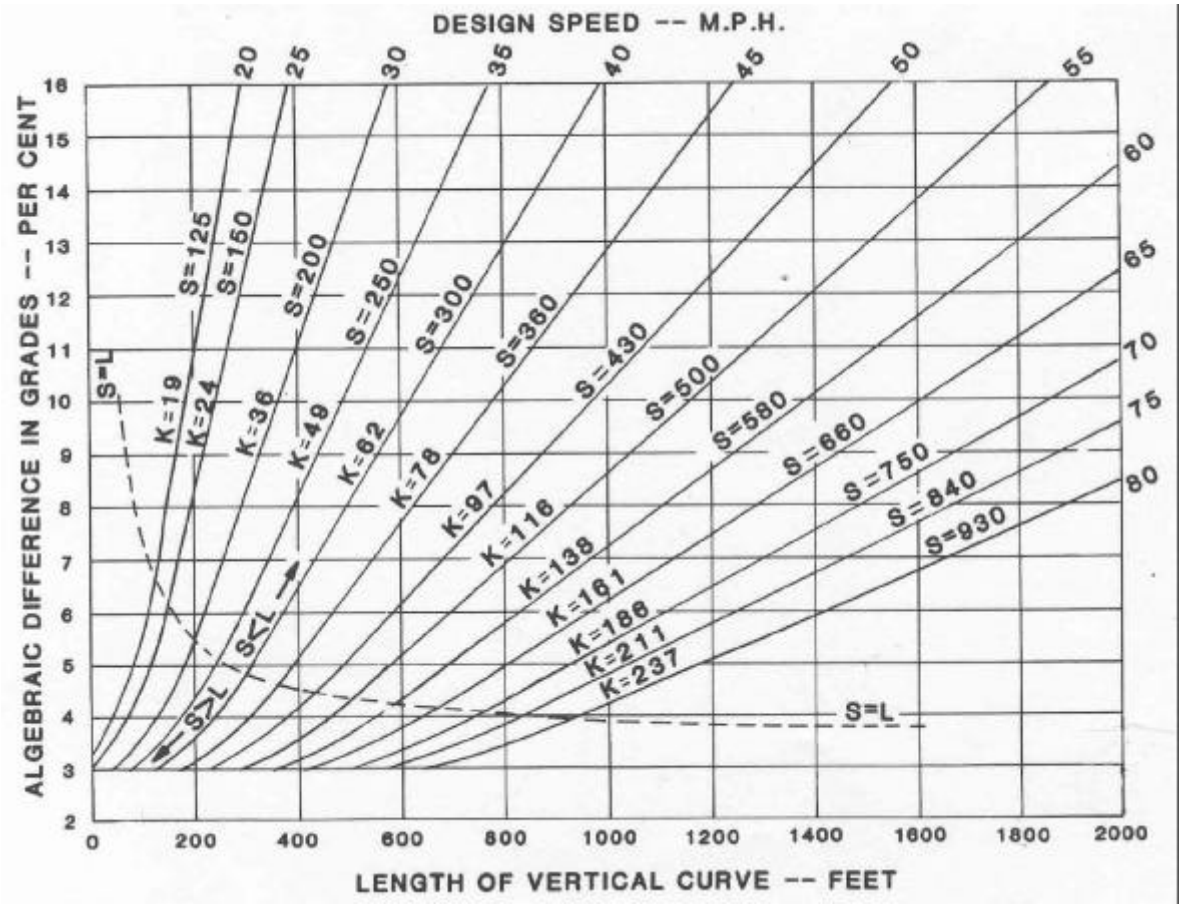
L = CURVE LENGTH IN FEET
A = ALGEBRAIC GRADE DIFFERENCE, G out% - Gin%
S = SIGHT DISTANCE IN FEET
V = DESIGN SPEED IN M.P.H. FOR "S"
K = DISTANCE IN FEET REQUIRED TO ACHIEVE A 1 % CHANGE IN GRADE.
K VALUE SHOWN IS VALID WHEN S<L

WHEN S>L

$$L = 2S - \frac{400 + 3.5S}{A}$$

WHEN S<L

$$L = \frac{AS^2}{400 + 3.5S}$$



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

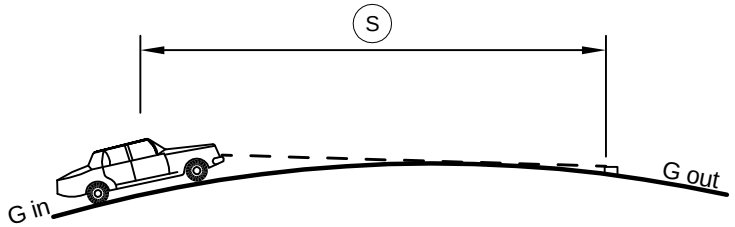
STOPPING SIGHT DISTANCE ON SAG VERTICAL CURVES

Scale:	Issued: Aug. 2006
Drawing No:	A-4
Sheet No:	1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

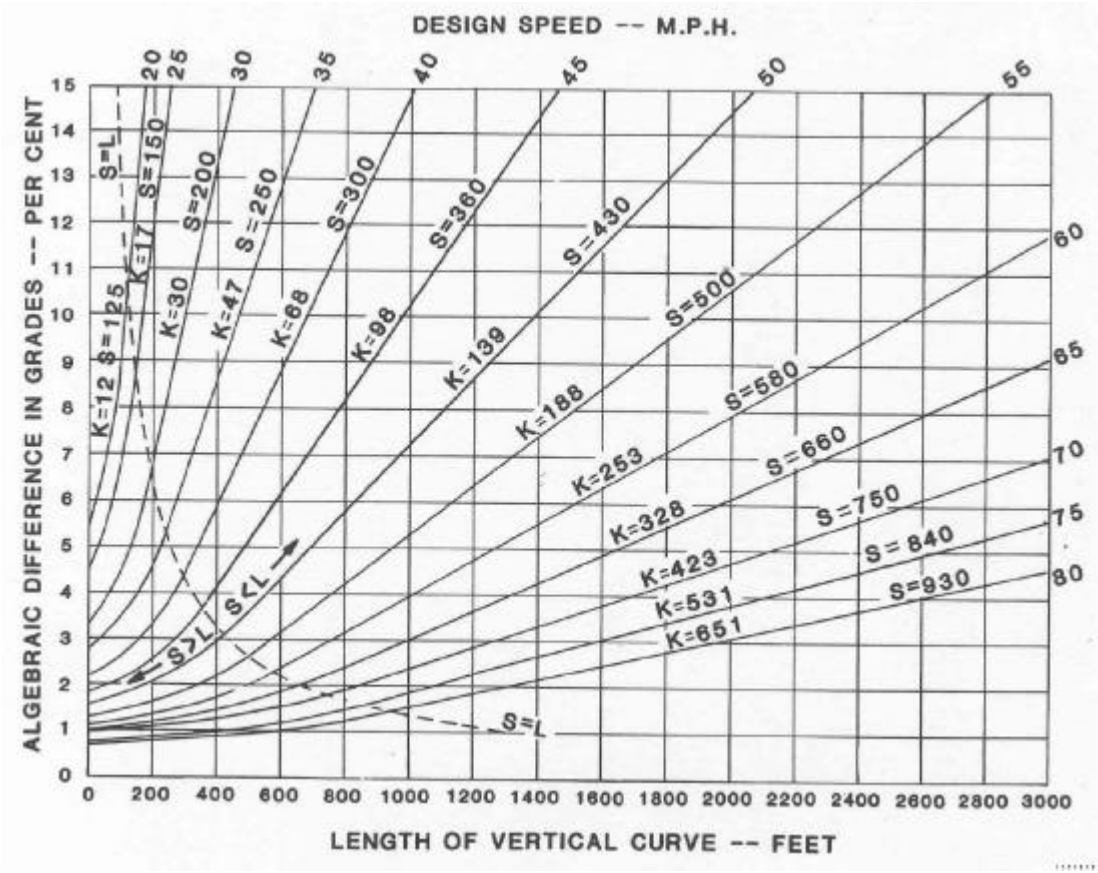
REFERENCE: 1988 STATE HIGHWAY DESIGN MANUAL FIGURE 201.4

HEIGHT OF EYE - 3.5 FEET
HEIGHT OF OBJECT - 0.50 FEET.



L = CURVE LENGTH IN FEET
A = ALGEBRAIC GRADE DIFFERENCE, G out% - G in%
S = SIGHT DISTANCE IN FEET
V = DESIGN SPEED IN M.P.H. FOR "S"
K = DISTANCE IN FEET REQUIRED TO ACHIEVE A 1 % CHANGE IN GRADE.
K VALUE SHOWN IS VALID WHEN S<L

WHEN S>L	WHEN S<L
$L = 2S - \frac{1329}{A}$	$L = \frac{AS^2}{1329}$



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STOPPING SIGHT DISTANCE ON CREST VERTICAL CURVES

Scale:	Issued: Aug. 2006
Drawing No: A-4a	
Sheet No: 1 OF 1	

Revisions					
Description	Approved	Date	Description	Approved	Date

FOR RURAL ROADS - LESS THAN 35 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 500	+4%
500-1000	+3%
1000-5000	+2%
Over 5000	Standard crown section

FOR RURAL ROADS - 35 MPH to 45 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 600	+6%
600-1000	+5%
1000-1500	+4%
1500-2000	+3%
2000-7000	+2%
Over 7000	Standard crown section

FOR RURAL ROADS - OVER 45 MPH	
CURVE RADIUS - FEET	SUPER-ELEVATION - %
Under 1100	+10%
1100-1350	+9%
1350-1600	+8%
1600-1900	+7%
1900-2200	+6%
2200-2700	+5%
2700-3500	+4%
3500-4500	+3%
4500-20000	+2%
Over 20000	Standard crown section

NOTES:

1. THIS TABLE CONTAINS THE STANDARD RADII AND SPEEDS FOR THE USE OF SUPERELEVATIONS ON RURAL COUNTY ROADS. SUPER-ELEVATIONS ARE NOT ALLOWED ON URBAN COUNTY STREETS.
2. SUPERELEVATIONS GREATER THAN 10% ARE NOT ALLOWED WITHOUT THE APPROVAL OF THE DEPARTMENT.
3. WHEN USING SUPER-ELEVATIONS, THE DESIGN SHALL BE BASED ON THE CALTRANS HIGHWAY DESIGN MANUAL WHICH PROVIDES INFORMATION ON HORIZONTAL AND VERTICAL ALIGNMENTS, TRANSITIONS, THE AXIS OF ROTATION, DRAINAGE AND OTHER PERTINENT INFORMATION.
4. SUPERELEVATION DIAGRAMS SHALL BE PROVIDED ON THE APPROVED PLANS.

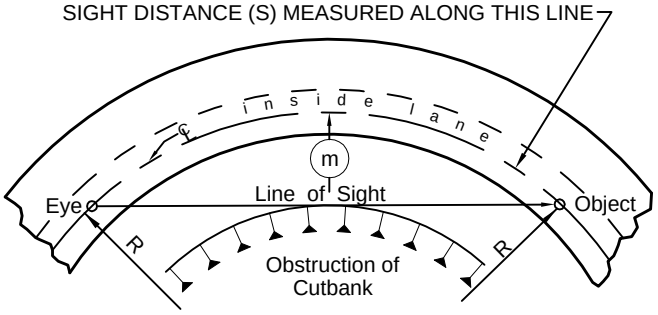
SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SUPER-ELEVATION ON HORIZONTAL CURVES

Scale:	Issued: Aug. 2006
Drawing No: A-4b	
Sheet No: 1 OF 1	

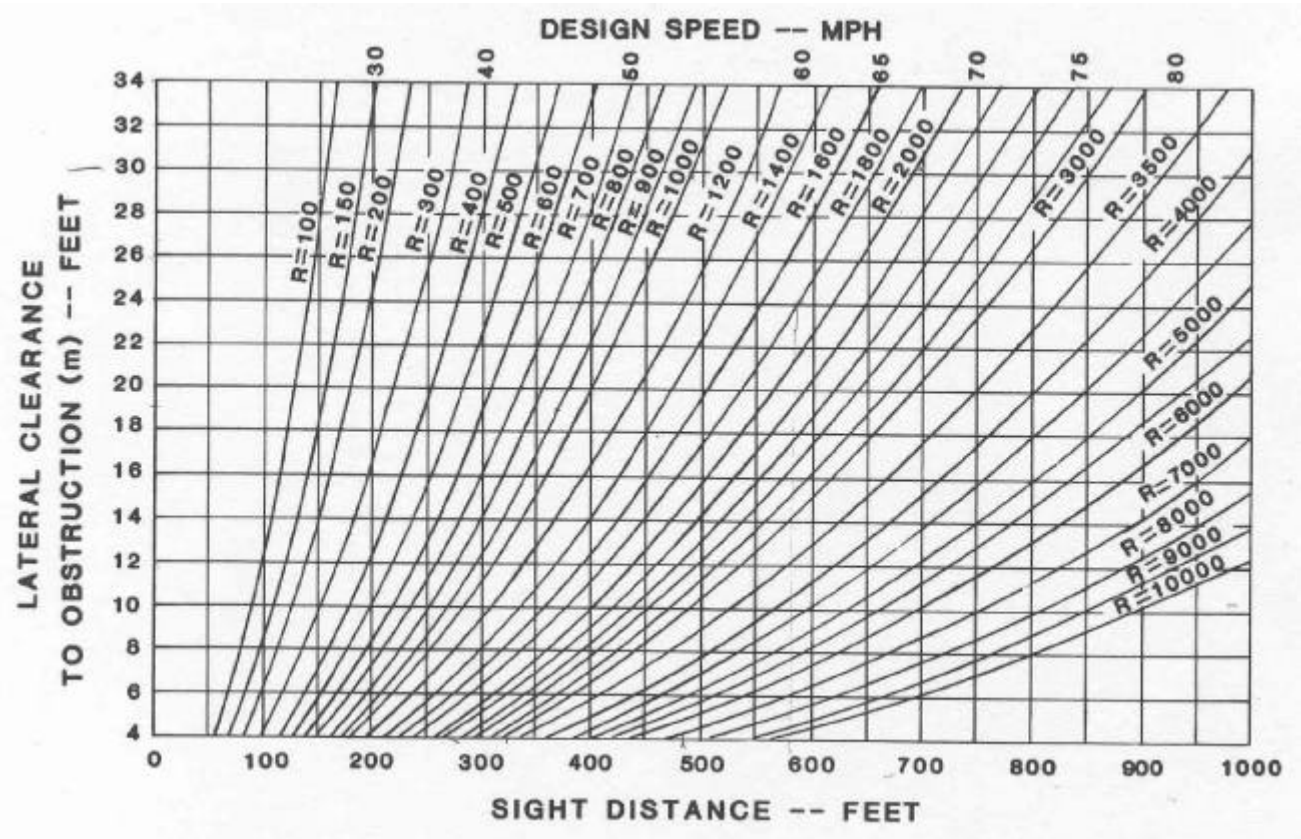
Revisions					
Description	Approved	Date	Description	Approved	Date

REFERENCE: 1988 STATE HIGHWAY DESIGN MANUAL FIGURE 201.6



S = SIGHT DISTANCE
R = RADIUS OF CL INSIDE LANE IN FEET
m = DISTANCE FROM CL INSIDE LANE IN FEET
V = DESIGN SPEED FOR "S" IN MPH

HEIGHT OF EYE = 3.50. HEIGHT OF OBJECT = 0.50 FEET
LINE OF SIGHT IS 2.0 FEET ABOVE ℄ INSIDE LANE AT POINT OF OBSTRUCTION.



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STOPPING SIGHT DISTANCE ON HORIZONTAL CURVES

Scale:	Issued: Aug. 2006
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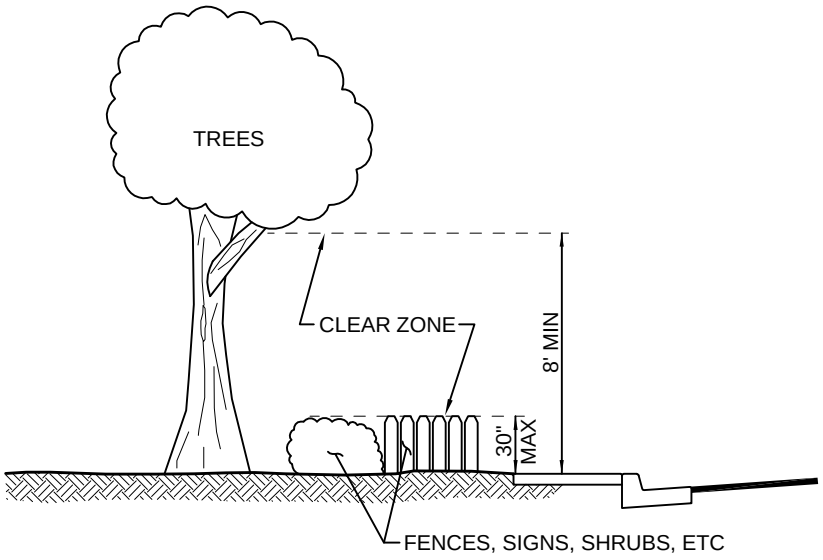
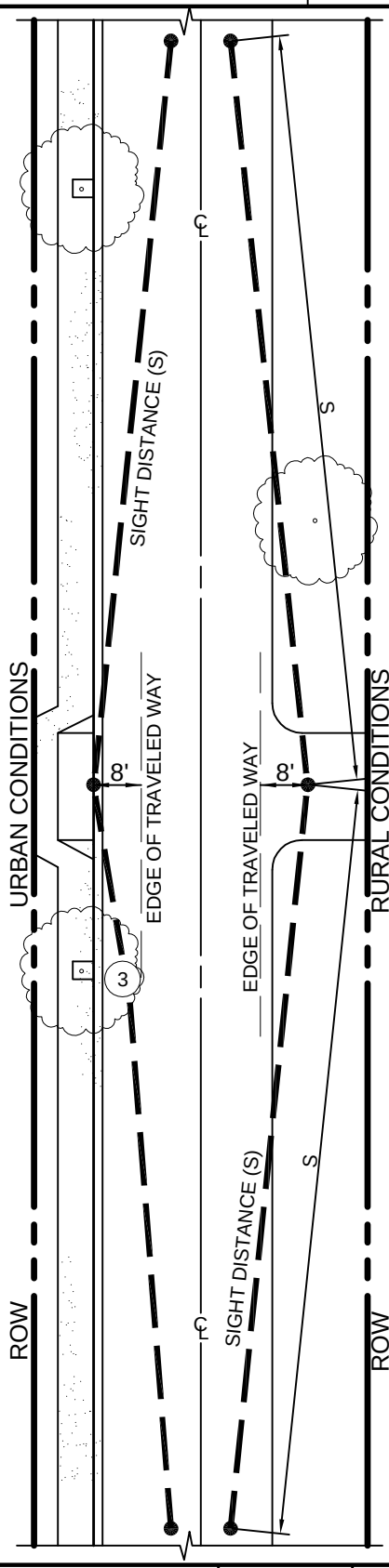
Description	Approved	Date	Description	Approved	Date

DESIGN SPEED (MPH)	"S" SIGHT DISTANCE (FEET)
20	125'
30	200'
40	275'
50	350'
60	450'

NOTES:
1. FOR USE WITH DRIVEWAY SIGHT DISTANCE ONLY. FOLLOW STATE STANDARD SIGHT DISTANCE REQUIREMENTS FOR INTERSECTIONS.
2. LINE OF SIGHT IS FROM A POINT ON THE DRIVEWAY WHICH IS 3-FEET HIGH AND 8-FEET BEHIND THE EDGE OF TRAVELED WAY, TO A POINT THAT IS 2.5-FEET HIGH AND LOCATED AT MIDPOINT OF THE TRAVELED WAY.
3. NO OBSTRUCTION OF THE LINE OF SIGHT SHALL BE ALLOWED WITHIN THE VERTICAL CLEAR ZONE BETWEEN 2.5-FEET AND 8-FEET.



VERTICAL CLEAR ZONE



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

DRIVEWAY SIGHT DISTANCE

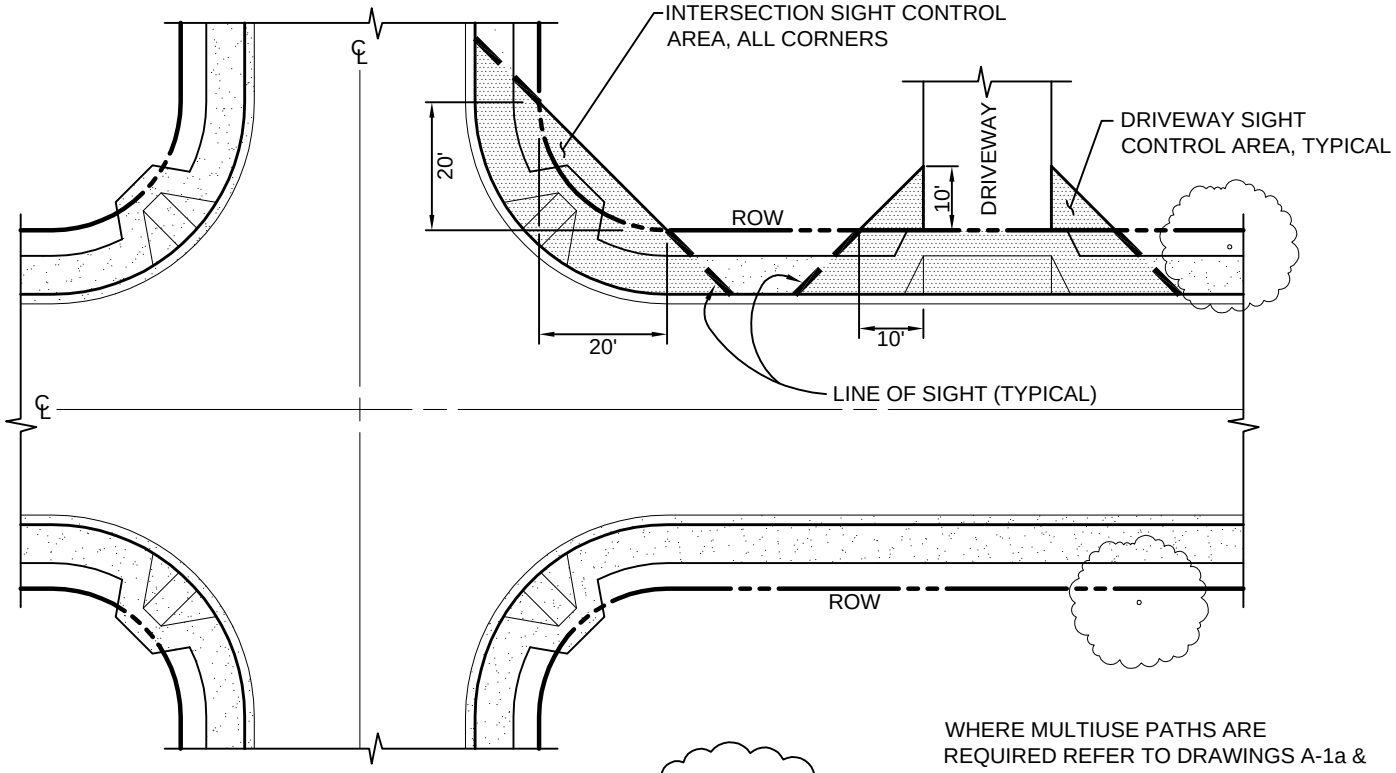
Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-5a

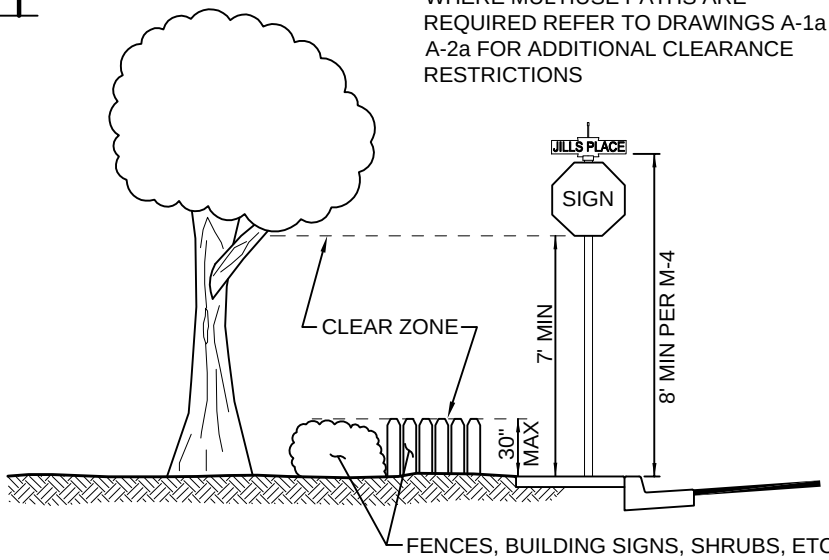
Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

NOTES:
1. OBSTRUCTIONS WITHIN CONTROLLED AREA SHALL NOT EXCEED THE MAXIMUM CLEARANCES IDENTIFIED HEREON.



WHERE MULTIUSE PATHS ARE REQUIRED REFER TO DRAWINGS A-1a & A-2a FOR ADDITIONAL CLEARANCE RESTRICTIONS



VERTICAL CLEAR ZONE

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SIGHT DISTANCE CONTROL AREAS

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-5b

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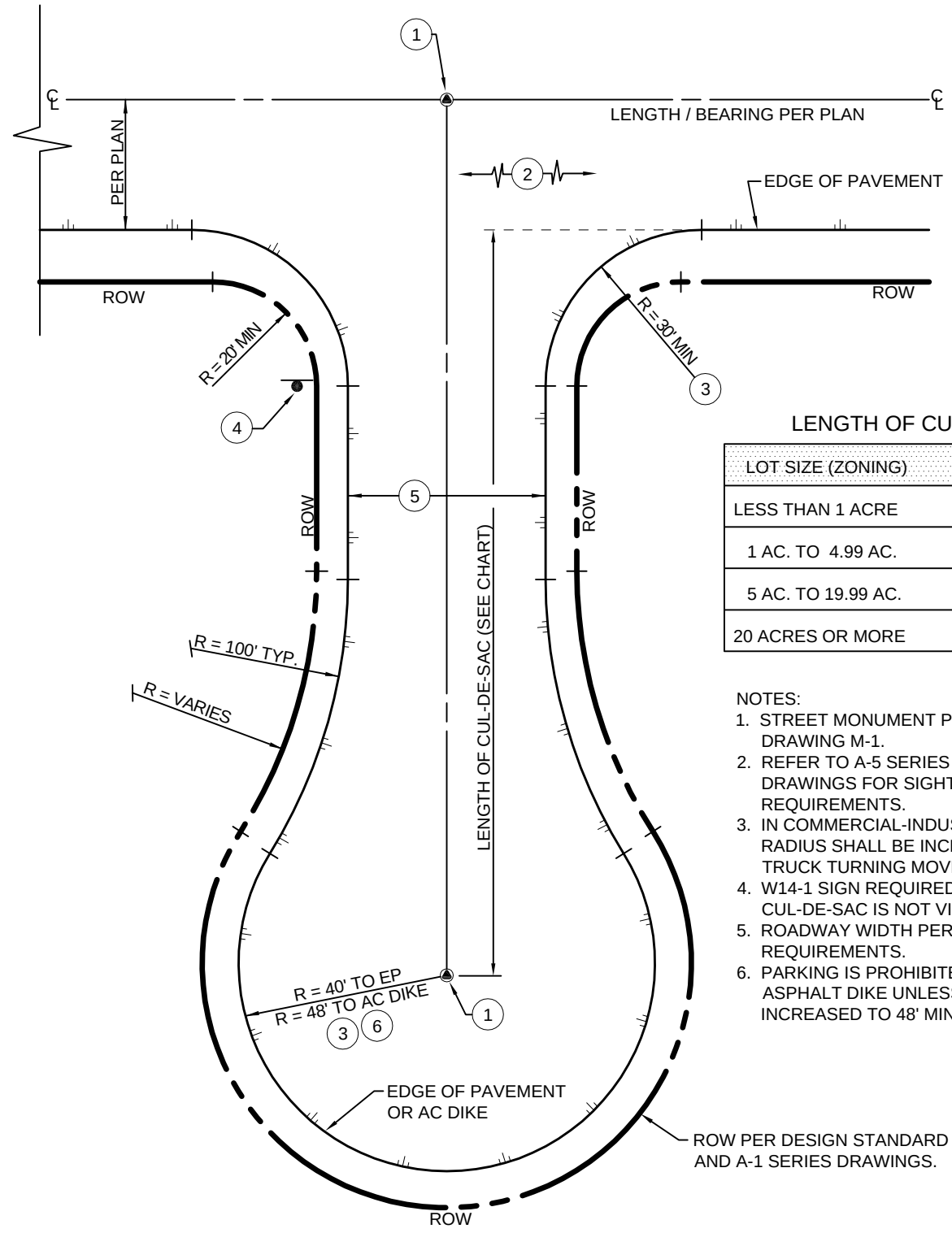

LENGTH OF CUL-DE-SAC

LOT SIZE (ZONING)	MAX. LENGTH
LESS THAN 1 ACRE	800'
1 AC. TO 4.99 AC.	1320'
5 AC. TO 19.99 AC.	2640'
20 ACRES OR MORE	5280'

NOTES:
1. STREET MONUMENT PER STANDARD DRAWING M-1.
2. REFER TO A-5 SERIES STANDARD DRAWINGS FOR SIGHT DISTANCE REQUIREMENTS.
3. IN COMMERCIAL-INDUSTRIAL ZONES THE RADIUS SHALL BE INCREASED TO MEET TRUCK TURNING MOVEMENTS.
4. W14-1 SIGN REQUIRED WHEN END OF CUL-DE-SAC IS NOT VISIBLE.
5. ROADWAY WIDTH PER DESIGN REQUIREMENTS.
6. PARKING IS PROHIBITED IN AREAS WITH ASPHALT DIKE UNLESS THE RADIUS IN INCREASED TO 48' MINIMUM.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CUL-DE-SAC

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-6

Sheet No: 1 OF 1

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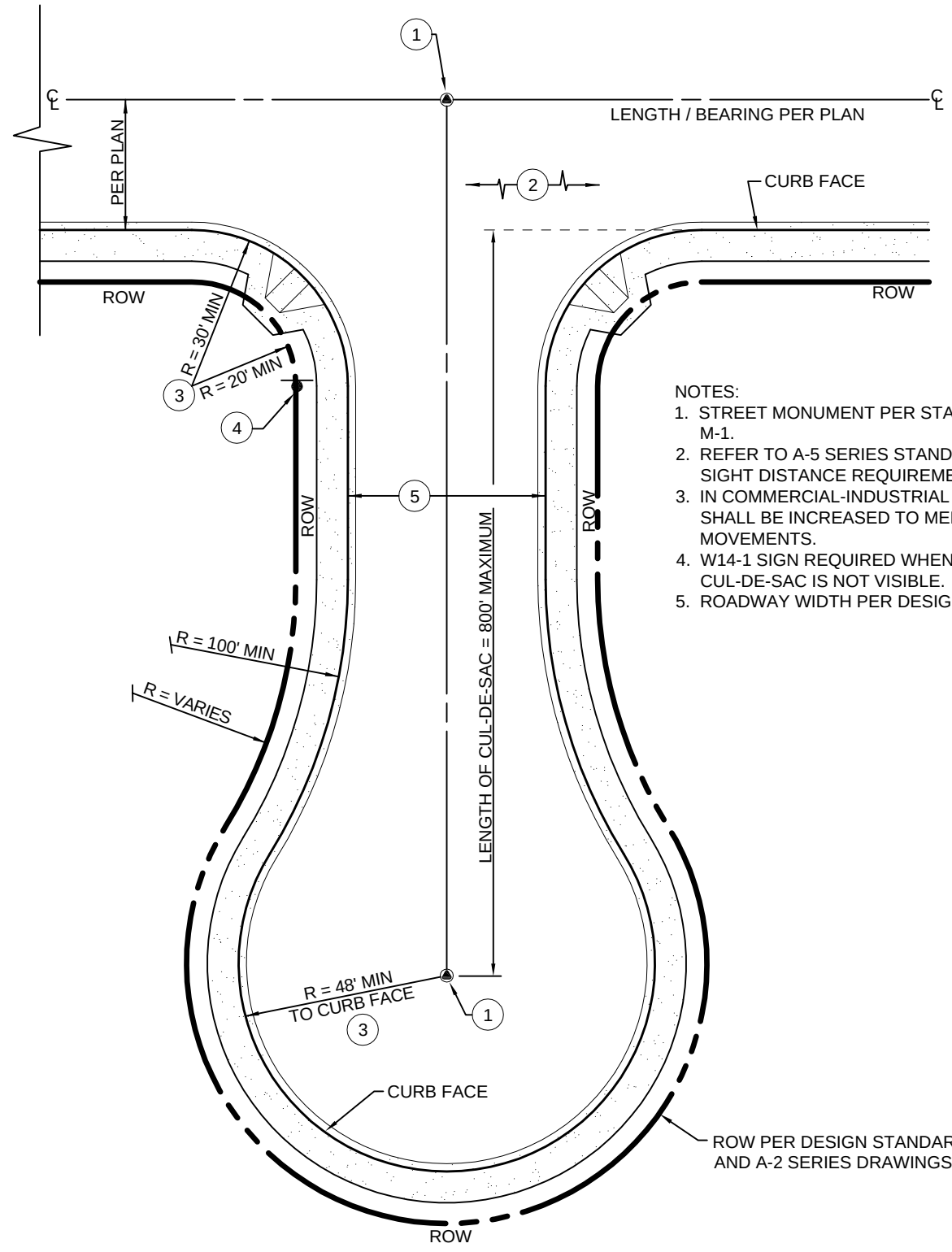

NOTES:
1. STREET MONUMENT PER STANDARD DRAWING M-1.
2. REFER TO A-5 SERIES STANDARD DRAWINGS FOR SIGHT DISTANCE REQUIREMENTS.
3. IN COMMERCIAL-INDUSTRIAL ZONES THE RADIUS SHALL BE INCREASED TO MEET TRUCK TURNING MOVEMENTS.
4. W14-1 SIGN REQUIRED WHEN END OF CUL-DE-SAC IS NOT VISIBLE.
5. ROADWAY WIDTH PER DESIGN REQUIREMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN CUL-DE-SAC

Scale:	Issued:
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Drawing No: A-6a

Sheet No: 1 OF 1

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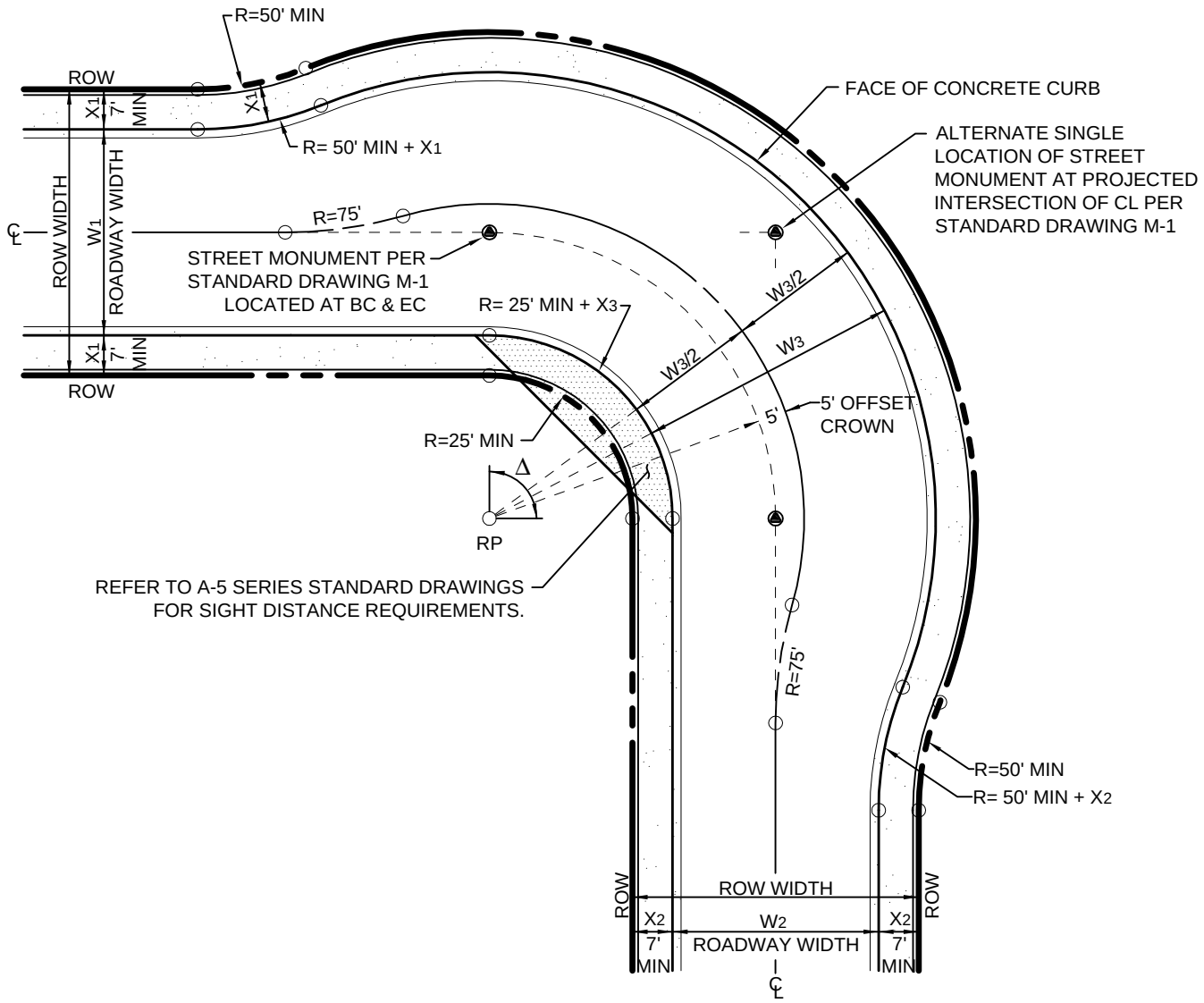
NOTES:
1. KNUCKLES SHALL ONLY BE ALLOWED IN URBAN AREAS.
2. KNUCKLE USE IS LIMITED TO ADT<500, DESIGN SPEEDS OF 25 MPH OR LESS, AND WITH PRIOR APPROVAL OF THE DEPARTMENT.
3. UNDER NO CIRCUMSTANCES SHALL Δ BE GREATER THAN 90°.
4. IN COMMERCIAL-INDUSTRIAL ZONES THE DEPARTMENT MAY REQUIRE THAT ALL RADII SHALL BE ADJUSTED BY THE DESIGN ENGINEER TO MEET TRUCK TURNING MOVEMENTS.



LAYOUT NOTES:
- W_3 = THE GREATER OF THE ROAD WIDTHS OF W_1 OR W_2 + 10'
- X_3 = THE GREATER OF THE ROW WIDTHS OF X_1 OR X_2

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL KNUCKLE

Scale:	Issued:
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Drawing No: A-6b

Sheet No: 1 OF 1

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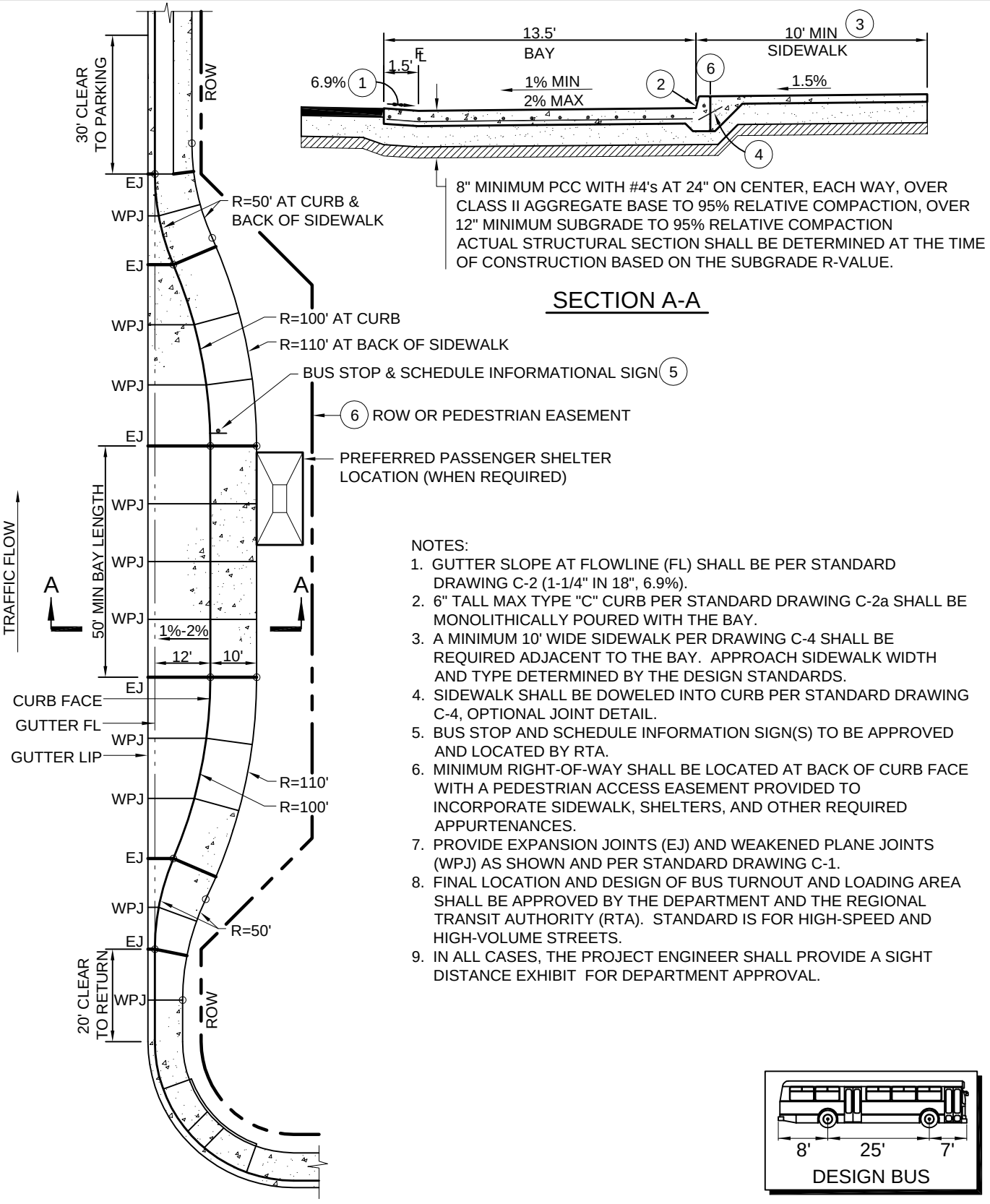

NOTES:

1. GUTTER SLOPE AT FLOWLINE (FL) SHALL BE PER STANDARD DRAWING C-2 (1-1/4" IN 18", 6.9%).
2. 6" TALL MAX TYPE "C" CURB PER STANDARD DRAWING C-2a SHALL BE MONOLITHICALLY POURED WITH THE BAY.
3. A MINIMUM 10' WIDE SIDEWALK PER DRAWING C-4 SHALL BE REQUIRED ADJACENT TO THE BAY. APPROACH SIDEWALK WIDTH AND TYPE DETERMINED BY THE DESIGN STANDARDS.
4. SIDEWALK SHALL BE DOWELED INTO CURB PER STANDARD DRAWING C-4, OPTIONAL JOINT DETAIL.
5. BUS STOP AND SCHEDULE INFORMATION SIGN(S) TO BE APPROVED AND LOCATED BY RTA.
6. MINIMUM RIGHT-OF-WAY SHALL BE LOCATED AT BACK OF CURB FACE WITH A PEDESTRIAN ACCESS EASEMENT PROVIDED TO INCORPORATE SIDEWALK, SHELTERS, AND OTHER REQUIRED APPURTENANCES.
7. PROVIDE EXPANSION JOINTS (EJ) AND WEAKENED PLANE JOINTS (WPJ) AS SHOWN AND PER STANDARD DRAWING C-1.
8. FINAL LOCATION AND DESIGN OF BUS TURNOUT AND LOADING AREA SHALL BE APPROVED BY THE DEPARTMENT AND THE REGIONAL TRANSIT AUTHORITY (RTA). STANDARD IS FOR HIGH-SPEED AND HIGH-VOLUME STREETS.
9. IN ALL CASES, THE PROJECT ENGINEER SHALL PROVIDE A SIGHT DISTANCE EXHIBIT FOR DEPARTMENT APPROVAL.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN BUS TURNOUT & LOADING AREA

Scale:	Issued:
NTS	Aug. 2006

Drawing No: A-6c

Sheet No: 1 OF 1

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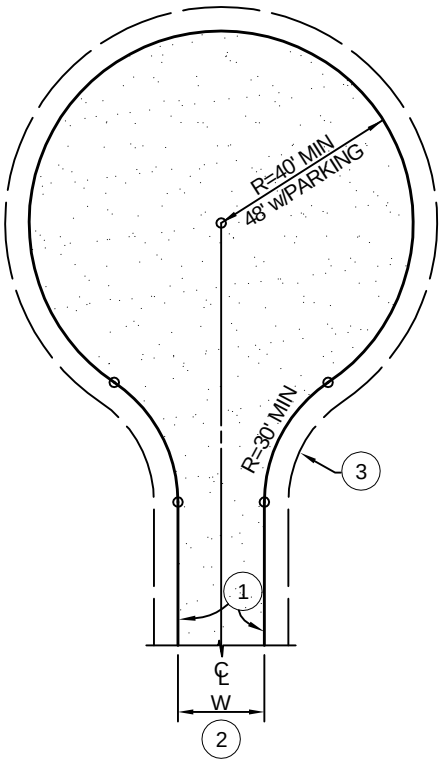
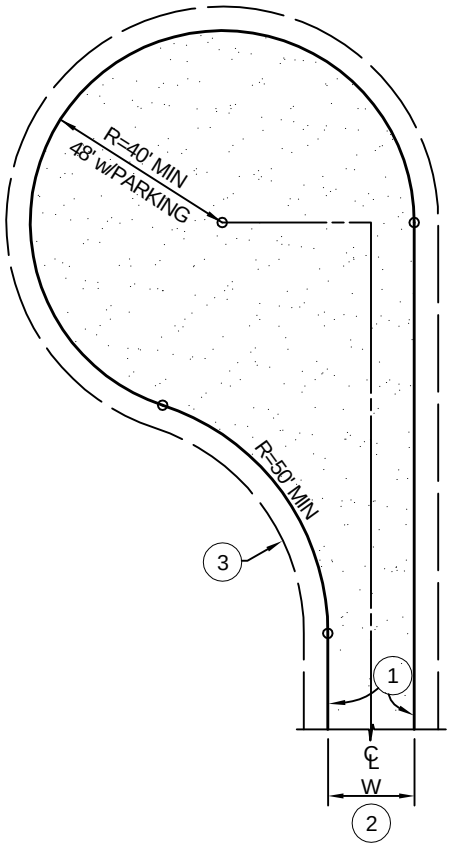
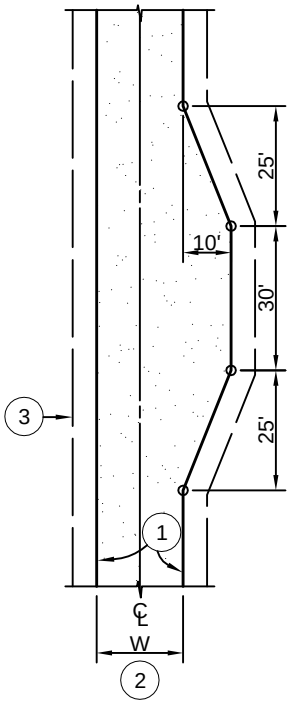


CUL-DE-SAC TURNAROUND

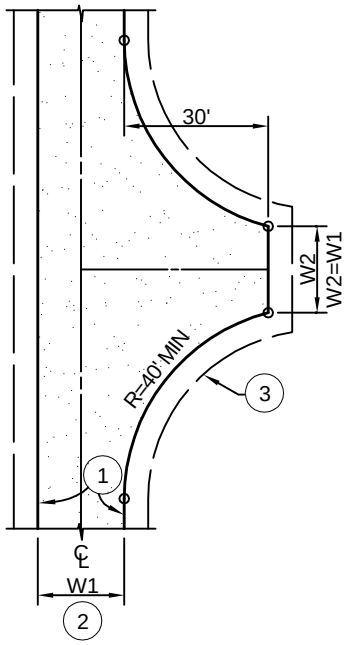


OFFSET CUL-DE-SAC TURNAROUND

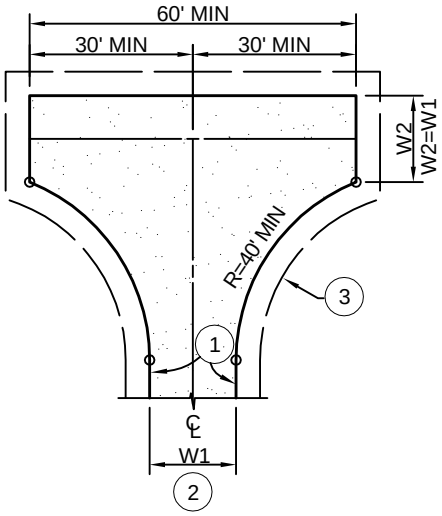


TURNOUT

WHERE REQUIRED BY CDF/SLOCO FIRE



90° TURNAROUND



HAMMERHEAD

NOTES:

1. EDGE OF PAVEMENT, EDGE OF GRAVEL ROAD, FACE OF AC DIKE, OR FACE OF CURB (REFER TO CURRENT CDF/SLO COUNTY FIRE "FIRE PREVENTION STANDARDS").
2. ACCESS ROAD WIDTH (W) AND STRUCTURAL SECTION REQUIREMENTS PER CURRENT CDF/SLO COUNTY "FIRE ROAD STANDARDS".
3. ACCESS EASEMENT SHALL EXTEND A MINIMUM OF 5' BEYOND THE LIMITS OF REQUIRED GRADING OR AS DICTATED BY THE DESIGN ENGINEER.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPICAL FIRE ACCESS TURN AROUND STANDARDS

Scale:	Issued:
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Drawing No: A-6d

Sheet No: 1 OF 1

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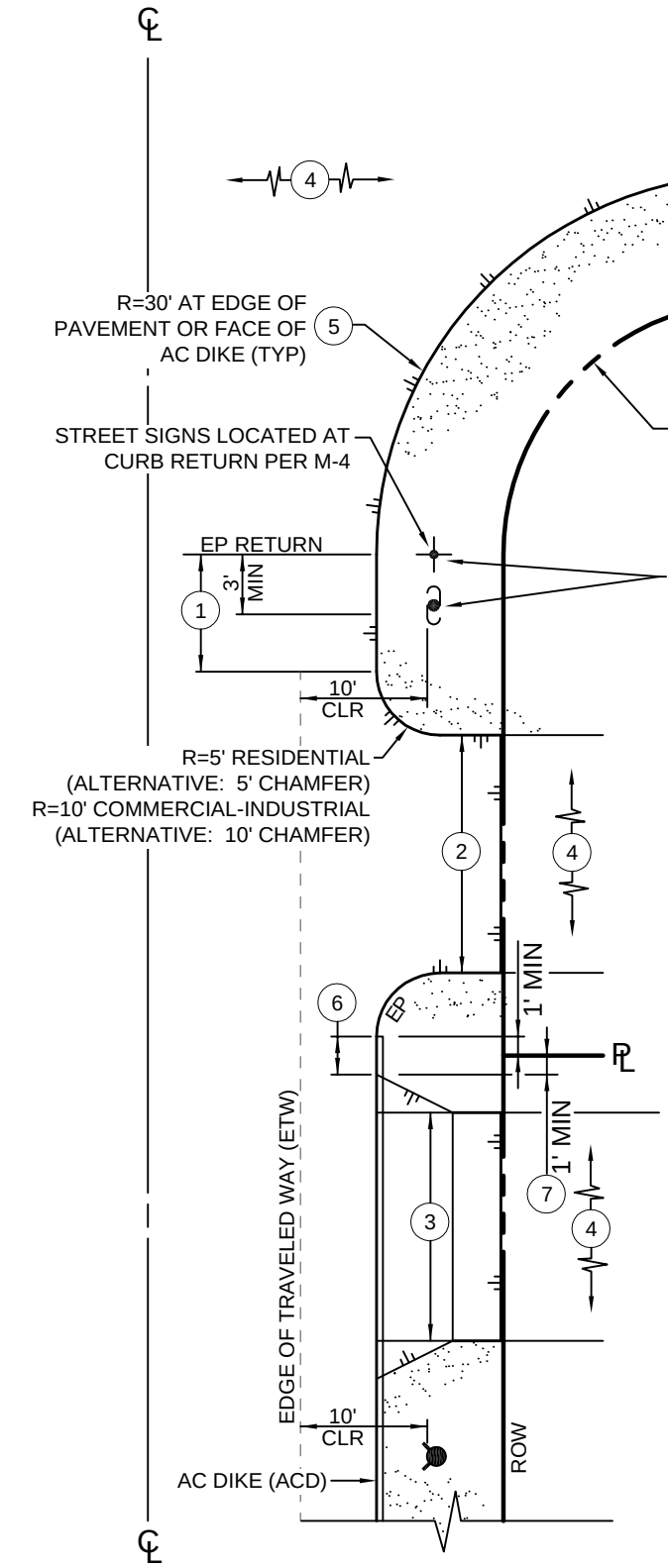

ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, ABOVE GROUND VAULTS AND ALL OTHER ROADSIDE OBSTACLES SHALL BE LOCATED TO PROVIDE A 10-FOOT CLEAR ZONE FROM THE EDGE OF TRAVELED WAY. WITH THE EXCEPTION OF TRAFFIC SIGNS, ALL OBSTACLES SHALL BE LOCATED NO CLOSER THAN 3-FEET TO A RETURN AND SHALL MEET THE SIGHT DISTANCE REQUIREMENTS OF THE A-5 SERIES DRAWINGS.

NOTES:

1. DISTANCE BETWEEN THE CURB RETURN AND THE FIRST DRIVEWAY SHALL BE 6-FEET MINIMUM FOR RURAL RESIDENTIAL, AND 50-FEET MINIMUM FOR COMMERCIAL AND INDUSTRIAL ZONES.
2. STANDARD DRAWING B-1a SHALL BE USED WHEN THE DRIVEWAY IS LOCATED AGAINST EDGE OF PAVEMENT.
3. STANDARD DRAWING B-1b SHALL BE USED WHEN THE DRIVEWAY IS LOCATED AGAINST ASPHALT DIKE.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
6. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM CLEARANCE BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FEET AND 20-FEET ARE NOT ALLOWED).
7. THE DRIVEWAY WING OR RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM EACH PROPERTY LINE. THIS STANDARD MAY BE WAIVED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
8. IN RESIDENTIAL ZONES, THE TOTAL WIDTH (W) OF ALL DRIVEWAYS SERVING A SINGLE PARCEL SHALL NOT EXCEED 60-PERCENT OF THE PARCEL FRONTAGE.
9. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL DRIVEWAY

LAYOUT STANDARDS

Scale:	Issued:
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Drawing No: B-1

Sheet No: 1 OF 1

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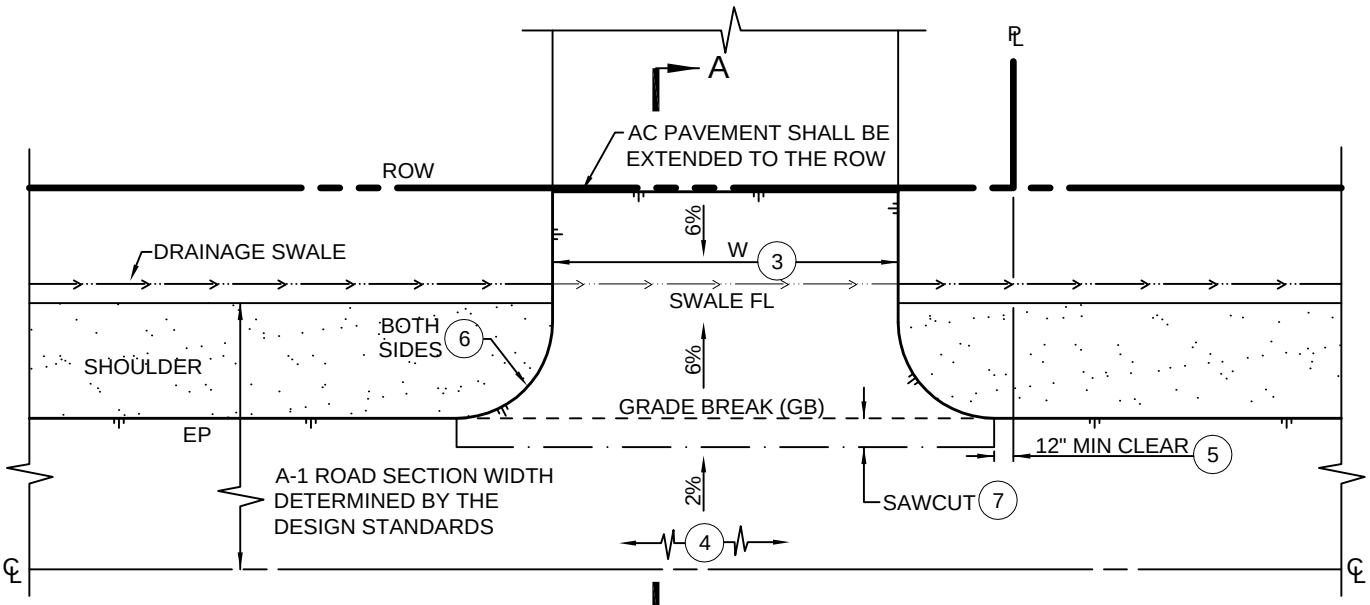
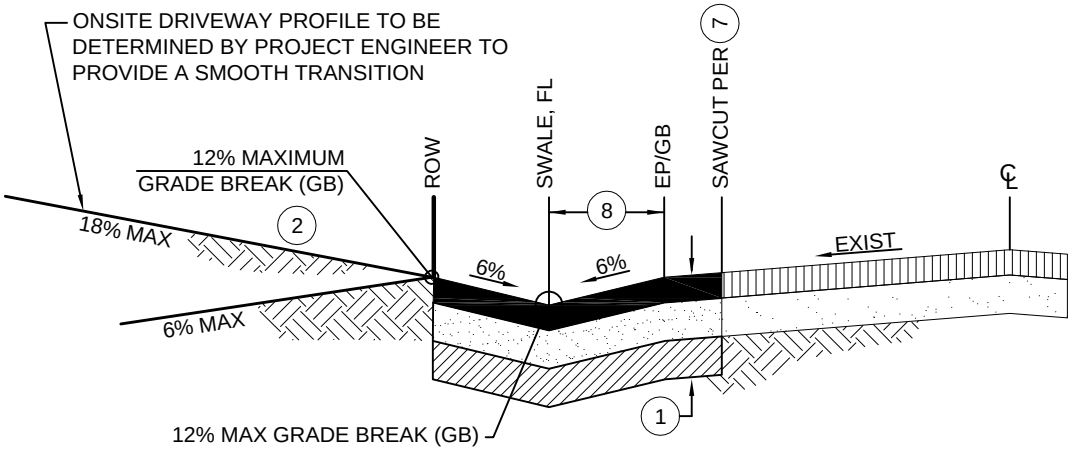


PLAN VIEW



SECTION A-A

NOTES:

1. WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
2. OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
3. RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET CDF/FIRE REGULATIONS.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
6. THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FEET FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FEET FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
7. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 OR R-1a.
8. DISTANCE TO MATCH ROADSIDE DRAINAGE SWALE PER SERIES A-1 DRAWING REQUIREMENTS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL RESIDENTIAL DRIVEWAY

TYPE 1 ASPHALT DRIVEWAY

Scale:	Issued:
NTS	Aug. 2006

Drawing No: B-1a

Sheet No: 1 OF 1

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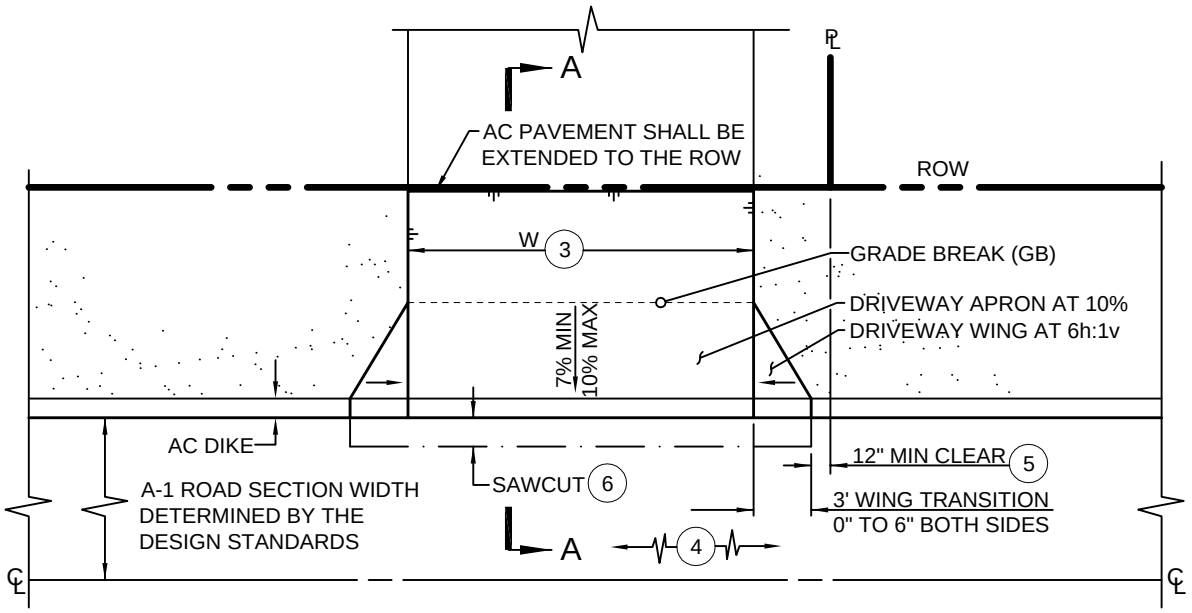
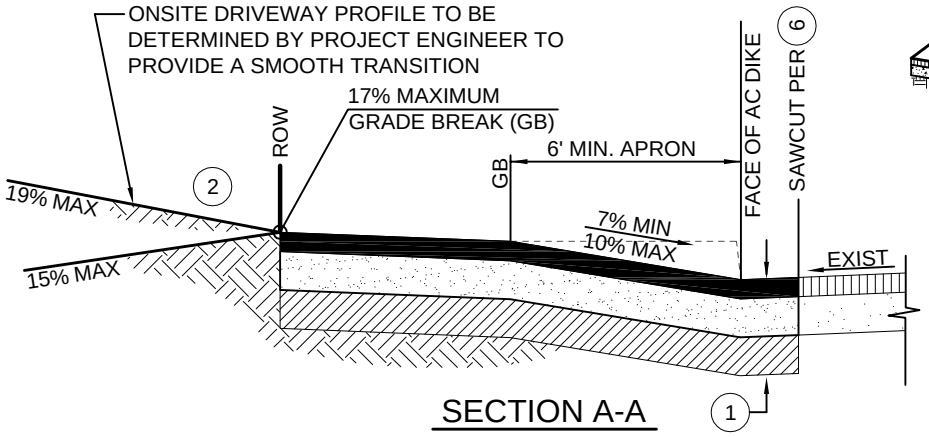
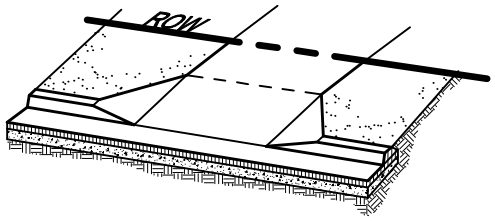
Description	Approved	Date	Description	Approved	Date



PLAN VIEW



SECTION A-A



PERSPECTIVE VIEW
NO SCALE

NOTES:
1. WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
2. OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
3. RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET CDF/FIRE REGULATIONS.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. THE DRIVEWAY WING SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
6. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 OR R-1a.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL RESIDENTIAL DRIVEWAY

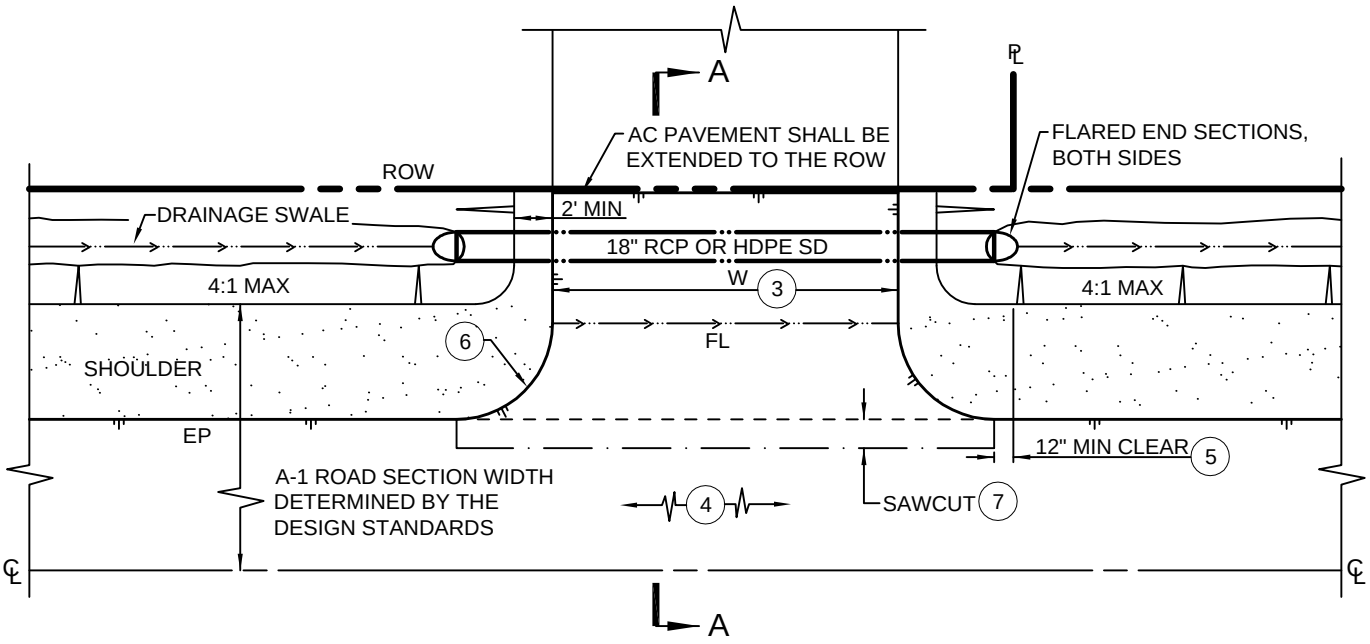
TYPE 2 ASPHALT DRIVEWAY

Scale:	Issued:
NTS	Aug. 2006

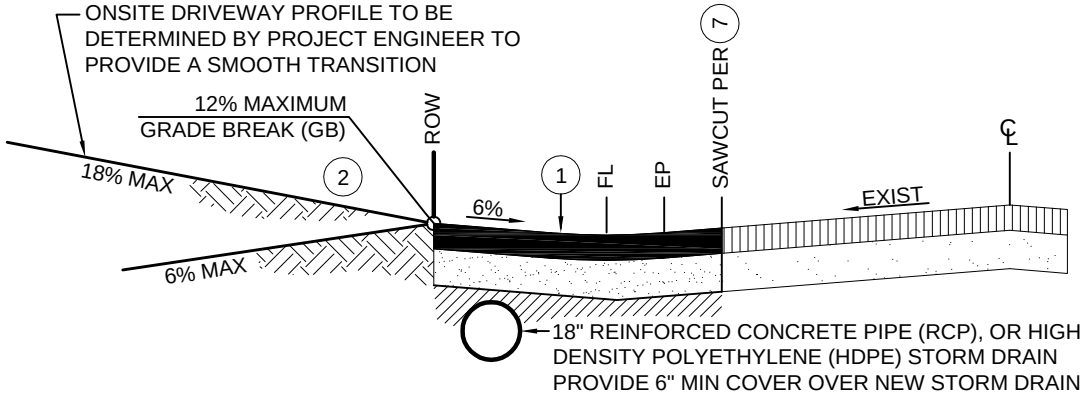
Drawing No: B-1b

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



PLAN VIEW



SECTION A-A

NOTES:

1. WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
2. OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
3. RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET CDF/FIRE REGULATIONS.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
6. THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FEET FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FEET FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
7. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 OR R-1a.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL RESIDENTIAL DRIVEWAY

TYPE 3: ASPHALT DRIVEWAY WITH CULVERT (PRIOR DEPARTMENT APPROVAL REQUIRED)

Scale:	Issued:
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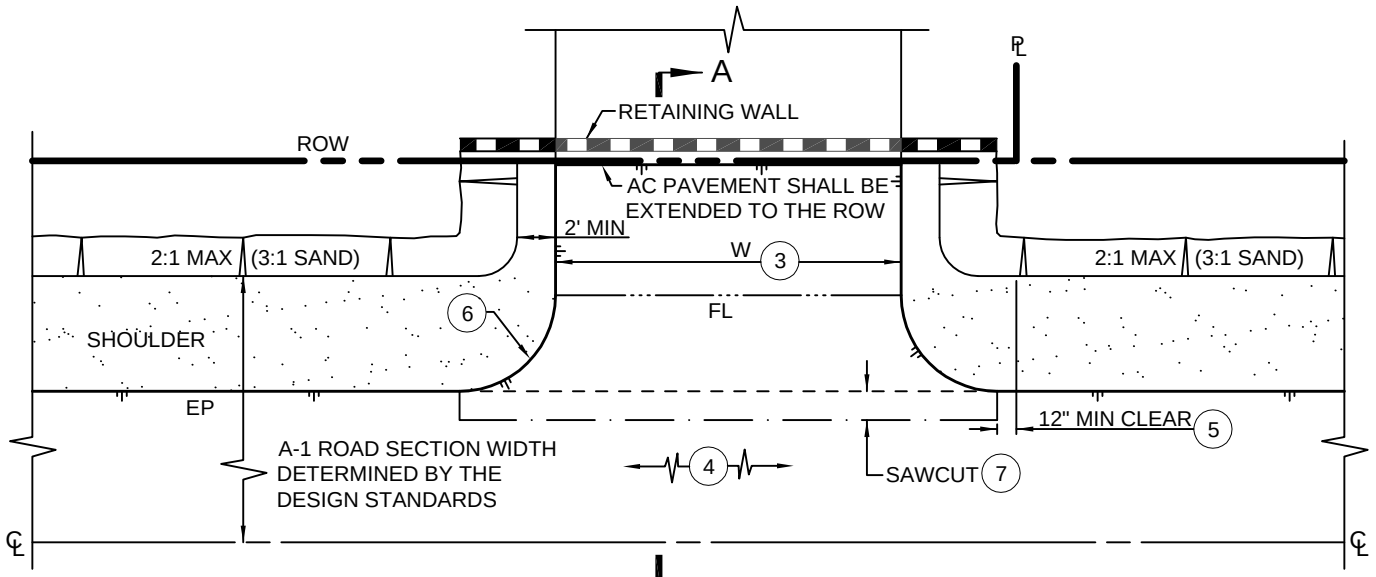
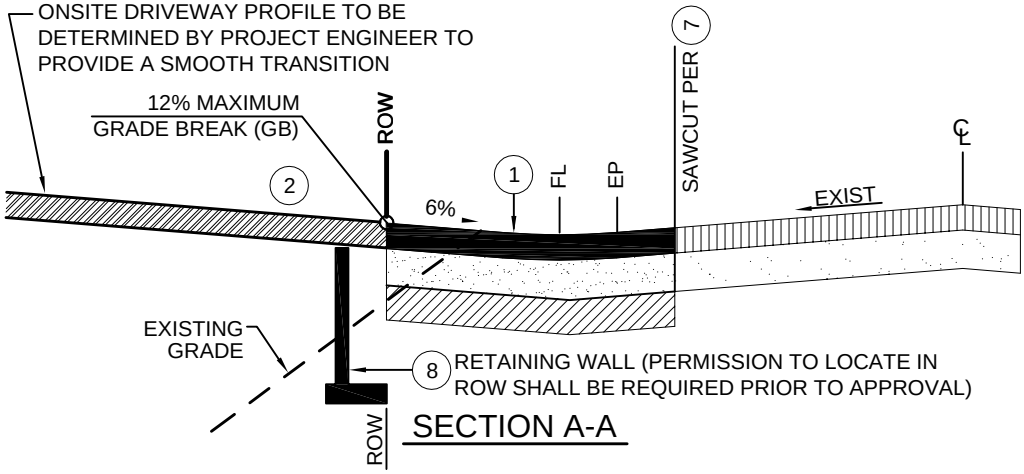
Drawing No: B-1c

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



PLAN VIEW



SECTION A-A

NOTES:

1. WITHIN THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY SECTION SHALL MATCH THE APPROVED ROAD SECTION, OR SHALL MATCH THE EXISTING ROAD SECTION, AND SHALL MEET THE FOLLOWING REQUIREMENTS:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
2. OUTSIDE THE PUBLIC RIGHT-OF-WAY, THE DRIVEWAY STRUCTURAL SECTION SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHALL BE IN COMPLIANCE WITH CDF/FIRE REGULATIONS.
3. RESIDENTIAL DRIVEWAY WIDTH SHALL BE 10' MINIMUM TO 20' MAXIMUM, COMMERCIAL-INDUSTRIAL DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM TO 35-FEET MAXIMUM. ALL DRIVEWAYS SHALL MEET CDF/FIRE REGULATIONS.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. THE END OF DRIVEWAY RETURN SHALL BE 1-FOOT MINIMUM CLEAR FROM THE PROPERTY LINE.
6. THE DRIVEWAY RETURN SHALL HAVE A RADIUS OF 5-FEET FOR RESIDENTIAL (ALTERNATIVE: 5-FOOT CHAMFER), AND A RADIUS OF 10-FEET FOR COMMERCIAL-INDUSTRIAL (ALTERNATIVE: 10-FOOT CHAMFER).
7. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-1 OR R-1a.
8. IF RETAINING WALL ARE REQUIRED TO BE LOCATED IN THE RIGHT-OF-WAY THE FOLLOWING SHALL APPLY:
   A. PRIOR APPROVAL SHALL BE GRANTED BY THE DEPARTMENT.
   B. THE RETAINING WALL SHALL BE ENGINEERED. PLANS AND CALCULATIONS SHALL BE SUBMITTED FOR DEPARTMENT APPROVAL.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL RESIDENTIAL DRIVEWAY

TYPE 4: ASPHALT DRIVEWAY W/ RETAINING WALL (PRIOR DEPARTMENT APPROVAL REQUIRED)

Scale:	Issued:
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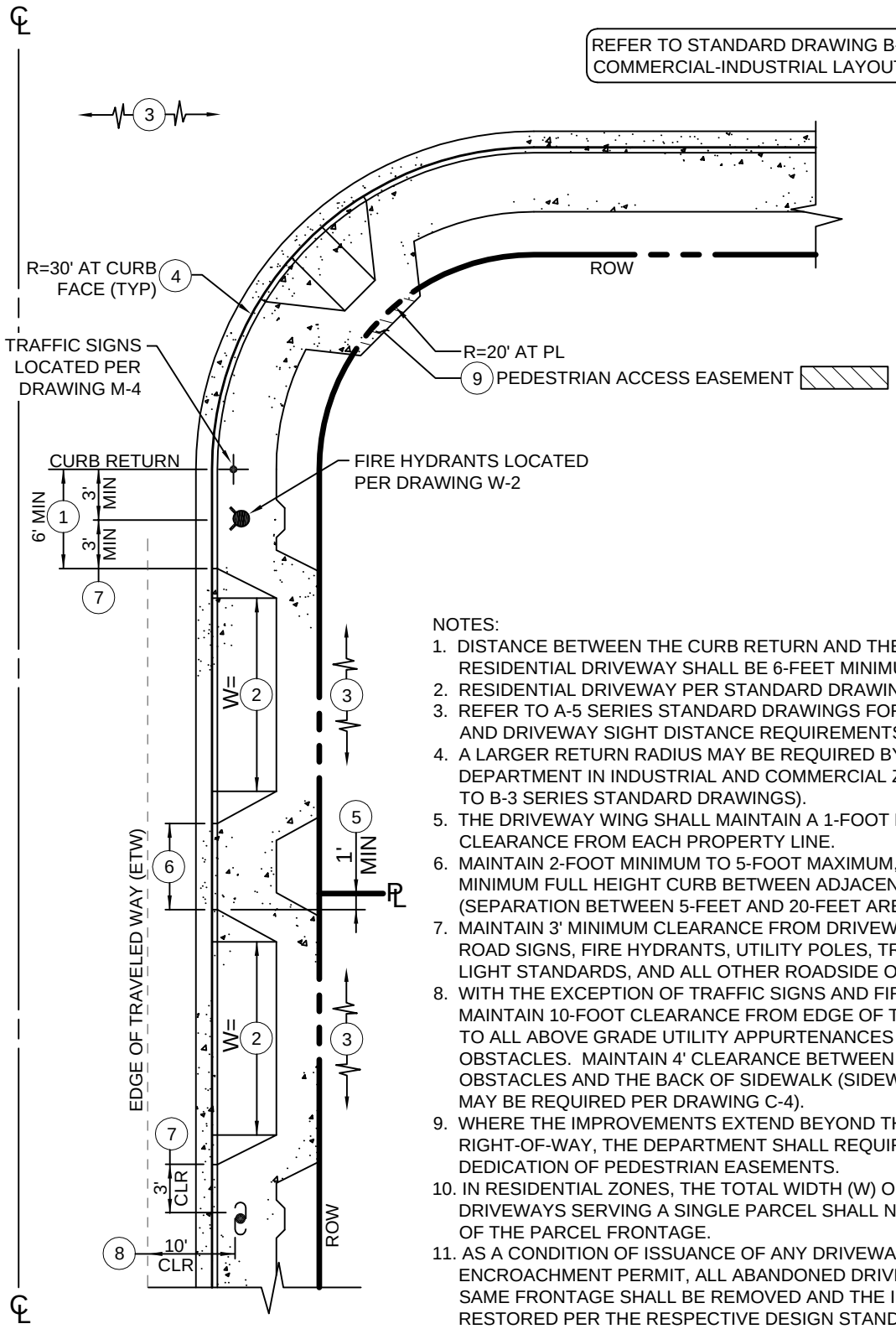
Drawing No: B-1d

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

REFER TO STANDARD DRAWING B-3 FOR URBAN COMMERCIAL-INDUSTRIAL LAYOUT STANDARDS



NOTES:

1. DISTANCE BETWEEN THE CURB RETURN AND THE FIRST RESIDENTIAL DRIVEWAY SHALL BE 6-FEET MINIMUM.
2. RESIDENTIAL DRIVEWAY PER STANDARD DRAWING B-2a.
3. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
4. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES (REFER TO B-3 SERIES STANDARD DRAWINGS).
5. THE DRIVEWAY WING SHALL MAINTAIN A 1-FOOT MINIMUM CLEARANCE FROM EACH PROPERTY LINE.
6. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM FULL HEIGHT CURB BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FEET AND 20-FEET ARE NOT ALLOWED).
7. MAINTAIN 3' MINIMUM CLEARANCE FROM DRIVEWAY WING TO ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, AND ALL OTHER ROADSIDE OBSTACLES.
8. WITH THE EXCEPTION OF TRAFFIC SIGNS AND FIRE HYDRANTS, MAINTAIN 10-FOOT CLEARANCE FROM EDGE OF TRAVELED WAY TO ALL ABOVE GRADE UTILITY APPURTENANCES AND ROADSIDE OBSTACLES. MAINTAIN 4' CLEARANCE BETWEEN ALL SUCH OBSTACLES AND THE BACK OF SIDEWALK (SIDEWALK WIDENING MAY BE REQUIRED PER DRAWING C-4).
9. WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE DEPARTMENT SHALL REQUIRE THE DEDICATION OF PEDESTRIAN EASEMENTS.
10. IN RESIDENTIAL ZONES, THE TOTAL WIDTH (W) OF ALL DRIVEWAYS SERVING A SINGLE PARCEL SHALL NOT EXCEED 60% OF THE PARCEL FRONTAGE.
11. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.
12. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN DRIVEWAY

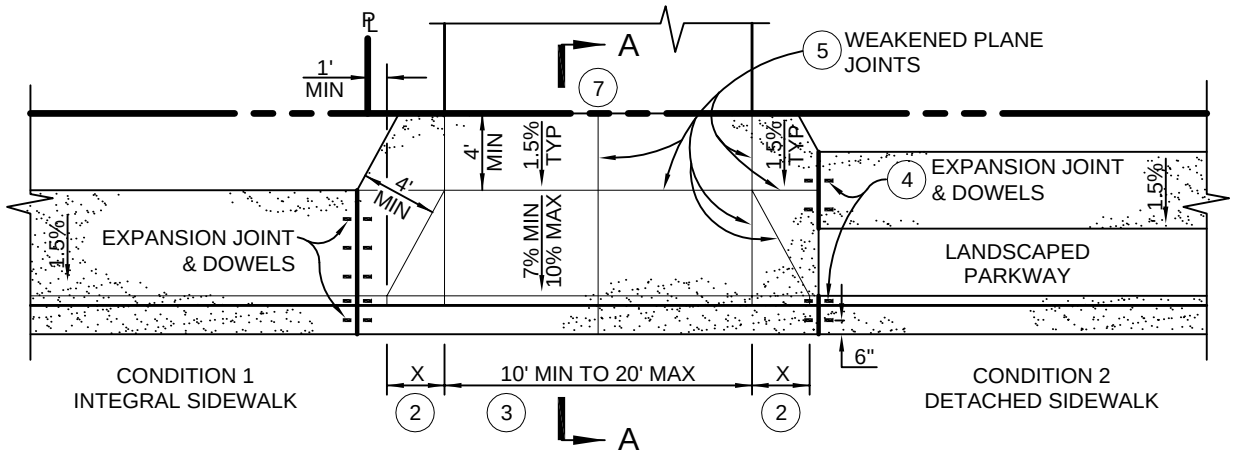
LAYOUT STANDARDS

Scale:	Issued:
NTS	Aug. 2006

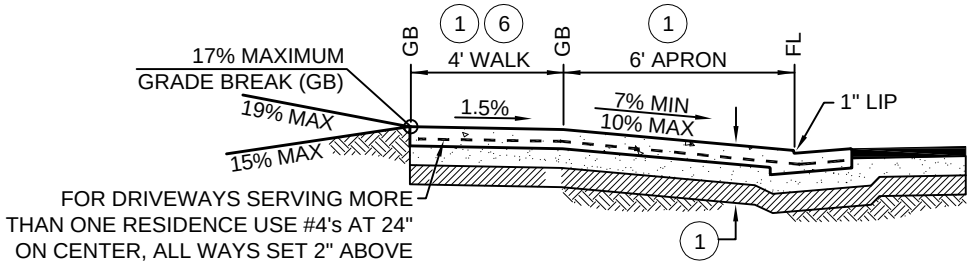
Drawing No: B-2

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

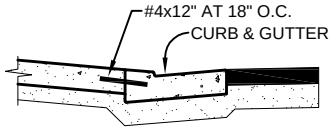


PLAN



FOR DRIVEWAYS SERVING MORE THAN ONE RESIDENCE USE #4's AT 24" ON CENTER, ALL WAYS SET 2" ABOVE AGGREGATE BASE ON DOBIES.

SECTION A-A



WHEN CURB & GUTTER IS PLACED PRIOR TO DRIVEWAY CONSTRUCTION THEN THE NEW DRIVEWAY SHALL BE DOWELED INTO THE CURB AND GUTTER WITH #4x12" AT 18" OC

COLD JOINT DETAIL

NOTES:

1. CONCRETE DRIVEWAY SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
   - 6-INCH MIN PORTLAND CEMENT CONCRETE, OVER
   - 6" MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 6" OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
   A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS. THE 4-FOOT WIDE SIDEWALK SHALL HAVE A LIGHT BROOM FINISH PARALLEL TO THE LINE OF TRAFFIC.
2. X = 3-FEET (6h:1v) EXCEPT FOR CURB HEIGHTS OVER 8-INCHES WHERE 4h:1v SLOPES SHALL BE USED ON CURB SLOPE.
3. W = DRIVEWAY WIDTH SHALL BE 10-FEET MINIMUM AND 20-FEET MAXIMUM FOR RESIDENTIAL ACCESS.
4. EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"Øx18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
5. WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
6. THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
7. WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE ACQUISITION OF PEDESTRIAN EASEMENTS SHALL BE REQUIRED BY THE DEPARTMENT.
8. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
9. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-2 OR R-2a.
10. THE HIGH VOLUME DRIVEWAY STANDARD B-3b SHALL BE USED AT ENTRANCES TO RESIDENTIAL DRIVEWAYS THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO AN ARTERIAL ROAD. THE DEPARTMENT RESERVES THE RIGHT TO REQUIRE THE USE OF A HIGH VOLUME DRIVEWAY BASED ON OTHER EXTENUATING CONDITIONS.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN DRIVEWAY

RESIDENTIAL DRIVEWAY

Scale:	Issued:
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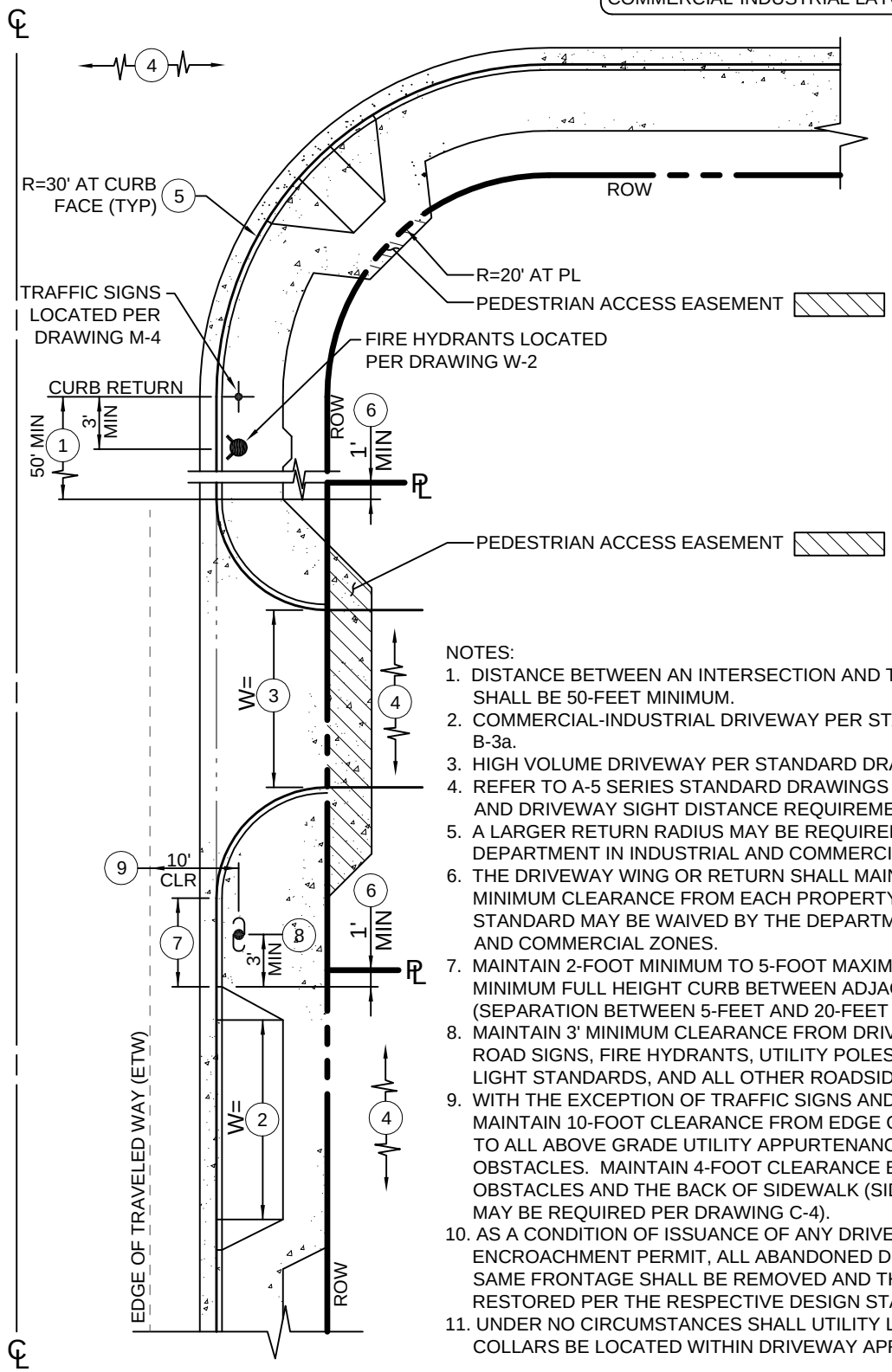
Drawing No: B-2a

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

REFER TO STANDARD DRAWING B-1 FOR RURAL COMMERCIAL-INDUSTRIAL LAYOUT STANDARDS



NOTES:

1. DISTANCE BETWEEN AN INTERSECTION AND THE FIRST DRIVEWAY SHALL BE 50-FEET MINIMUM.
2. COMMERCIAL-INDUSTRIAL DRIVEWAY PER STANDARD DRAWING B-3a.
3. HIGH VOLUME DRIVEWAY PER STANDARD DRAWING B-3b.
4. REFER TO A-5 SERIES STANDARD DRAWINGS FOR INTERSECTION AND DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
5. A LARGER RETURN RADIUS MAY BE REQUIRED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
6. THE DRIVEWAY WING OR RETURN SHALL MAINTAIN A 1-FOOT MINIMUM CLEARANCE FROM EACH PROPERTY LINE. THIS STANDARD MAY BE WAIVED BY THE DEPARTMENT IN INDUSTRIAL AND COMMERCIAL ZONES.
7. MAINTAIN 2-FOOT MINIMUM TO 5-FOOT MAXIMUM, OR 20-FOOT MINIMUM FULL HEIGHT CURB BETWEEN ADJACENT DRIVEWAYS (SEPARATION BETWEEN 5-FEET AND 20-FEET ARE NOT ALLOWED).
8. MAINTAIN 3' MINIMUM CLEARANCE FROM DRIVEWAY WING TO ROAD SIGNS, FIRE HYDRANTS, UTILITY POLES, TRAFFIC SIGNALS, LIGHT STANDARDS, AND ALL OTHER ROADSIDE OBSTACLES.
9. WITH THE EXCEPTION OF TRAFFIC SIGNS AND FIRE HYDRANTS, MAINTAIN 10-FOOT CLEARANCE FROM EDGE OF TRAVELED WAY TO ALL ABOVE GRADE UTILITY APPURTENANCES AND ROADSIDE OBSTACLES. MAINTAIN 4-FOOT CLEARANCE BETWEEN ALL SUCH OBSTACLES AND THE BACK OF SIDEWALK (SIDEWALK WIDENING MAY BE REQUIRED PER DRAWING C-4).
10. AS A CONDITION OF ISSUANCE OF ANY DRIVEWAY ENCROACHMENT PERMIT, ALL ABANDONED DRIVEWAYS ON THE SAME FRONTAGE SHALL BE REMOVED AND THE IMPROVEMENTS RESTORED PER THE RESPECTIVE DESIGN STANDARDS.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

COMMERCIAL-INDUSTRIAL DRIVEWAY

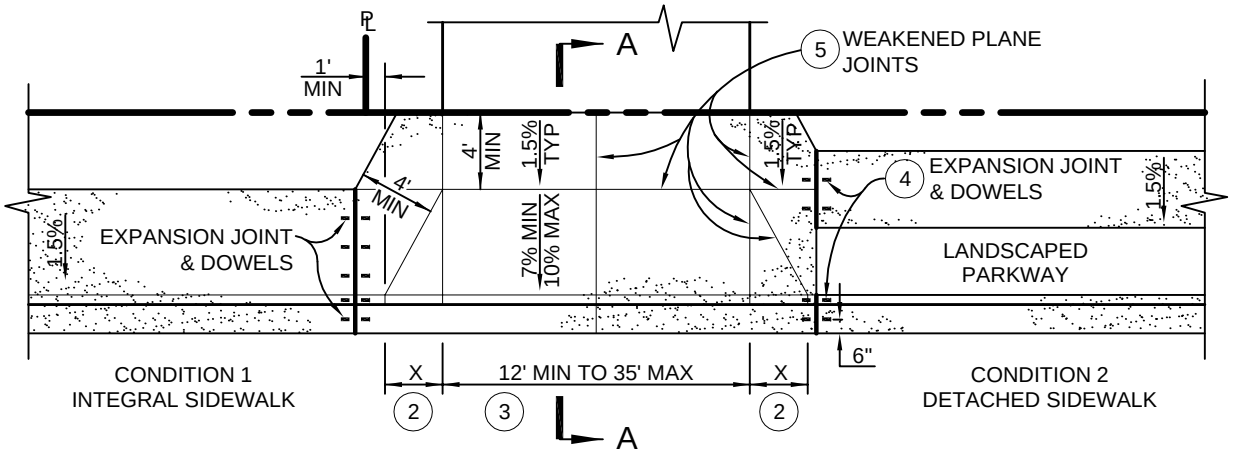
LAYOUT STANDARDS

Scale:	Issued:
NTS	Aug. 2006

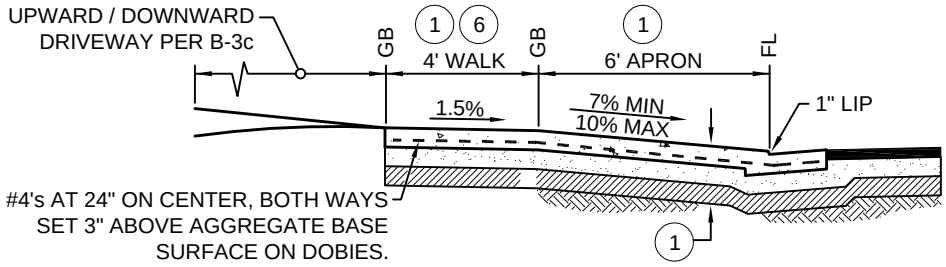
Drawing No: B-3

Sheet No: 1 OF 1

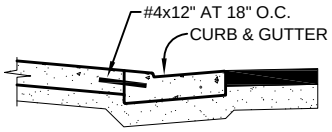
Revisions					
Description	Approved	Date	Description	Approved	Date



PLAN



SECTION A-A



WHEN CURB & GUTTER IS PLACED PRIOR TO DRIVEWAY CONSTRUCTION THEN THE NEW DRIVEWAY SHALL BE DOWELED INTO THE CURB AND GUTTER WITH #4x12" AT 18" OC

COLD JOINT DETAIL

NOTES:

1. CONCRETE DRIVEWAY SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
   - 8-INCH MINIMUM PORTLAND CEMENT CONCRETE REINFORCED WITH #4's AT 24" OC BOTH WAYS, OVER
   - 6" MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 6-INCHES OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
   A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS. THE 4-FOOT WIDE SIDEWALK SHALL HAVE A LIGHT BROOM FINISH PARALLEL TO THE LINE OF TRAFFIC.
2. X = 3-FEET (6h:1v) EXCEPT FOR CURB HEIGHTS OVER 8-INCHES WHERE 4h:1v SLOPES SHALL BE USED ON CURB SLOPE.
3. W = DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM AND 35-FEET MAXIMUM FOR COMMERCIAL-INDUSTRIAL ACCESS.
4. EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"Øx18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
5. WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
6. THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
7. WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE ACQUISITION OF PEDESTRIAN EASEMENTS SHALL BE REQUIRED BY THE DEPARTMENT.
8. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
9. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-2 OR R-2a.
10. THE HIGH VOLUME DRIVEWAY STANDARD B-3b SHALL BE USED AT ENTRANCES THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO AN ARTERIAL ROAD. THE DEPARTMENT RESERVES THE RIGHT TO REQUIRE THE USE OF A HIGH VOLUME DRIVEWAY BASED ON OTHER EXTENUATING CONDITIONS.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

COMMERCIAL-INDUSTRIAL DRIVEWAY

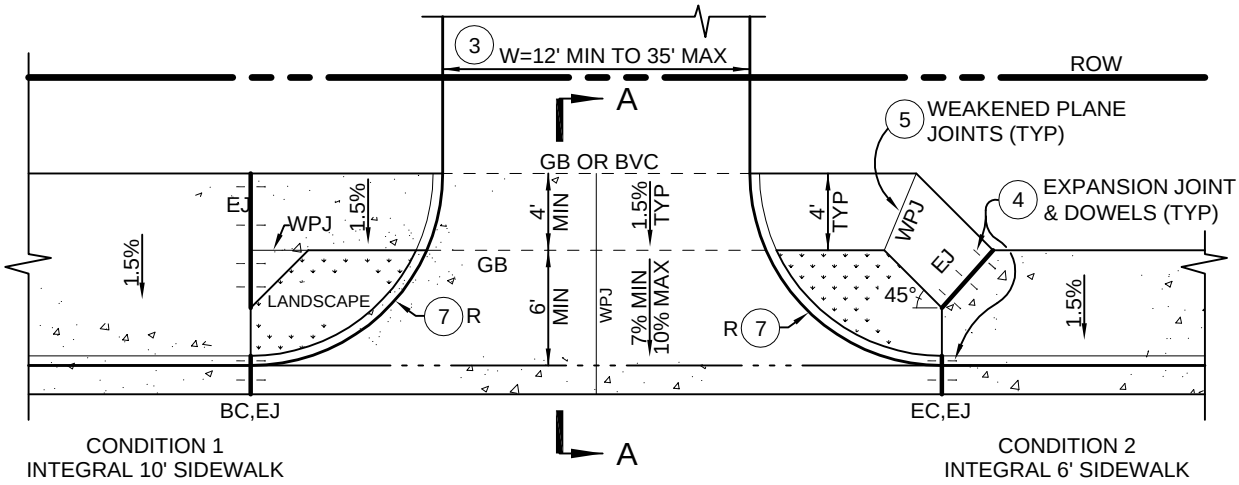
STANDARD DRIVEWAY

Scale:	Issued:
NTS	Aug. 2006

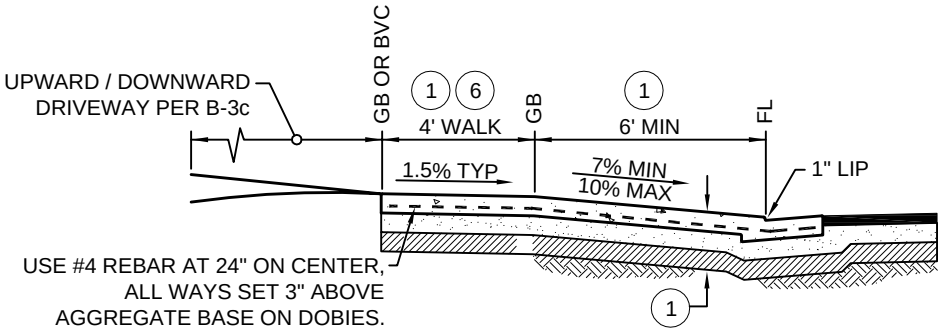
Drawing No: B-3a

Sheet No: 1 OF 1

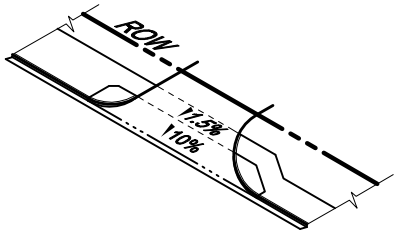
Revisions					
Description	Approved	Date	Description	Approved	Date



PLAN



SECTION A-A



PERSPECTIVE VIEW
NO SCALE

NOTES:

1. CONCRETE DRIVEWAY SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE. TYPICAL SECTION SHALL BE:
   - 8-INCH MINIMUM PORTLAND CEMENT CONCRETE REINFORCED WITH #4's AT 24" OC BOTH WAYS, OVER
   - 6" MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION

   IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 6-INCHES OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
   A COURSE BROOM FINISH TRANSVERSE TO THE LINE OF TRAFFIC SHALL BE USED ON THE APRON AND WINGS. THE 4-
2. DIMENSIONS "W" & "R" AND PARKWAY WIDTH SHALL BE SHOWN ON PLANS.
3. W = DRIVEWAY WIDTH SHALL BE 12-FEET MINIMUM AND 35-FEET MAXIMUM FOR COMMERCIAL-INDUSTRIAL ACCESS.
4. EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AS SHOWN. 1/2"Øx18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
5. WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED AS SHOWN AND PER STANDARD DRAWING C-1.
6. THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
7. RADIUS (R) EQUALS PARKWAY WIDTH BUT SHALL NOT BE LESS THAN 10 FEET.
8. WHERE THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY, THE ACQUISITION OF PEDESTRIAN EASEMENTS SHALL BE REQUIRED BY THE DEPARTMENT.
8. REFER TO A-5 SERIES STANDARD DRAWINGS FOR DRIVEWAY SIGHT DISTANCE REQUIREMENTS.
9. FOR NEW DRIVEWAY CONSTRUCTION AGAINST EXISTING ROADWAY, SAWCUT TO REMOVE EXISTING ROADWAY AND RECONSTRUCT PER STANDARD DRAWINGS R-2 OR R-2a.
10. THIS HIGH VOLUME DRIVEWAY STANDARD SHALL BE USED AT ENTRANCES THAT EXCEED 200 VEHICLES PER PM PEAK HOUR AND EXIT ONTO AN ARTERIAL ROAD, OR WHERE REQUIRED BY THE DEPARTMENT.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN DRIVEWAY APRONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

COMMERCIAL-INDUSTRIAL DRIVEWAY

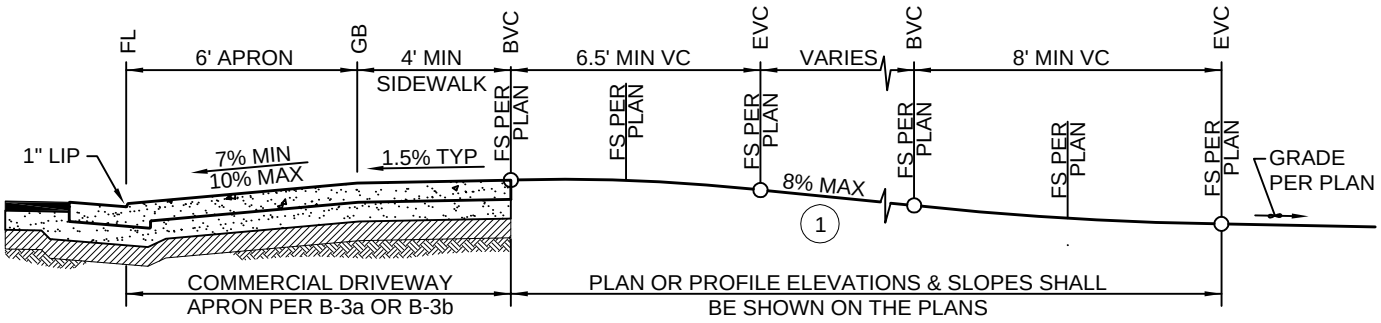
HIGH VOLUME DRIVEWAY

Scale:	Issued:
NTS	Aug. 2006

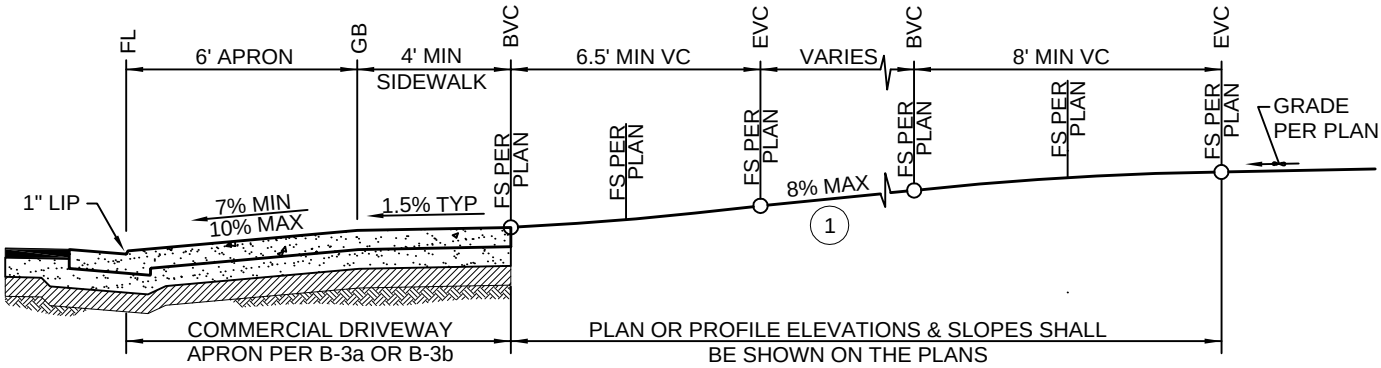
Drawing No: **B-3b**

Sheet No: 1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date



DOWNWARD DRIVEWAY



UPWARD DRIVEWAY

NOTES:

1. THE MAXIMUM SLOPE OF 8% SHALL NOT BE EXCEEDED ALONG ANY LONGITUDINAL PORTION OF THE NEW DRIVEWAY. THE SLOPE MAY BE INCREASED TO 12% WITH SPECIAL CONSTRUCTION TECHNIQUES AND PRIOR DEPARTMENT APPROVAL.
2. THE CROSS SLOPE OF THE 4-FOOT WIDE SIDEWALK SHALL BE 1.5% (3/16-INCH PER FOOT), BUT NOT EXCEED 2% (1/4-INCH PER FOOT). MINIMUM SIDEWALK WIDTH FOR CLEAR PASSAGE SHALL BE MAINTAINED (NO OBSTACLES LOCATED WITHIN).
3. THIS STANDARD IS INTENDED TO BE USED IN CONJUNCTION WITH STANDARD DRAWINGS B-3a AND B-3b.

ABBREVIATIONS:

BVC	BEGIN VERTICAL CURVE
EVC	END VERTICAL CURVE
FL	FLOWLINE
FS	FINISHED SURFACE (ELEVATION)
GB	GRADE BREAK
VC	VERTICAL CURVE

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

COMMERCIAL-INDUSTRIAL DRIVEWAY

UPWARD / DOWNWARD DRIVEWAY

Scale:	Issued:
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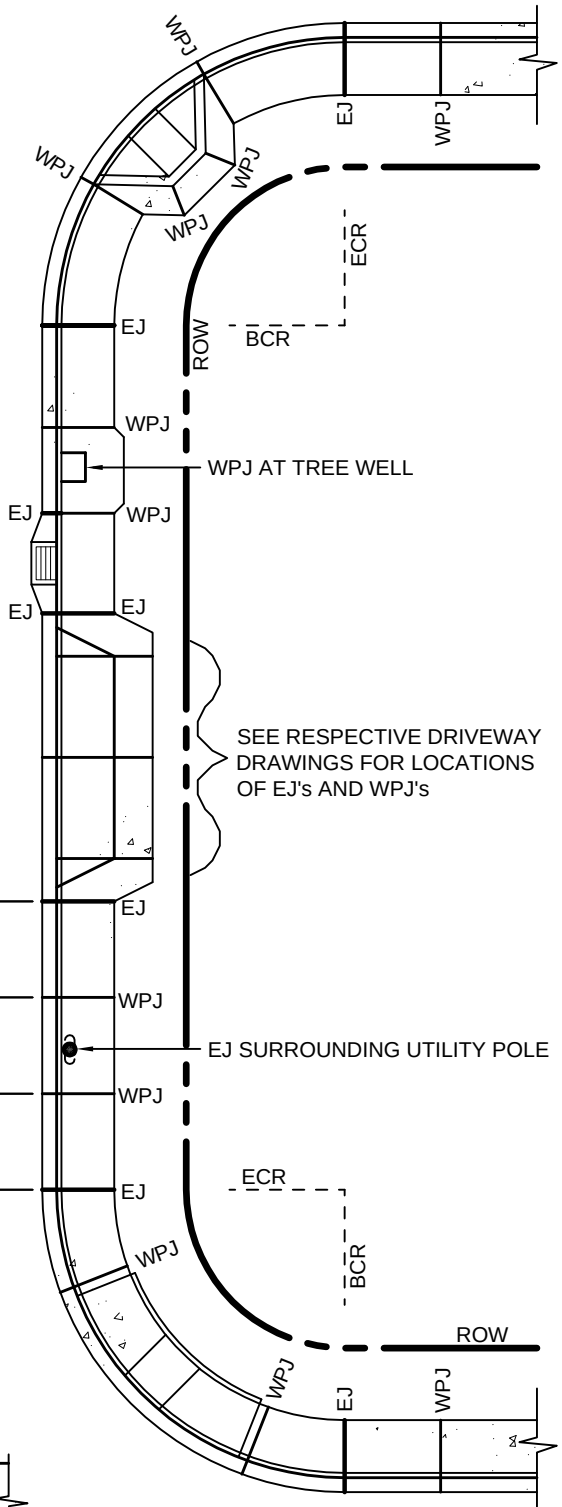
Drawing No: B-3c

Sheet No: 1 OF 1

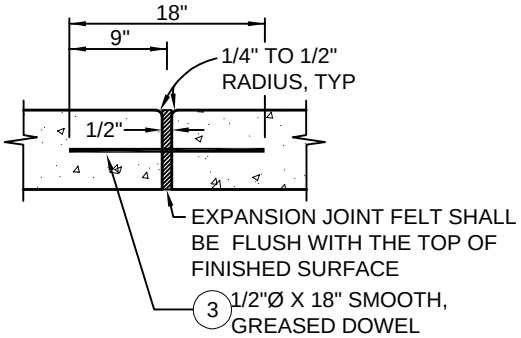
Revisions					
Description	Approved	Date	Description	Approved	Date

NOTES:

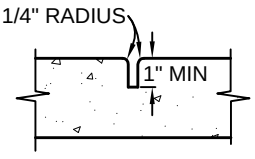
1. EXPANSION JOINTS (EJ) SHALL BE PLACED AT CURB RETURNS, DRIVEWAYS, STORM DRAIN CATCH BASINS, AROUND UTILITY POLES, AT LONGITUDINAL CURB GUTTER AND SIDEWALK INTERVALS NOT TO EXCEED 30-FEET, AND AT ALL OTHER LOCATIONS AS DIRECTED BY THE DEPARTMENT. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS IN ADJACENT EXISTING IMPROVEMENTS AS APPLICABLE.
2. WEAKENED PLANE JOINTS (WPJ) SHALL BE A MINIMUM 1-INCH IN DEPTH AND PLACED AT LONGITUDINAL CURB GUTTER AND SIDEWALK INTERVALS NOT EXCEEDING 10-FEET BETWEEN EXPANSION JOINTS. THE INTERVALS BETWEEN WEAKENED PLANE JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS IN ADJACENT EXISTING IMPROVEMENTS AS APPLICABLE.
3. 1/2"Ø x 18" SMOOTH, GREASED DOWELS SHALL BE PLACED AT ALL EXPANSION JOINTS, ONE IN THE NEW CURB FACE, ONE IN THE NEW GUTTER, AND AT 18-INCHES ON CENTER IN NEW SIDEWALK.
4. WHEN PLACED IN SIDEWALKS, BOTH EXPANSION JOINTS AND WEAKENED PLANE JOINTS SHALL EXTEND THROUGH THE ADJACENT CURB AND GUTTER.
5. REFER TO RESPECTIVE IMPROVEMENT (CURB, GUTTER, SIDEWALK, RAMP, DRIVEWAY, ETC) STANDARD DRAWING FOR ADDITIONAL CONSTRUCTION INFORMATION.



REFER TO DRAWING R-3 FOR REPAIR OF EXISTING SIDEWALKS



EXPANSION JOINT (1)



WEAKENED PLANE JOINT (2)

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

EXPANSION & WEAKENED PLANE JOINT REQUIREMENTS

Scale:	Issued:
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Drawing No: C-1

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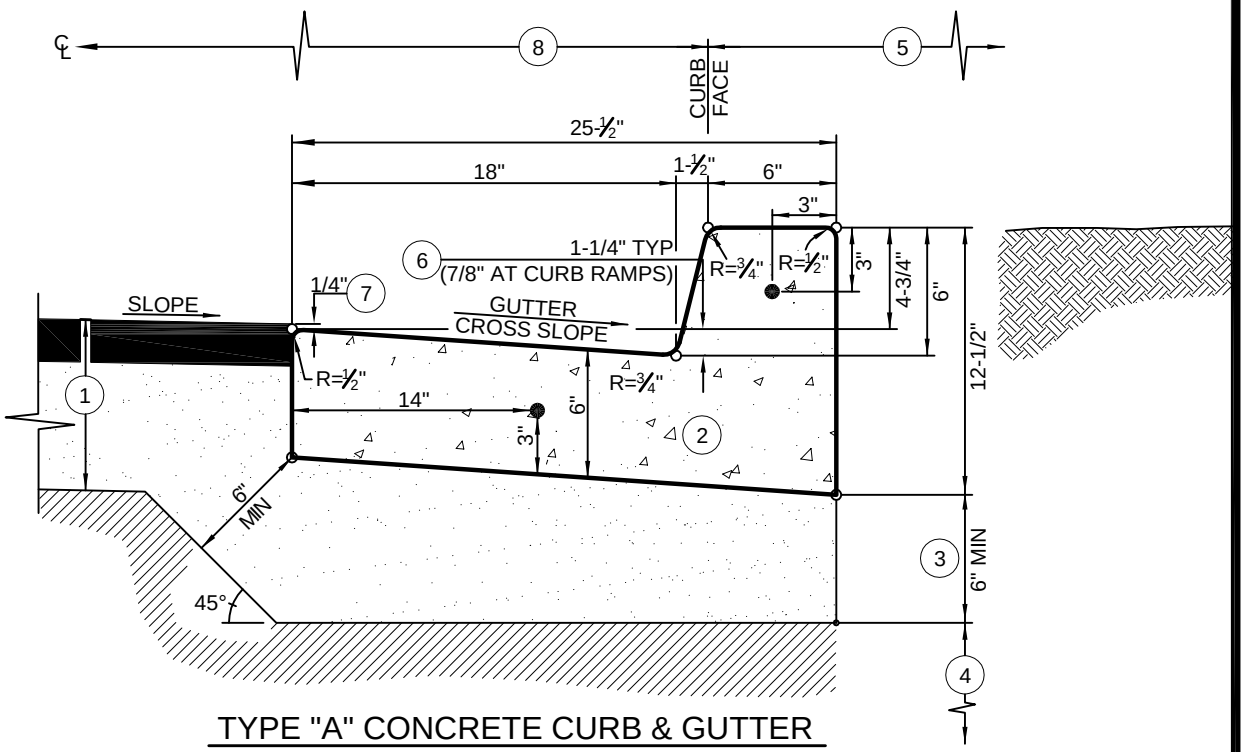
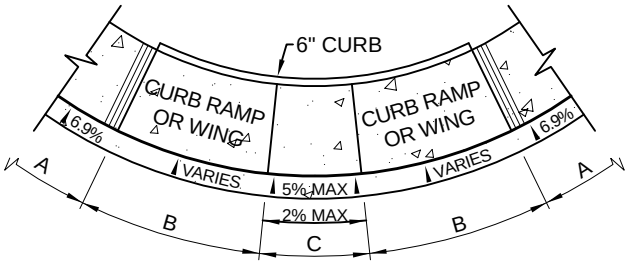


TYPE "A" CONCRETE CURB & GUTTER

NOTES:

1. ROADWAY STRUCTURAL SECTION PER PLAN OR AS EXISTING.
2. CONCRETE CURB OR CURB AND GUTTER SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
3. 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION OR MATCH BASE THICKNESS REQUIREMENT FOR NEW OR EXISTING ROAD SECTION, WHICHEVER IS GREATEST.
4. 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION.
5. SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
6. GUTTER CROSS SLOPE SHALL NOT EXCEED 5% ACROSS CURB RAMPS PER DETAIL BELOW.
7. THE ROADWAY FINISHED SURFACE SHALL BE 1/4" ABOVE THE GUTTER LIP.
8. PAVEMENT WIDTH MEASURED FROM ROAD CENTERLINE TO THIS POINT.
9. 1/2"Ø x 18" LONG GREASED SMOOTH DOWELS (●) SHALL BE CONSTRUCTED AT ALL EXPANSION JOINTS AND CONSTRUCTION JOINTS, REFER TO STANDARD DRAWING C-1.
10. EXPANSION JOINTS SHALL BE CONSTRUCTED AT 30-FEET MAXIMUM INTERVALS, AT ENDS OF ALL CURB RETURNS, AND EACH SIDE OF DRIVEWAY DEPRESSIONS PER STANDARD DRAWING C-1. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE.
11. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT 10-FEET MAXIMUM INTERVALS PER STANDARD DRAWING C-1. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE.
12. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN THE CURB & GUTTER.



NOTES:

A. GUTTER CROSS SLOPE = 1-1/4" IN 18" = 6.9%
B. GUTTER CROSS SLOPE TRANSITION ZONE (VARIES)
C. GUTTER CROSS SLOPE = 7/8" IN 18" = 4.9% (5% MAX)
LONGITUDINAL SLOPE = 2% MAX

TYPICAL GUTTER TRANSITION AT CURB RAMP

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPE "A" CONCRETE CURB & GUTTER

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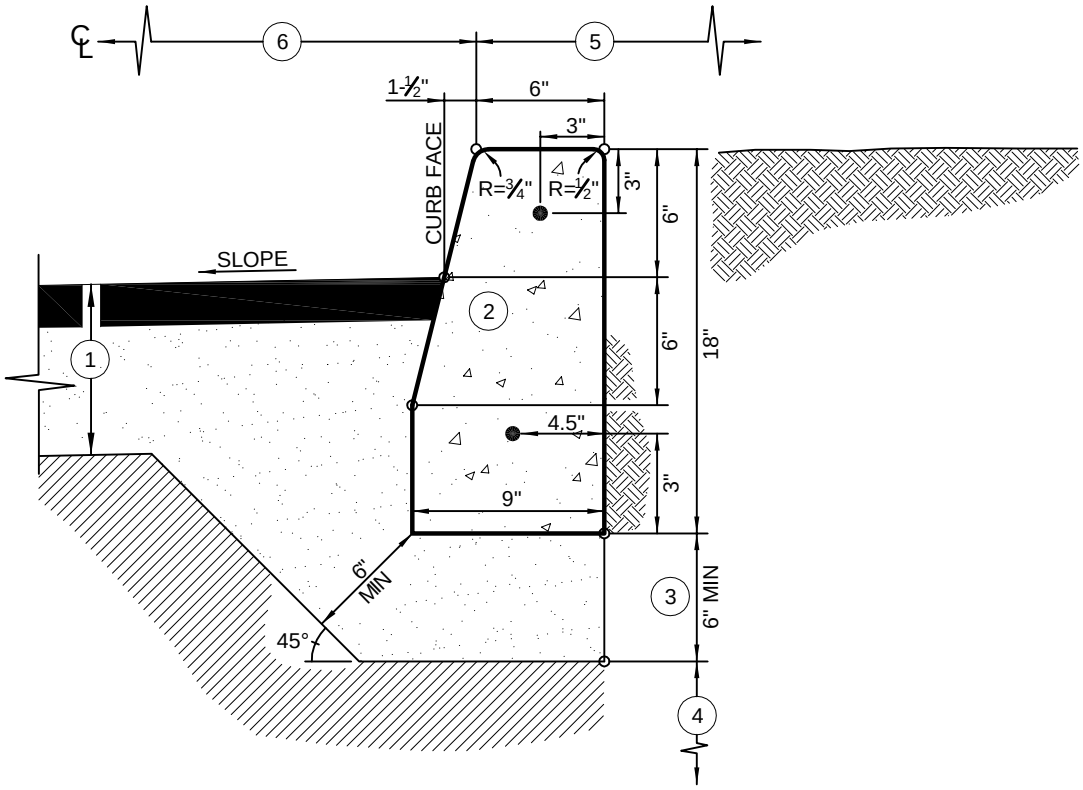

TYPE "C" CONCRETE CURB

NOTES:

1. ROADWAY STRUCTURAL SECTION PER PLAN OR AS EXISTING.
2. CONCRETE CURB OR CURB AND GUTTER SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
3. 6" MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION OR MATCH BASE THICKNESS REQUIREMENT FOR NEW OR EXISTING ROAD SECTION, WHICHEVER IS GREATEST.
4. 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION.
5. SUBGRADE AND AGGREGATE BASE COMPACTION REQUIREMENTS SHALL EXTEND TO THE BACK OF CURB OR TO THE BACK OF ATTACHED SIDEWALK (WHICHEVER CONDITION IS APPLICABLE).
6. PAVEMENT WIDTH MEASURED FROM ROAD CENTERLINE TO THIS POINT.
7. 1/2"Ø x 18" LONG GREASED SMOOTH DOWELS (●) SHALL BE CONSTRUCTED AT ALL EXPANSION JOINTS PER STANDARD DRAWING C-1.
8. EXPANSION JOINTS SHALL BE CONSTRUCTED AT 30-FEET MAXIMUM INTERVALS, AT ENDS OF ALL CURB RETURNS, AND EACH SIDE OF DRIVEWAY DEPRESSIONS. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE PER STANDARD DRAWING C-1.
9. WEAKENED PLANE JOINTS SHALL BE CONSTRUCTED AT 10-FEET MAXIMUM INTERVALS PER STANDARD DRAWING C-1. THE INTERVALS BETWEEN EXPANSION JOINTS SHALL VARY TO ALLOW MATCHING OF JOINTS ADJACENT EXISTING IMPROVEMENTS WHEN APPLICABLE.
10. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN THE TOP OF CURB.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TYPE "C" CONCRETE CURB

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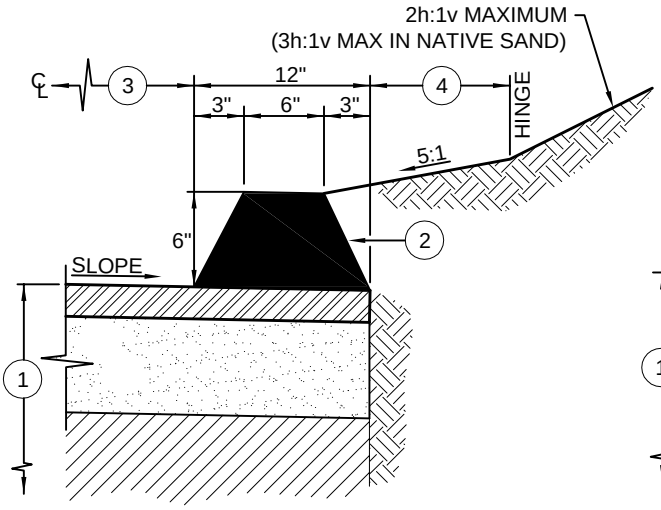
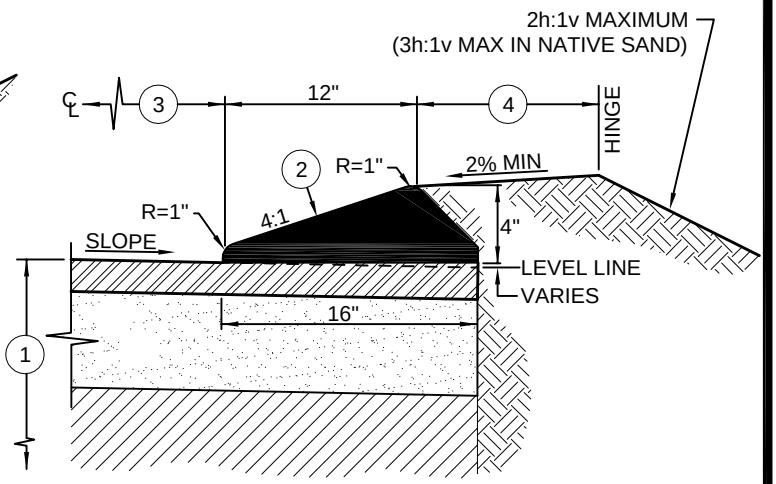


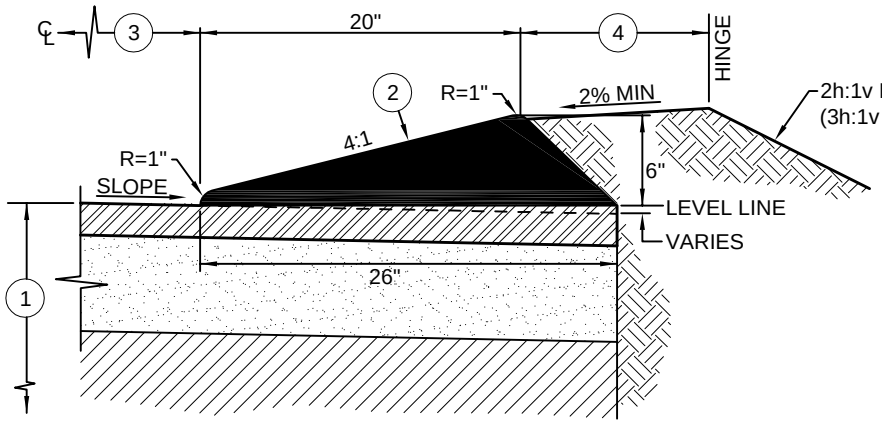
TYPE "A" ASPHALT DIKE

FOR USE IN CUT CONDITIONS



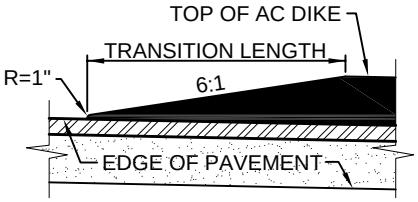
TYPE "E" MOUNTABLE ASPHALT DIKE

FOR USE IN FLAT & FILL CONDITIONS



TYPE "D" MOUNTABLE ASPHALT DIKE

FOR USE IN FLAT & FILL CONDITIONS (OPTIONAL)



DIKE END TRANSITION 5

NOTES:

1. ROADWAY STRUCTURAL SECTION THICKNESS PER PLAN.
2. ASPHALT CONCRETE DIKE SHALL BE REQUIRED PER THE DESIGN STANDARDS (REFER TO A-1 SERIES STANDARD DRAWINGS). USE PG 70-10 ASPHALT BINDER FOR ALL ASPHALT CONCRETE DIKE.
3. ROADWAY TRAVEL PLUS SHOULDER WIDTH MEASURED FROM ROAD CENTERLINE TO THIS POINT.
4. REFER TO A-1 SERIES STANDARD DRAWINGS FOR MINIMUM DISTANCES TO HINGE POINT.
5. A 6h:1v DIKE HEIGHT TAPER SHALL BE PROVIDED AT EACH END OF AN AC DIKE.
6. ASPHALT DIKE SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER. TYPE "A" DIKE SHALL BE USED WHEN THE ROADWAY IS BELOW EXISTING OR FINISHED SURFACE. TYPE "D" OR "E" DIKE SHALL BE REQUIRED IN CONDITIONS WHERE THE ROADWAY IS ABOVE OR LEVEL WITH EXISTING OR FINISHED SURFACE.
7. PRIOR TO PROJECT ACCEPTANCE, ALL DAMAGED ASPHALT DIKE SHALL BE REMOVED AND REPLACED AND A FOG SEAL SHALL BE APPLIED TO BOTH THE REPLACED ASPHALT DIKE AND TO THE REMAINING UNDAMAGED ASPHALT DIKE TO THE LIMITS DETERMINED BY THE DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

ASPHALT DIKES

Scale:	Issued:
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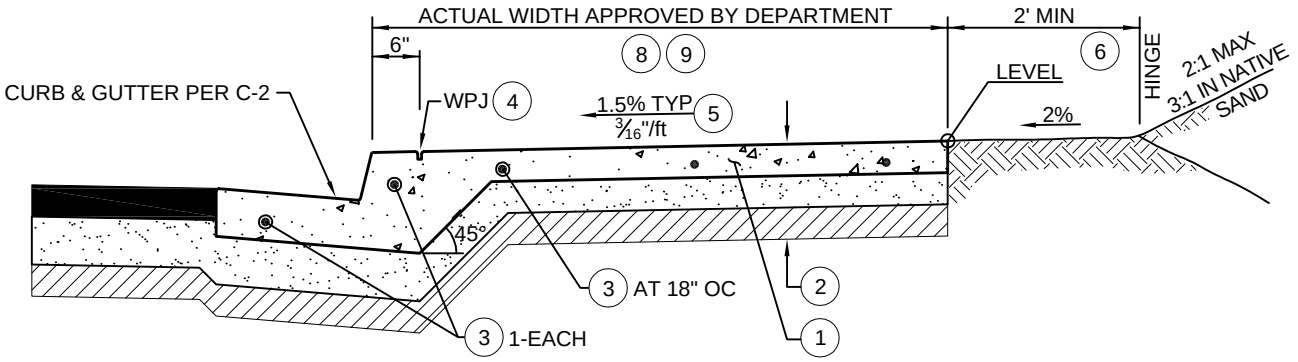
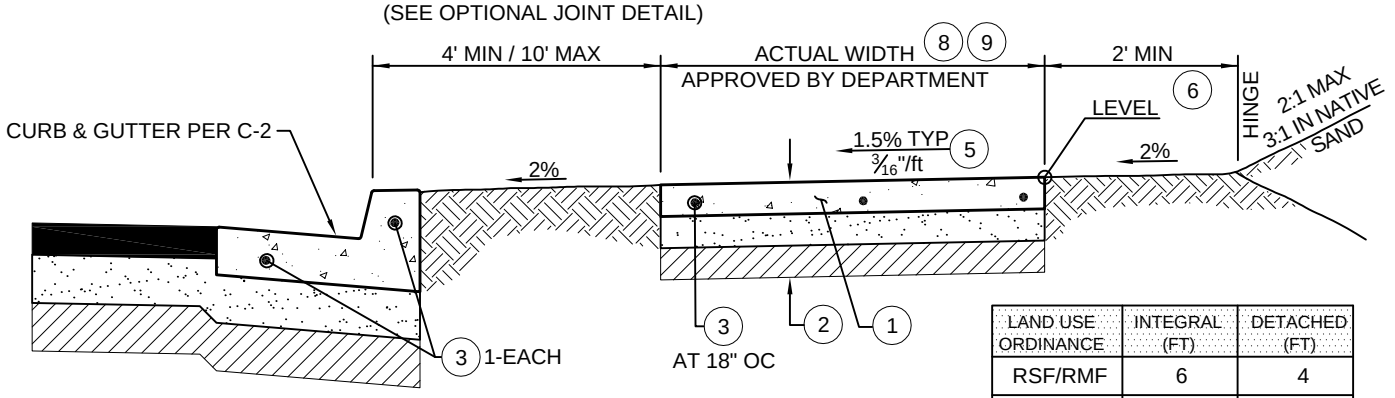


INTEGRAL SIDEWALK (MONOLITHIC)

(SEE OPTIONAL JOINT DETAIL)



DETACHED OR MEANDERING SIDEWALK

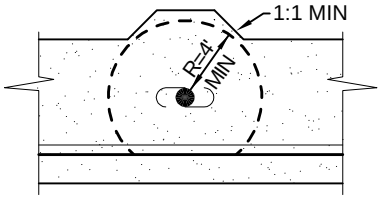
LAND USE ORDINANCE	INTEGRAL (FT)	DETACHED (FT)
RSF/RMF	6	4
CR	10	6
CS	6	4
OP	8	4
IND	6	4

SIDEWALK WIDTH TABLE

NOTES:

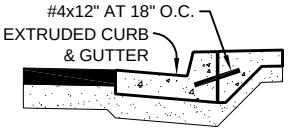
1. CONCRETE SIDEWALK SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
2. TYPICAL SECTION SHALL BE:
   - 4-INCH MIN PCC (6-INCH OR 8-INCH WHEN WITHIN A DRIVEWAY), OVER
   - 4-INCH MIN CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12-INCH MIN SUBGRADE TO 95% RELATIVE COMPACTION

   IF THE R-VALUE OF THE NATIVE MATERIAL IS 55 OR GREATER THEN THE 4-INCH OF AGGREGATE BASE MAY BE SUBSTITUTED WITH COMPACTED NATIVE MATERIAL.
3. EXPANSION JOINTS (EJ) SHALL BE CONSTRUCTED AT LONGITUDINAL INTERVALS NOT EXCEEDING 30-FEET. 1/2"Ø x 18" SMOOTH, GREASED DOWELS SHALL BE PLACED IN THE EJ, ONE IN CURB FACE, ONE IN GUTTER, AND AT 18-INCHES ON CENTER IN SIDEWALKS PER STANDARD DRAWING C-1.
4. WEAKENED PLANE JOINTS (WPJ) SHALL BE CONSTRUCTED BETWEEN EXPANSION JOINTS AT LONGITUDINAL INTERVALS NOT EXCEEDING 10-FEET, AND AT 6-INCHES BEHIND THE CURB FACE FOR ATTACHED SIDEWALKS PER STANDARD DRAWING C-1.
5. THE CROSS SLOPE OF THE SIDEWALK SHALL NOT EXCEED 2% (1/4-INCH PER 12-INCHES), 1.5% (3/16-INCH PER 12-INCHES) IS RECOMMENDED.
6. THE 2-FOOT BENCH IS NOT REQUIRED FOR ADJOINING SLOPES OF 5h:1v OR FLATTER.
7. ALTHOUGH THE PROJECT CONDITIONS OF APPROVAL OR THE AREA SPECIFIC PLAN MAY REQUIRE AN ALTERNATIVE SIDEWALK CONFIGURATION, THE CONSTRUCTION SPECIFICATIONS OF THIS STANDARD SHALL APPLY.
8. THE SIDEWALK SHALL BE WIDENED WHERE REQUIRED TO ALLOW FOR A 4-FOOT CLEAR PASSAGE AROUND ALL ABOVE GRADE OBSTACLES LOCATED WITHIN THE SIDEWALK.
9. WATER PURVEYOR METER BOXES ARE ALLOWED WITHIN THE SIDEWALK PROVIDED THAT ALL LIDS AND LIDS WITH A.M.R. SYSTEMS ARE SET FLUSH WITH THE SIDEWALK.
10. ALL UTILITY VAULTS AND LIDS MUST BE LOCATED OUTSIDE OF THE SIDEWALK OR HAVE PRIOR DEPARTMENT APPROVAL FOR LOCATION WITHIN THE SIDEWALK. UTILITY LIDS WITHIN THE SIDEWALK SHALL HAVE A NON-SLIP SURFACE.



SIDEWALK SHALL BE WIDENED BEHIND ALL ABOVE GRADE OBSTACLES TO PROVIDE A 4-FEET MINIMUM CLEARANCE.

8 SIDEWALK WIDENING DETAIL



WHEN EXTRUDED CURB & GUTTER IS USED EXTRUDING MACHINE MUST BE CAPABLE OF PLACING A DENSE GRADE OF CONCRETE. SIDEWALK PORTION MUST BE PLACE WITHIN 1 HOUR OF EXTRUDED CURB & GUTTER UNLESS OPTIONAL JOINT IS USED.

OPTIONAL JOINT DETAIL

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SIDEWALKS

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Drawing No: C-4

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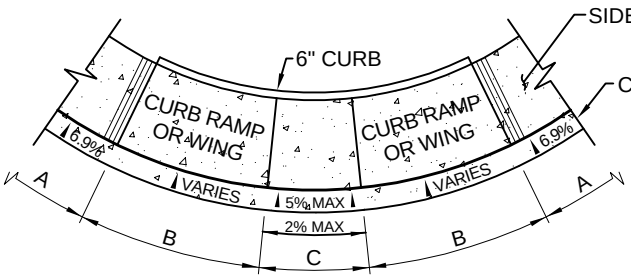
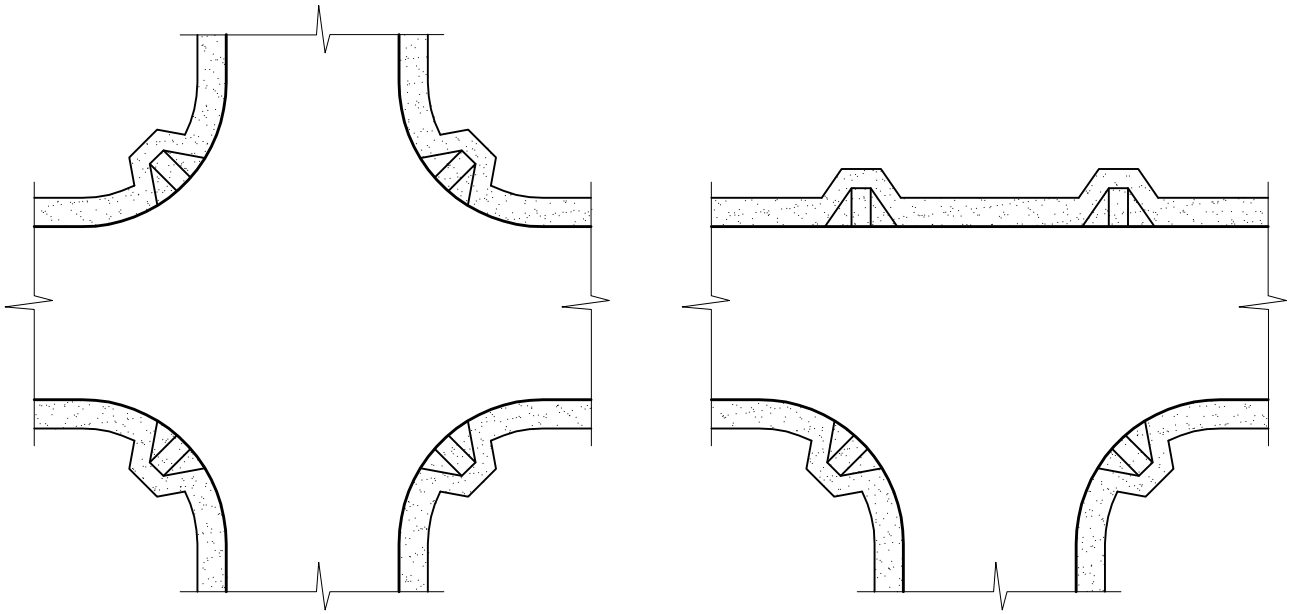
CURB RAMP NOTES:

1. ALL CURB RAMPS FOR NEW CONSTRUCTION, RETROFIT, AND REPLACEMENT SHALL CONFORM TO THE LATEST DEPARTMENT ADOPTED STATE STANDARD PLANS. CONTACT THE DEPARTMENT FOR THE LATEST ADOPTED STANDARD.
2. NEW SIDEWALKS AND PATHS SHALL BE PROVIDED WITH CURB RAMPS AT ALL INTERSECTIONS.
3. MID-BLOCK CURB RAMPS ARE DISCOURAGED AND SHALL REQUIRE PRIOR DEPARTMENT APPROVAL.
4. THE PROJECT ENGINEER SHALL DETAIL EACH CURB RAMP ON THE PLANS. MINIMUM DETAIL REQUIREMENTS SHALL INCLUDE DIMENSIONS, SLOPES, AND SPOT ELEVATIONS.
5. THE DEPARTMENT MAY GRANT EXCEPTIONS TO THESE STANDARDS ON AN INDIVIDUAL BASIS. THE DEPARTMENT ADA COORDINATOR SHALL REVIEW AND PROVIDE PRIOR APPROVAL OF ALL EXCEPTIONS.



NOTES:
A. GUTTER CROSS SLOPE = 1-1/4" IN 18" = 6.9%
B. GUTTER CROSS SLOPE TRANSITION ZONE (VARIES)
C. GUTTER CROSS SLOPE = 7/8" IN 18" = 4.9% (5% MAX)
LONGITUDINAL SLOPE = 2% MAX

TYPICAL GUTTER TRANSITION AT CURB RAMP



TYPICAL CURB RAMP PLACEMENT

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CURB RAMPS

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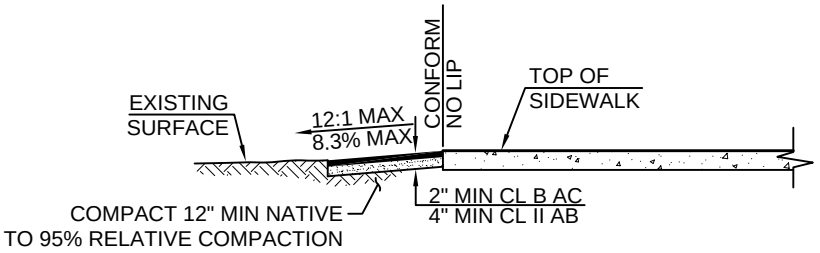
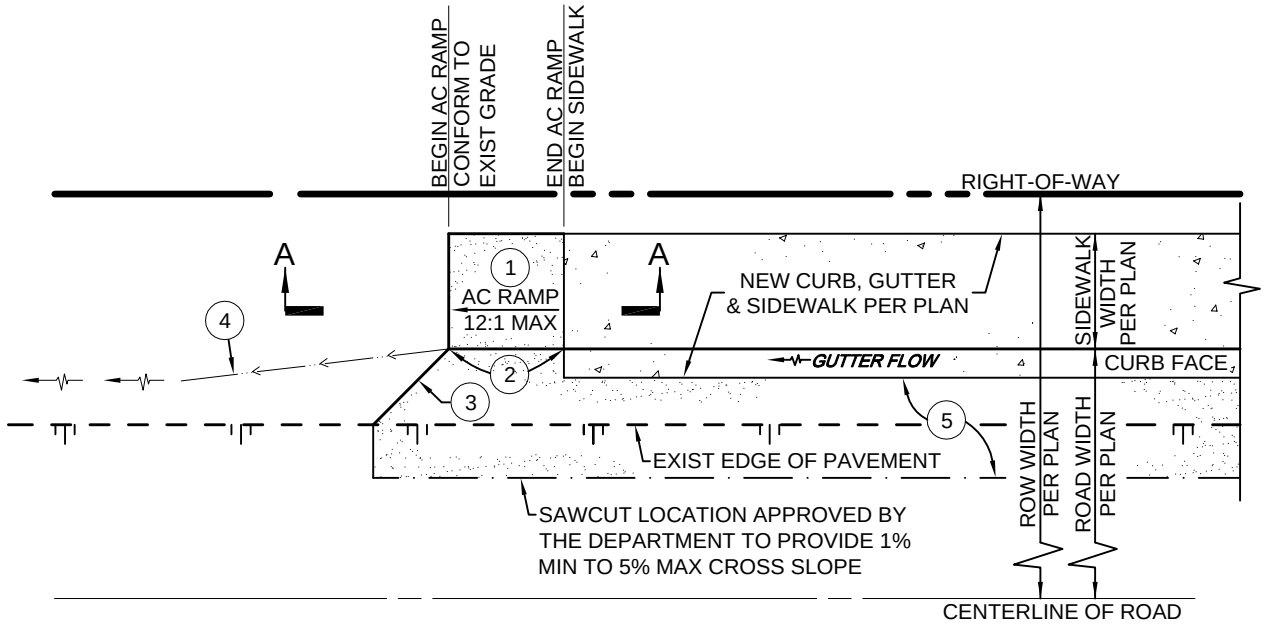


SECTION A-A: ASPHALT CONCRETE RAMP



PLAN VIEW

NOTES:
FOR USE AT THE END OF NEW SIDEWALK TO PROVIDE A SMOOTH TRANSITION FROM EDGE OF NEW SIDEWALK TO EXISTING GRADE. IF A SMOOTH TRANSITION CANNOT BE ACHIEVED THEN THE DEPARTMENT MAY REQUIRE A SIDEWALK BARRICADE BE CONSTRUCTED PER DRAWING M-3.

1. CONSTRUCT NEW ASPHALT CONCRETE RAMP. RAMP SHALL BE 2-INCHES MINIMUM ASPHALT CONCRETE TO 95% RELATIVE COMPACTION, OVER 4-INCHES MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER COMPACTED NATIVE MATERIAL. SLOPE OF RAMP SHALL NOT EXCEED 12:1 (8.33%), RECOMMENDED SLOPE OF 8% MAXIMUM.
2. TYPE "A" ASPHALT DIKE PER DRAWING C-1 TAPERED FROM 0-INCHES (FLUSH) TO 6-INCHES TALL TO MATCH EDGE OF NEW CONCRETE CURB.
3. CONSTRUCT NEW EDGE OF PAVEMENT TAPER AT 1:1 MINIMUM IN RESIDENTIAL (5:1 MINIMUM IN COMMERCIAL) AREAS TO JOIN EXISTING EDGE OF PAVEMENT (THE DEPARTMENT MAY REQUIRE A LONGER TAPER LENGTH).
4. GRADE AND RECOMPACT EXISTING SHOULDER TO PROVIDE A POSITIVE DRAINAGE CONNECTION BETWEEN NEW GUTTER FLOWLINE TO EXISTING SWALE PATH.
5. NEW ROADWAY WIDENING, STRUCTURAL SECTION PER PLANS.

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ASPHALT RAMP DETAIL

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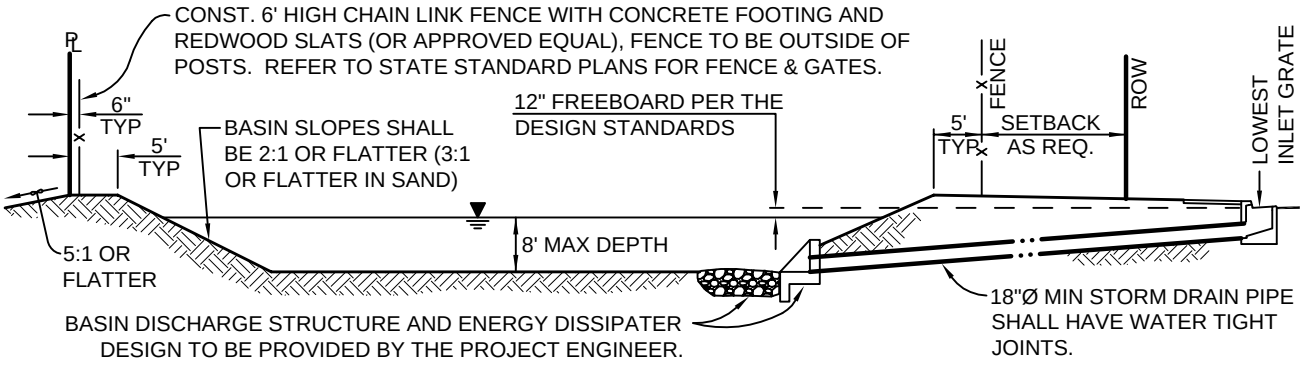
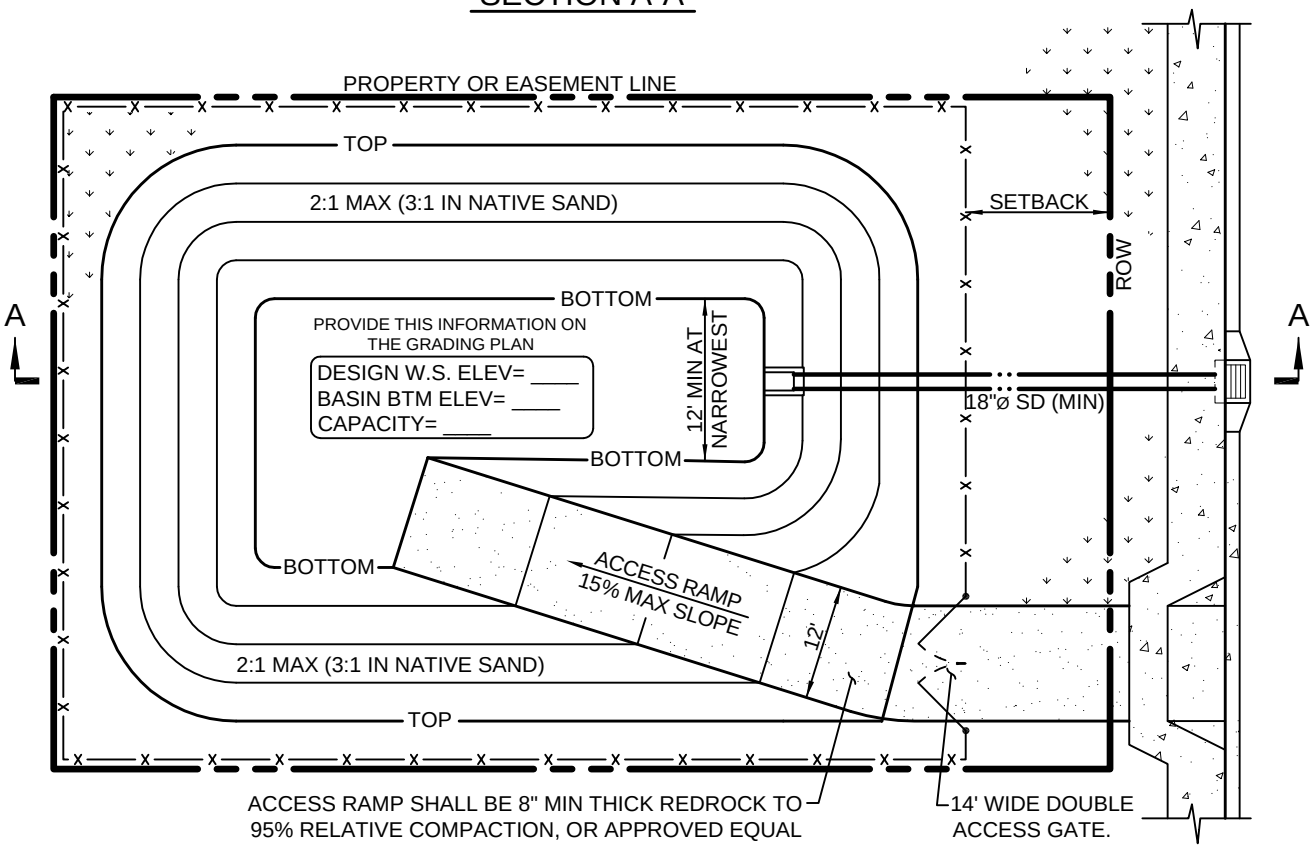


SECTION A-A



PLAN VIEW

NOTES:

1. WHERE DEEP DETENTION BASINS ARE PROPOSED THEY SHALL MEET THE SAME REQUIREMENTS OF THIS STANDARD.
2. BASINS MUST FULLY DRAIN WITHIN 7 DAYS OR A PERCOLATION ENHANCEMENT SYSTEM SHALL BE REQUIRED. THE DEPARTMENT MAY ALSO REQUIRE PERCOLATION TESTS AND CERTIFICATION FROM THE PROJECT ENGINEER.
3. A BASIN OVERFLOW STRUCTURE TO ACCOMMODATE UP TO A 100-YEAR STORM EVENT SHALL BE DESIGNED WHICH DISCHARGES FLOWS TO THE PUBLIC RIGHT-OF-WAY OR A DEFINED WATER COURSE IN A NON-EROSIVE MANNER.
4. THE OVERLAND ESCAPE PATH (NOTE 3) SHALL BE IDENTIFIED ON THE PLANS AND SHOWN TO PROTECT DOWNSTREAM PROPERTIES IN THE EVENT OF BASIN SPILL OR FAILURE.
5. ADDITIONAL BASIN AND BASIN LANDSCAPING REQUIREMENTS MAY BE IMPOSED AS PART OF THE DESIGN STANDARDS.
6. BASIN LANDSCAPING AND EROSION CONTROL SHALL BE SUBSTANTIALLY ESTABLISHED PRIOR TO PROJECT ACCEPTANCE.

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DEEP RETENTION BASIN

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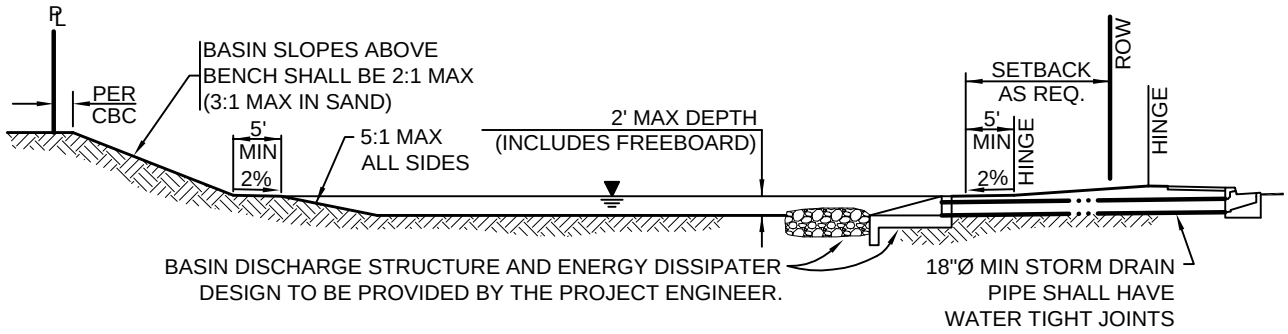
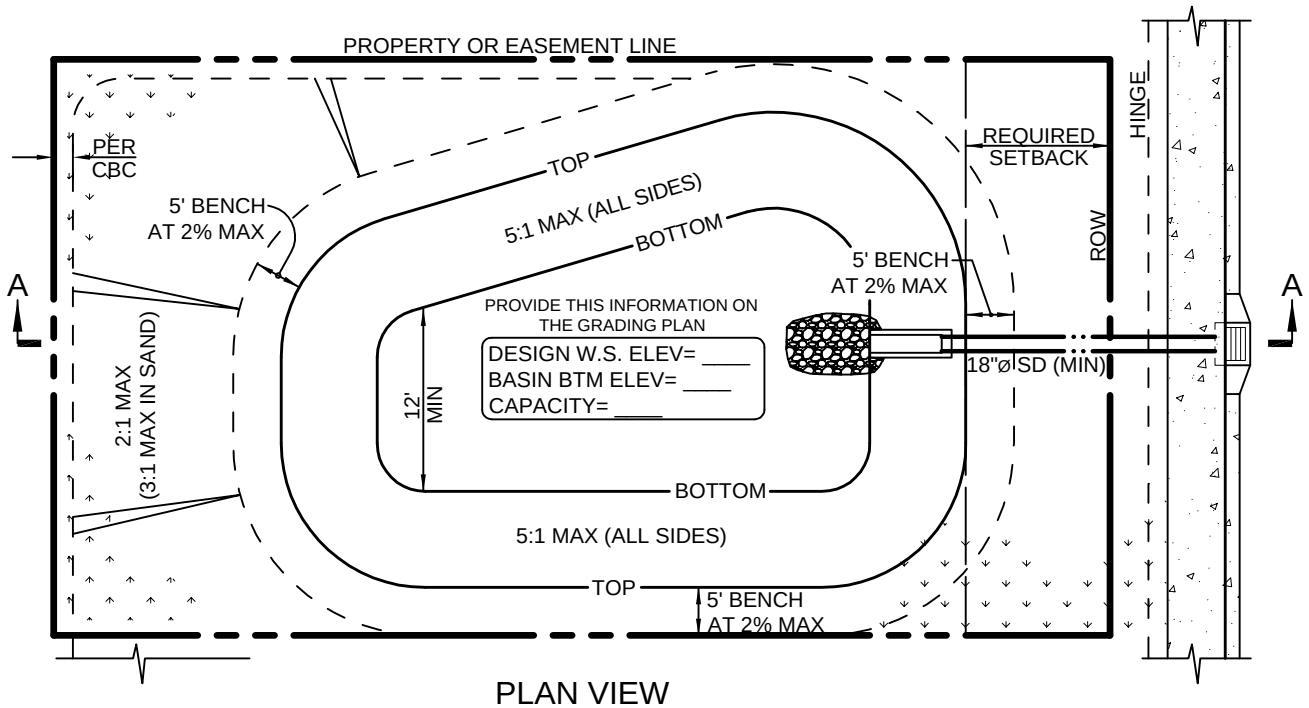


SECTION A-A



PLAN VIEW

NOTES:

1. WHERE SHALLOW DETENTION BASINS ARE PROPOSED THEY SHALL MEET THE SAME REQUIREMENTS OF THIS STANDARD.
2. BASINS MUST FULLY DRAIN WITHIN 7 DAYS OR A PERCOLATION ENHANCEMENT SYSTEM SHALL BE REQUIRED. THE DEPARTMENT MAY ALSO REQUIRE PERCOLATION TESTS AND CERTIFICATION FROM THE PROJECT ENGINEER.
3. A BASIN OVERFLOW STRUCTURE TO ACCOMMODATE UP TO A 100-YEAR STORM EVENT SHALL BE DESIGNED WHICH DISCHARGES FLOWS TO THE PUBLIC RIGHT-OF-WAY OR A DEFINED WATER COURSE IN A NON-EROSIVE MANNER.
4. THE OVERLAND ESCAPE PATH (NOTE 3) SHALL BE IDENTIFIED ON THE PLANS AND SHOWN TO PROTECT DOWNSTREAM PROPERTIES IN THE EVENT OF BASIN SPILL OR FAILURE.
5. ADDITIONAL BASIN AND BASIN LANDSCAPING REQUIREMENTS MAY BE IMPOSED AS PART OF THE DESIGN STANDARDS.
6. BASIN LANDSCAPING AND EROSION CONTROL SHALL BE SUBSTANTIALLY ESTABLISHED PRIOR TO PROJECT ACCEPTANCE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

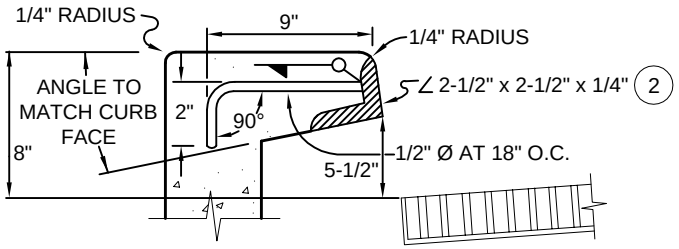
SHALLOW RETENTION BASIN

Scale:	Issued:
NTS	Aug. 2006

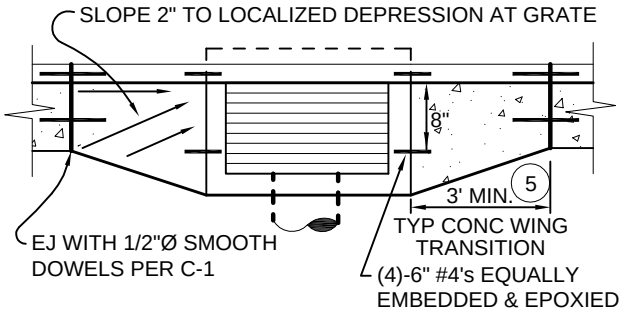
Drawing No: D-1a

Sheet No: 1 OF 1

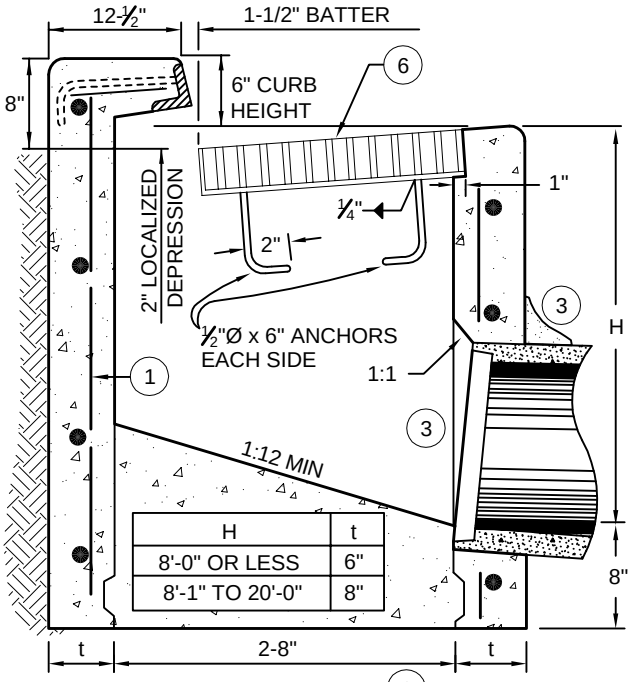
Revisions					
Description	Approved	Date	Description	Approved	Date



FACE ANGLE ANCHOR

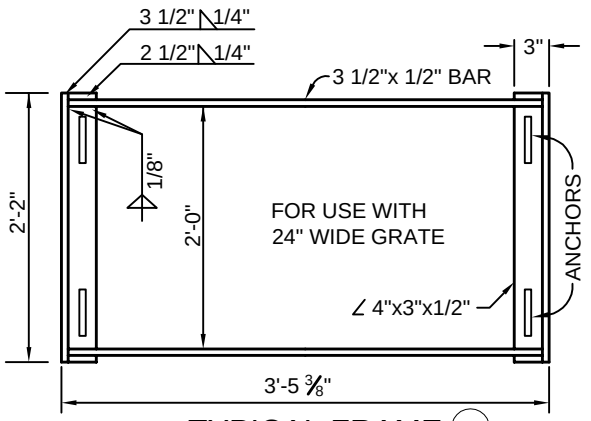


WING TRANSITION PLAN

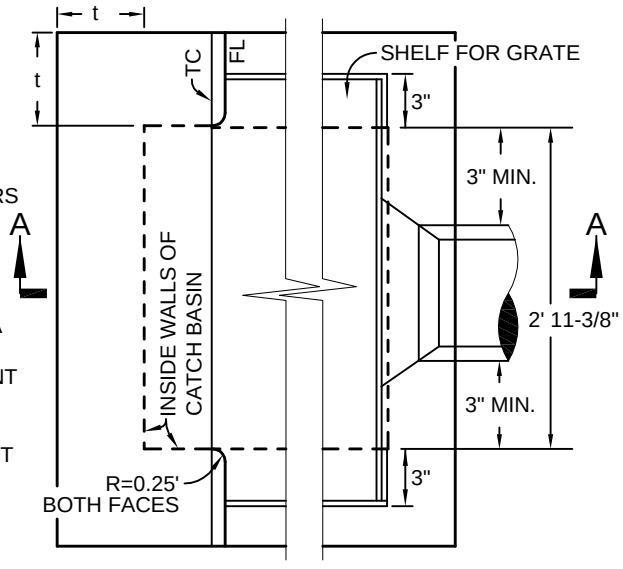


H	t
8'-0" OR LESS	6"
8'-1" TO 20'-0"	8"

SECTION A-A 8



TYPICAL FRAME 4



PLAN

NOTES:

1. REINFORCING STEEL SHALL BE #4 BARS AT 18" O.C. PLACED 1-1/2" CLEAR TO INSIDE OF BOX UNLESS OTHERWISE NOTED. BASIN FLOORS SHALL HAVE WOOD FLOAT FINISH AND A MINIMUM SLOPE OF 12h:1v FROM ALL DIRECTIONS TOWARDS OUTLET PIPE. USE PORTLAND CEMENT CONCRETE PER THE DESIGN STANDARDS.
2. FACE ANGLE SHALL EXTEND FULL WIDTH OF BOX.
3. SMOOTH GROUT INSIDE AND OUTSIDE OF PIPE JUNCTION TO FORM A WATERTIGHT SEAL.
4. FRAME SHALL BE DIPPED IN COMMERCIAL QUALITY ASPHALTUM PAINT OR GALVANIZED.
5. IN ALL CASES 3' LONG CONCRETE WINGS SHALL BE CONSTRUCTED EITHER SIDE OF THE INLET. WHERE CATCH BASIN IS PLACED AGAINST AC DIKE A SEPARATE DETAIL SHALL BE PROVIDED ON THE PLANS SHOWING THIS TRANSITION.
6. GRATE SHALL CONFORM TO STATE STANDARD PLAN D77B AND BE BICYCLE PROOF.
7. PROJECT CONDITIONS MAY REQUIRE OIL AND/OR SEDIMENTATION CONTROL AT THE DIRECTION OF THE DEPARTMENT.
8. PRECAST INLETS MAY BE SUBSTITUTED AT THE APPROVAL OF THE DEPARTMENT. PRECAST INLETS SHALL HAVE 2" LOCALIZED DEPRESSION AT THE GRATE, 3' CONCRETE WINGS, EXPANSION JOINTS AS SHOWN, AND NO STEPS.

ALL CATCH BASINS SHALL BE EQUIP WITH A STAINLESS STEEL FRAME DESIGNED TO ACCEPT A "DrainPac™" STORM DRAIN FILTER INSERT, OR EQUAL.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

CATCH BASIN

Scale:	Issued:
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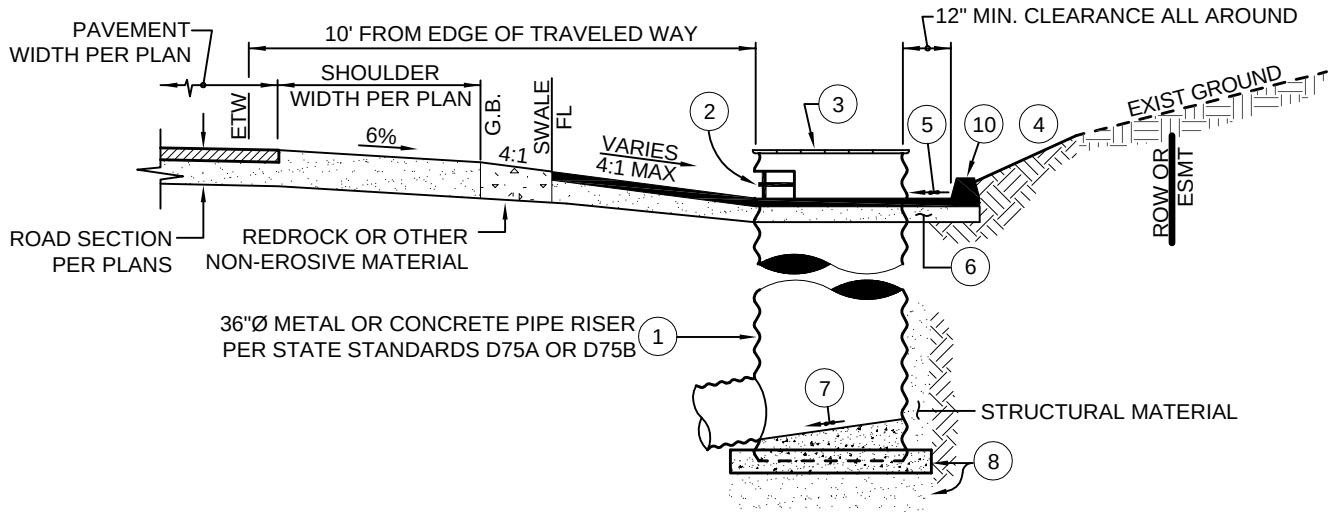
Drawing No:	D-2
Sheet No:	1 OF 1

Revisions					
Description	Approved	Date	Description	Approved	Date

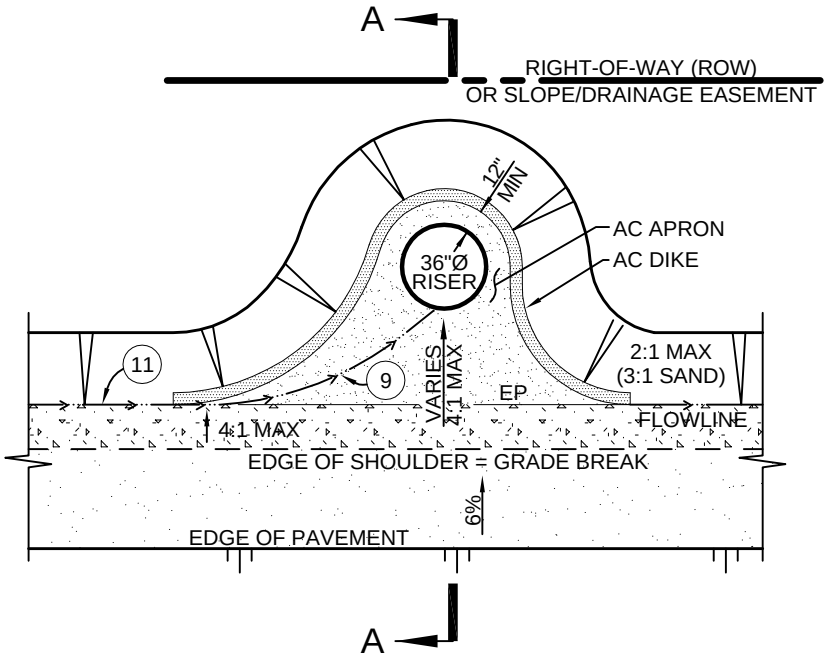


SECTION A-A

NOTES:

1. REFER TO THE 2006 STATE STANDARD PLANS D75A OR D75B FOR PIPE RISER DETAILS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS (RISER TYPE, COVER, GRATE, PIPE SIZE, ETC).
2. CONSTRUCT TRASH RACK PER THE 2006 STATE STANDARD PLAN D75C.
3. A COVER MAY BE USED WHEN THE RISER NOT LOCATED IN SUMP CONDITIONS, OTHERWISE USE TYPE "GMP" OR "GCP" GRATE. PROJECT ENGINEER SHALL PROVIDE HYDRAULIC CALCULATIONS.
4. MINIMUM CUT SLOPE SHALL BE 2 HORIZONTAL:1 VERTICAL (3h:1v IN NATIVE SAND).
5. SLOPE TO DRAIN TOWARDS RISER OPENING.
6. 2-INCH MINIMUM ASPHALT CONCRETE OVER 6-INCH MINIMUM CLASS II AGGREGATE BASE COMPACTED TO 95%.
7. RISER FLOOR SLOPED TO DRAIN AT 4h:1v TOWARDS OUTLET, PROVIDE WOOD FLOAT FINISH.
8. PORTLAND CEMENT CONCRETE BASE PER STATE STANDARD D75A OR D75B, OVER 6-INCH MINIMUM CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION.
9. MODIFY APPROACH GRADING AS REQUIRED TO PROVIDE SMOOTH FLOWLINE TRANSITION TOWARDS INLET.
10. TYPE "A" AC DIKE PER DRAWING C-3.
11. REQUIRED ROADSIDE DRAINAGE PER A-1 SERIES DRAWINGS. PROVIDE COMPACTED REDROCK OR OTHER DEPARTMENT APPROVED MATERIAL.
12. ALL EXPOSED STEEL SHALL BE COLD GALVANIZED.
13. A DRAINAGE EASEMENT SHALL BE OFFERED TO THE PUBLIC WHENEVER THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY.
14. MODIFY AS REQUIRED FOR SUMP CONDITIONS.

ALL CATCH BASINS SHALL BE EQUIP WITH A STAINLESS STEEL FRAME DESIGNED TO ACCEPT A "DrainPac™" STORM DRAIN FILTER INSERT, OR EQUAL.



PLAN

REDUCED SCALE

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CATCH BASIN

EDGE OF PAVEMENT CONDITION

Scale:	Issued:
NTS	Aug. 2006

Drawing No: D-2a

Sheet No: 1 OF 1

Revisions					
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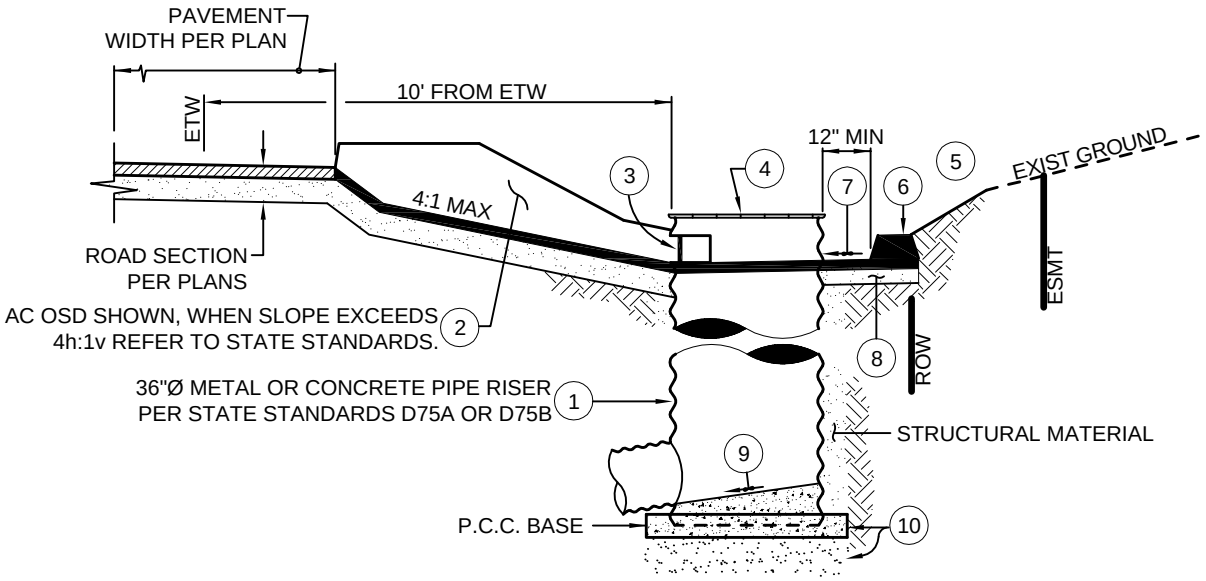
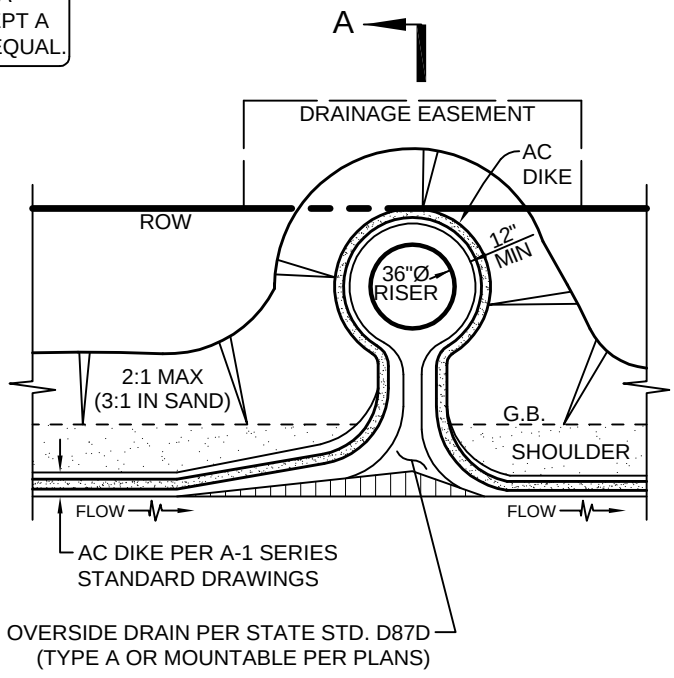


SECTION A-A

ALL CATCH BASINS SHALL BE EQUIP WITH A STAINLESS STEEL FRAME DESIGNED TO ACCEPT A "DrainPac™" STORM DRAIN FILTER INSERT, OR EQUAL.

NOTES:

1. REFER TO THE 2006 STATE STANDARD PLANS D75A OR D75B FOR PIPE RISER DETAILS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS (RISER TYPE, LID, GRATE, PIPE SIZE, ETC).
2. REFER TO THE 2006 STATE STANDARD D78D FOR AC OVERSIDE DRAIN DETAILS AND SPECIFICATIONS. THE PROJECT ENGINEER SHALL PROVIDE ALL DESIGN SPECIFICATIONS ON THE PLANS.
3. CONSTRUCT TRASH RACK PER THE 2006 STATE STANDARD PLAN D75C.
4. A LID MAY BE USED WHEN THE RISER NOT LOCATED IN SUMP CONDITIONS, OTHERWISE USE TYPE "GMP" OR "GCP" GRATE. PROJECT ENGINEER SHALL PROVIDE HYDRAULIC CALCULATIONS.
5. MINIMUM CUT SLOPE SHALL BE 2 HORIZONTAL:1 VERTICAL (3h:1v IN NATIVE SAND).
6. TYPE "A" AC DIKE PER DRAWING C-3..
7. SLOPE TO DRAIN TOWARDS RISER OPENING.
8. 2-INCH MINIMUM ASPHALT CONCRETE OVER 6-INCH MINIMUM COMPACTED AGGREGATE BASE.
9. RISER FLOOR SLOPED TO DRAIN AT 4h:1v TOWARDS OUTLET, PROVIDE WOOD FLOAT FINISH.
10. PORTLAND CEMENT CONCRETE BASE PER STATE STANDARD D75A OR D75B, OVER 6-INCH MINIMUM CLASS II AGGREGATE BASED TO 95% RELATIVE COMPACTION.
11. ALL EXPOSED STEEL SHALL BE COLD GALVANIZED.
12. A DRAINAGE EASEMENT SHALL BE OFFERED TO THE PUBLIC WHENEVER THE IMPROVEMENTS EXTEND BEYOND THE RIGHT-OF-WAY.
13. MODIFY AS REQUIRED FOR SUMP CONDITIONS.



PLAN

REDUCED SCALE

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL CATCH BASIN

ASPHALT DIKE CONDITION

Scale:	Issued:
NTS	Aug. 2006

Drawing No: D-2b

Sheet No: 1 OF 1

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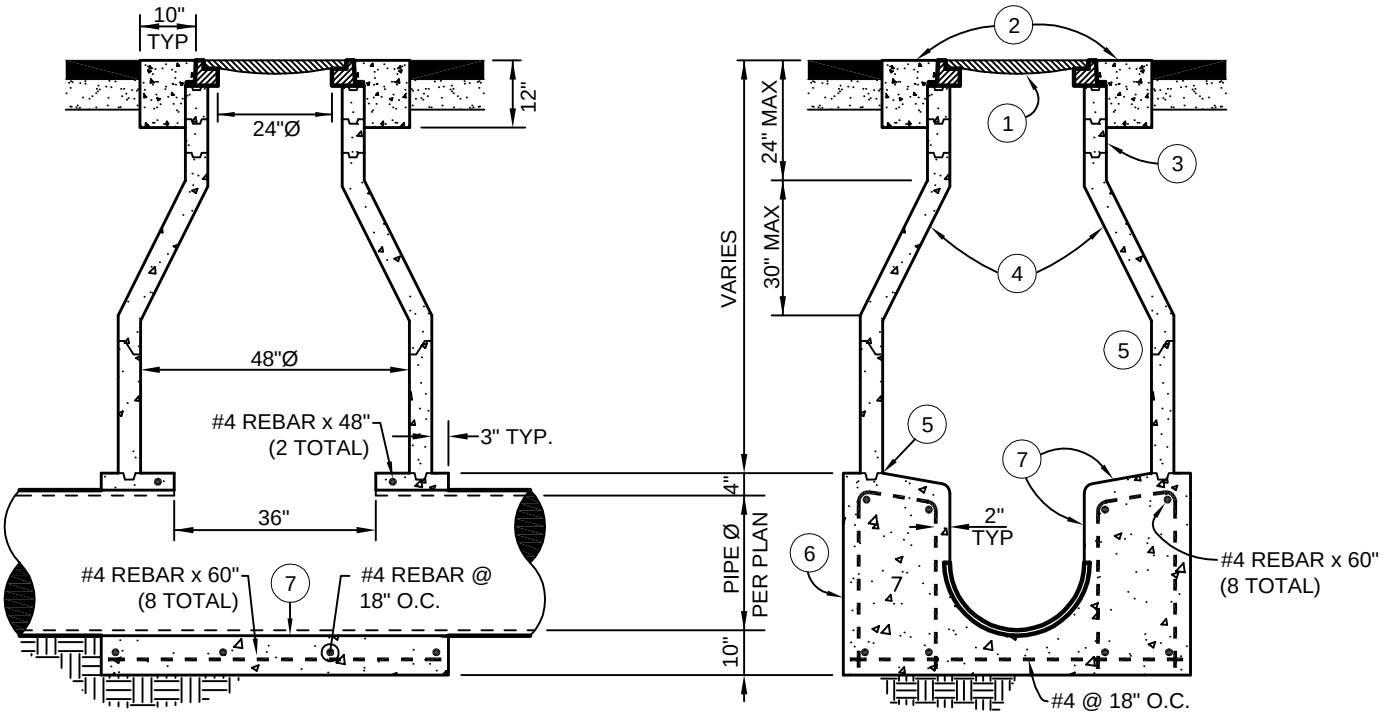
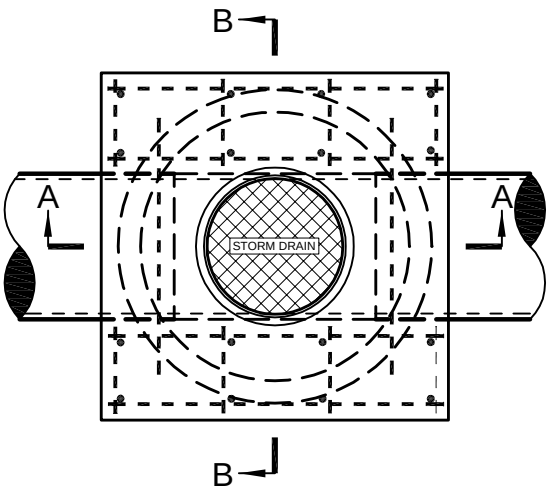


SECTION A-A

SECTION B-B



PLAN

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24"Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE AN OPEN PICKHOLE, AND BE LETTERED "STORM DRAIN".
2. COLLAR SHALL BE CLASS A PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE.
4. PRECAST SHAFT(S) AND CONCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. MANHOLE BASE SHALL BE CLASS A PORTLAND CEMENT CONCRETE, AND REST ON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
7. PIPE SHALL BE LAID THROUGH MANHOLE, AND TOP PORTION REMOVED AFTER BASE IS POURED. TROUGH SHALL HAVE STEEL-TROWEL FINISH, VERTICAL SIDES, ROUNDED CORNERS. TOP SURFACE SHALL HAVE 1-INCH PER 12-INCH SLOPE TOWARD TROUGH.
8. EQUIVALENT PRECAST BASE SHALL BE ALLOWED.
9. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STORM DRAIN MANHOLE

FOR PIPE DIAMETERS FROM 18" TO 36"

Scale:	Issued:
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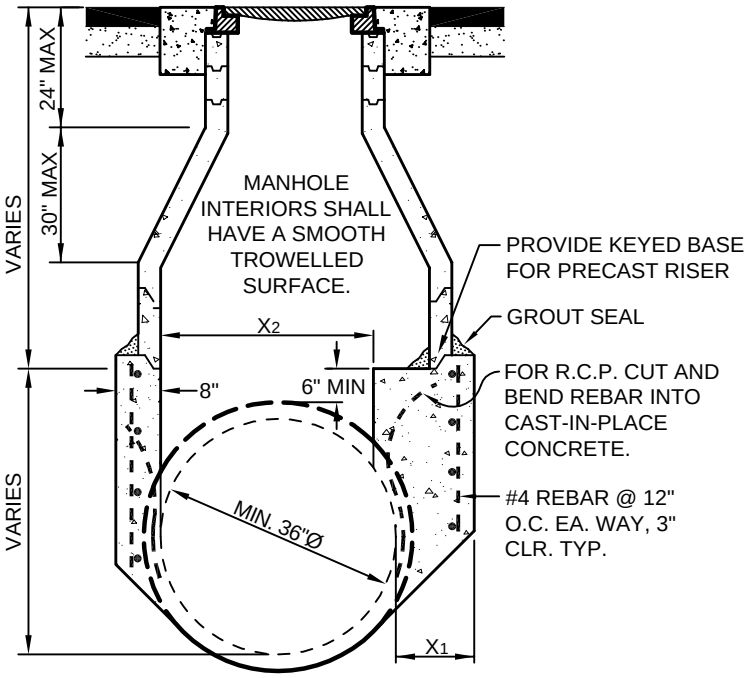
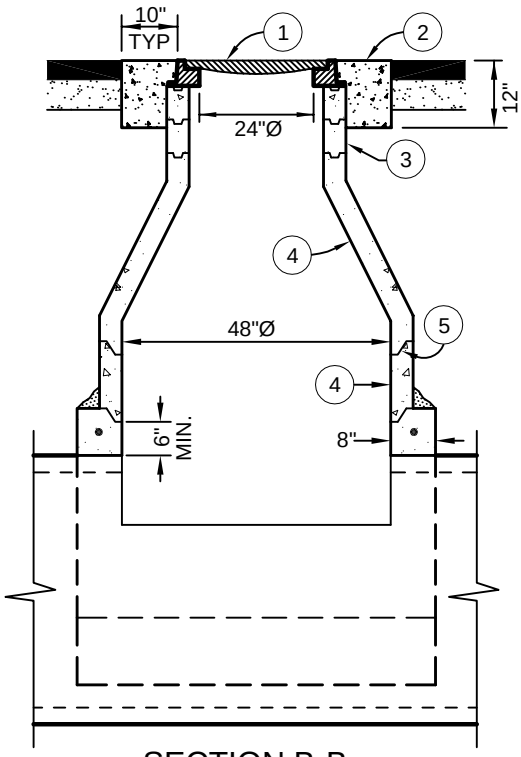
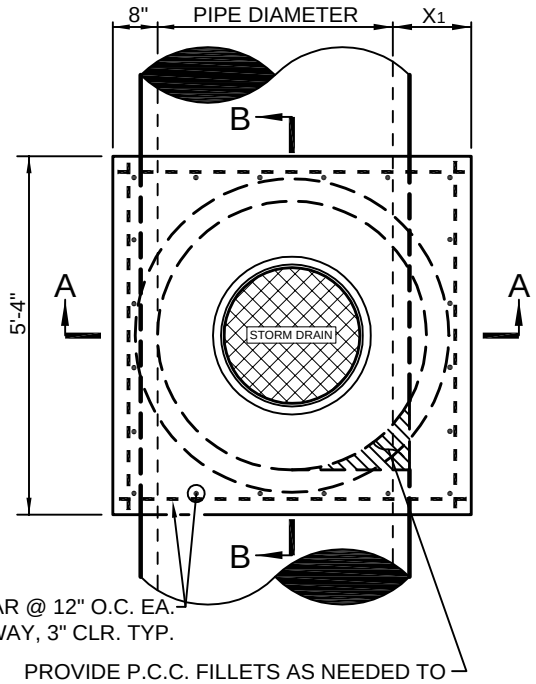
Revisions					
Description	Approved	Date	Description	Approved	Date



SECTION A-A



SECTION B-B



PLAN

DIMENSIONS				
PIPEØ	36"	42"	48"	54" AND GREATER
X_1	20"	14"	8"	EQUALS PIPE WALL THICKNESS
X_2	32"	38"	44"	48"

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24"Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE AN OPEN PICKHOLE, AND BE LETTERED "STORM DRAIN".
2. COLLAR SHALL BE CLASS A PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE.
4. PRECAST SHAFT(S) AND CONCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STORM DRAIN MANHOLE

FOR PIPE DIAMETERS GREATER THAN 36"

Scale:	Issued:
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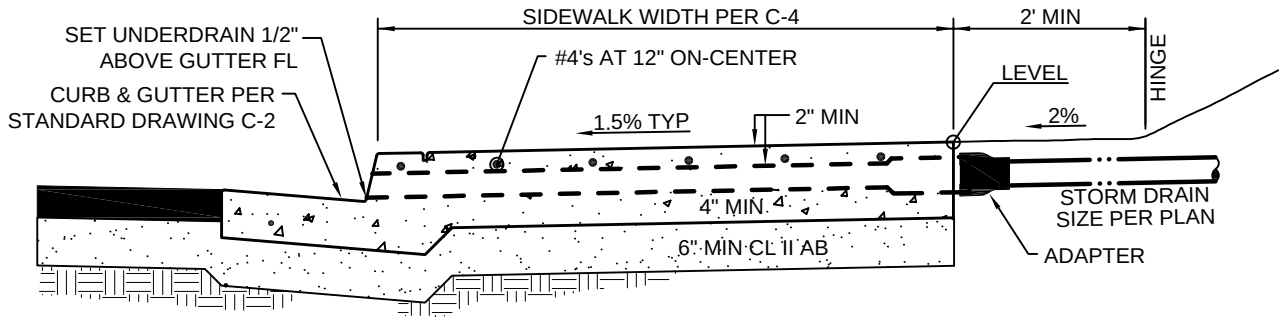
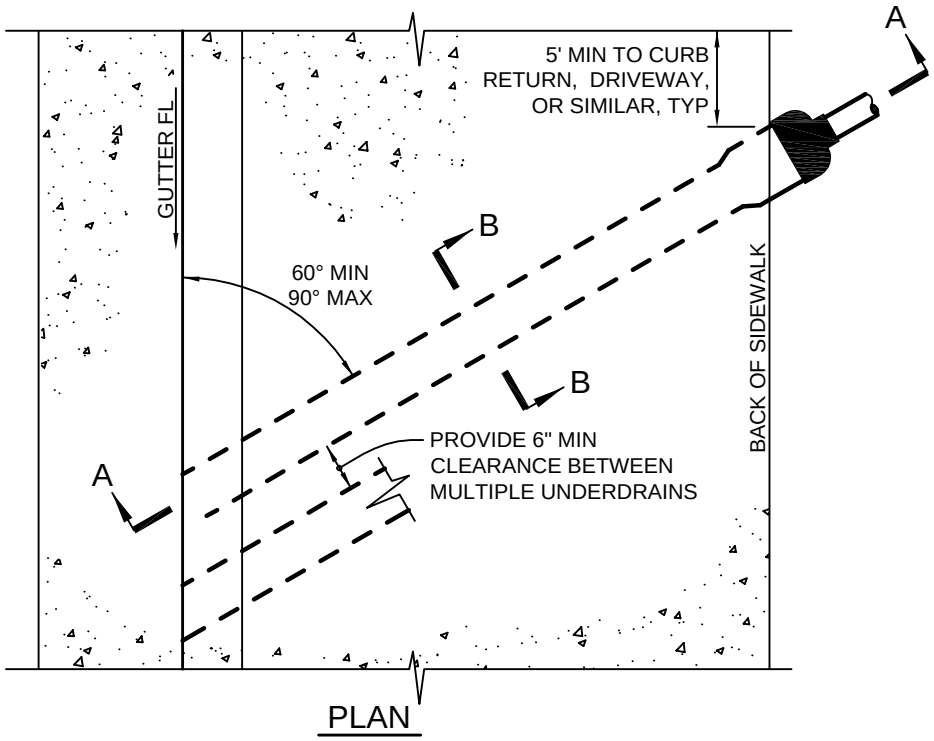
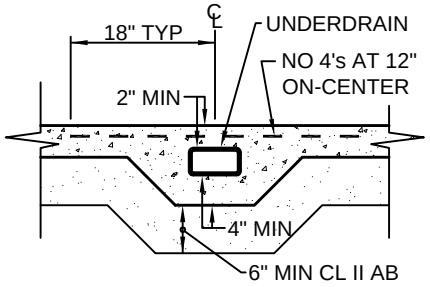


SECTION A-A
SHOWN AT 90°



PLAN

NOTES:
1. THE UNDERDRAIN SHALL BE A 3-INCH TALL BY 5-INCH WIDE (MINIMUM) RECTANGULAR CAST IRON CONDUIT, ALHAMBRA A-470 OR DEPARTMENT APPROVED EQUAL. THE DESIGN WIDTH SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHOWN ON THE PLANS.
2. THE UNDERDRAIN SHALL BE SET FLUSH WITH THE CURB FACE AND PLACED 1/2" ABOVE THE GUTTER FLOWLINE.
3. THE SLOPE OF THE UNDERDRAIN SHALL MATCH THE SIDEWALK CROSS SLOPE.
4. UNDERDRAIN SHALL NOT BE LOCATED CLOSER THAN 5-FEET TO A DRIVEWAY OR CURB RETURN.
5. MULTIPLE DRAINS SHALL HAVE 6-INCH MINIMUM CLEARANCE WITH MAXIMUM OF 3 DRAINS PER 10-FEET OF SIDEWALK.
6. REVERSE SIDEWALK UNDERDRAINS SHALL BE SET 1-INCH BELOW THE DESIGN GUTTER FLOWLINE, AND 3-FOOT GUTTER TRANSITIONS SHALL BE PROVIDED EITHER SIDE OF THE UNDERDRAIN. THE DESIGN ENGINEER SHALL DETAIL REVERSE UNDERDRAINS ON THE PLANS.



SECTION B-B

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK UNDERDRAIN
RESIDENTIAL

Scale:	Issued:
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Drawing No:	D-4
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Revisions					
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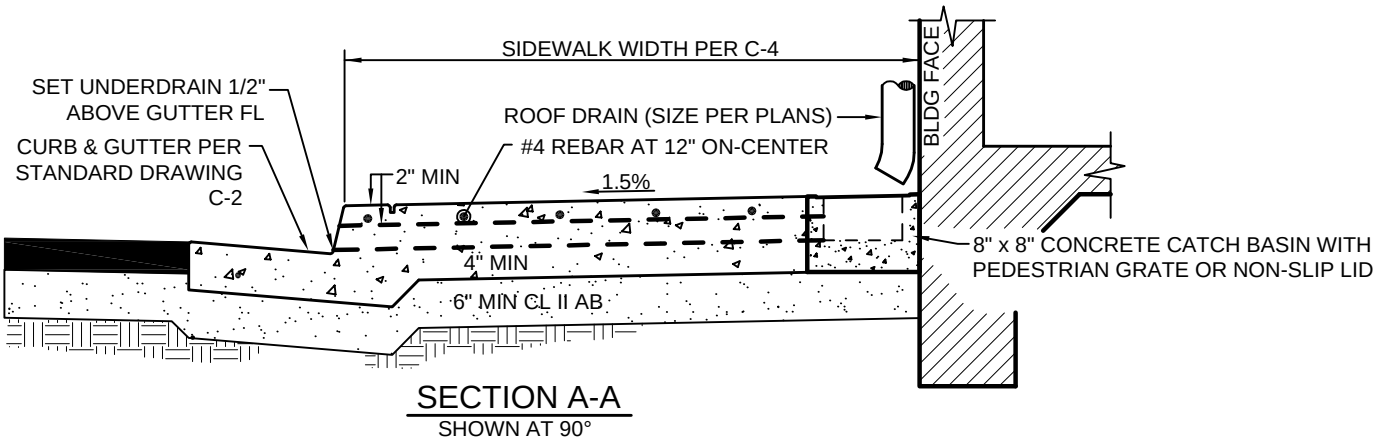
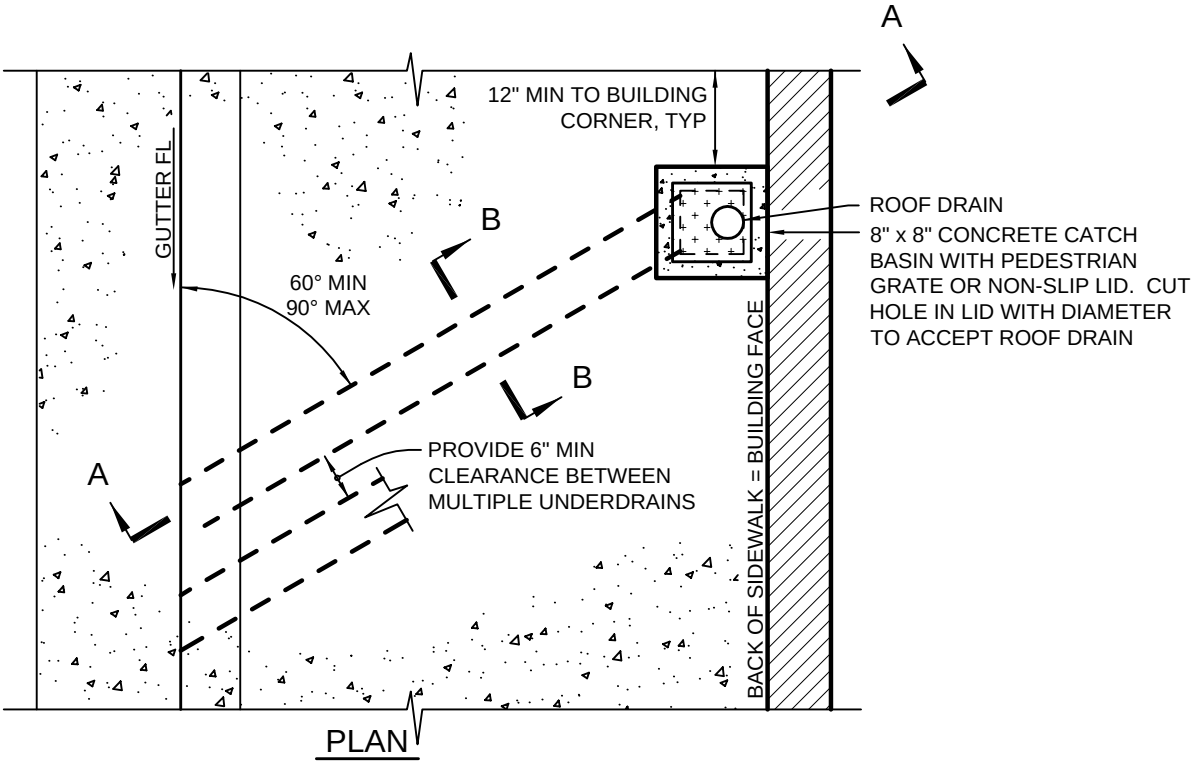
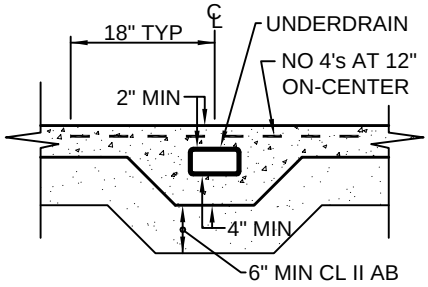


SECTION A-A
SHOWN AT 90°



PLAN

NOTES:
1. THE UNDERDRAIN SHALL BE A 3-INCH TALL BY 5-INCH WIDE (MINIMUM) RECTANGULAR CAST IRON CONDUIT, ALHAMBRA A-470 OR DEPARTMENT APPROVED EQUAL. THE DESIGN WIDTH SHALL BE DETERMINED BY THE PROJECT ENGINEER AND SHOWN ON THE PLANS.
2. THE UNDERDRAIN SHALL BE SET FLUSH WITH THE CURB FACE AND PLACED 1/2-INCH ABOVE THE GUTTER FLOWLINE.
3. THE SLOPE OF THE UNDERDRAIN SHALL MATCH THE SIDEWALK CROSS SLOPE.
4. UNDERDRAIN SHALL NOT BE LOCATED CLOSER THAN 5-FEET TO A DRIVEWAY OR CURB RETURN.
5. MULTIPLE DRAINS SHALL HAVE 6-INCH MINIMUM CLEARANCE WITH MAXIMUM OF 3 DRAINS PER 10-FEET OF SIDEWALK.
6. ALL JUNCTION BOXES SHALL HAVE A PEDESTRIAN RATED GRATE OR NON-SLIP LID AND BE APPROVED BY THE DEPARTMENT.



SECTION B-B

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK UNDERDRAIN

COMMERCIAL (ZERO SETBACK)

Scale:	Issued:
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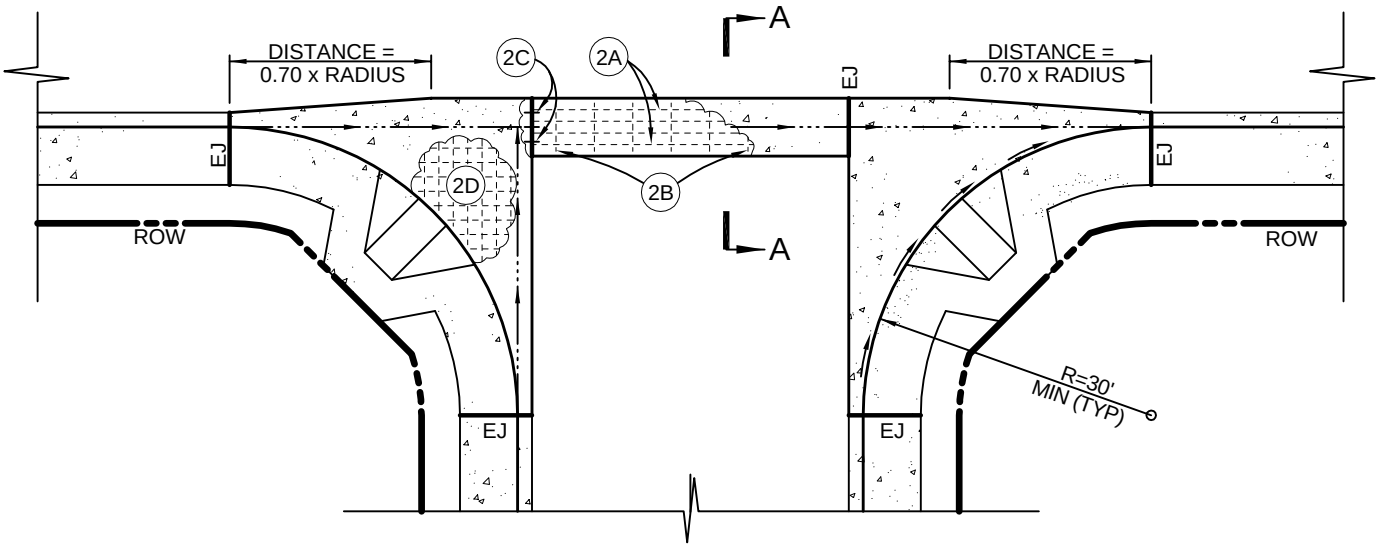
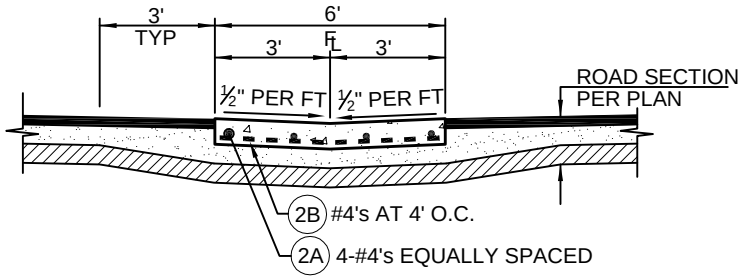


PLAN VIEW



SECTION A-A

NOTES:

1. TYPICAL CROSS GUTTER & SPANDREL SECTION SHALL BE:
   - 8" MINIMUM PORTLAND CONCRETE CEMENT PER THE DESIGN STANDARDS, OVER
   - 6" MINIMUM CLASS II AGGREGATE BASE (OR MATCH ROAD SECTION) TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
2. TYPICAL CROSS GUTTER & SPANDREL REINFORCEMENT SHALL BE:
   - 2A. (4) #4 REBAR CONTINUOUS & EQUALLY SPACED
   - 2B. #4 REBAR AT 4' ON CENTER
   - 2C. EXPANSION JOINT WITH (3) 1/2"Ø x 36" SMOOTH GREASED DOWELS (TYP BOTH SIDES)
   - 2D. #4 REBAR AT 18" ON CENTER ALL WAYS (3" CLEAR FROM ALL EDGES, TYPICAL)

   IN ALL CASES, DOBIES SET 2-INCHES ABOVE FINISHED AGGREGATE BASE SHALL BE USED TO SUPPORT REINFORCEMENT.
3. CONCRETE SHALL BE PORTLAND CEMENT CONCRETE CONFORMING TO THE DESIGN STANDARDS. CONCRETE CURING SHALL BE BY PIGMENTED CURING COMPOUND METHOD USING WHITE PIGMENT TYPE.
4. CURB RAMPS SHALL BE INSTALLED PER STANDARD DRAWING C-5.
5. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN THE CROSS GUTTER OR SPANDREL.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

CROSS GUTTER & SPANDREL

Scale:	Issued:
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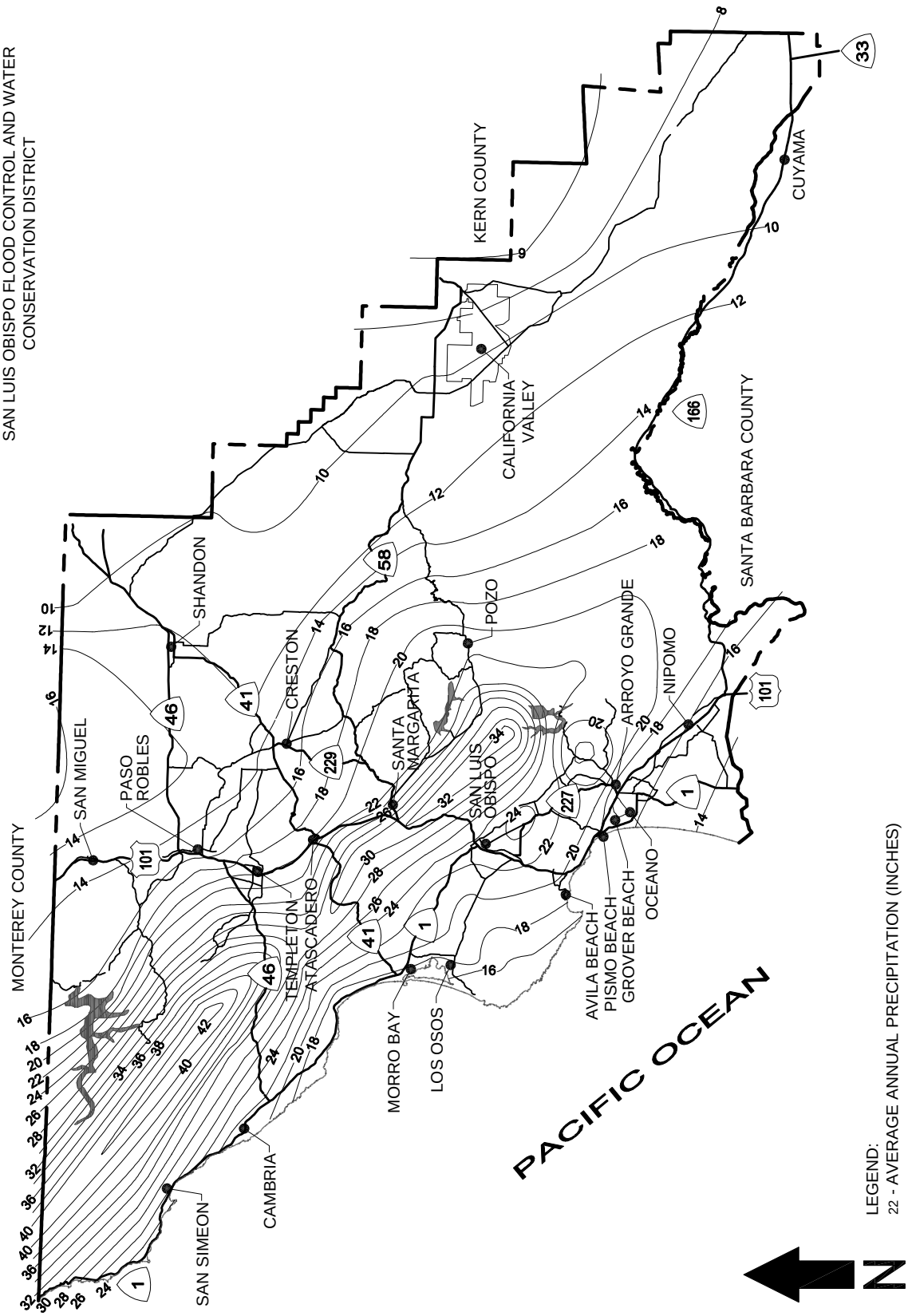
SAN LUIS OBISPO COUNTY AVERAGE ANNUAL PRECIPITATION

(JULY 1 THROUGH JUNE 30) FOR 42 YEAR PERIOD FROM 1955-56 THROUGH 1997-98)

SAN LUIS OBISPO FLOOD CONTROL AND WATER CONSERVATION DISTRICT



LEGEND:
22 - AVERAGE ANNUAL PRECIPITATION (INCHES)

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SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

AVERAGE ANNUAL RAINFALL

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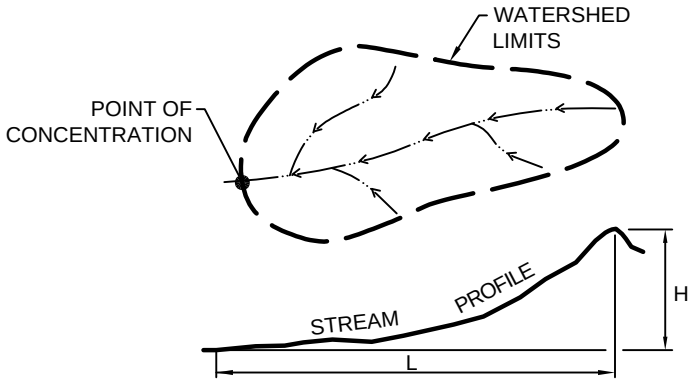
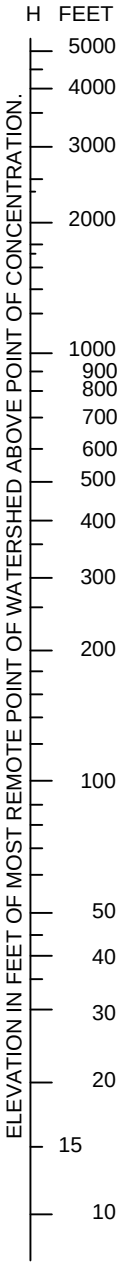
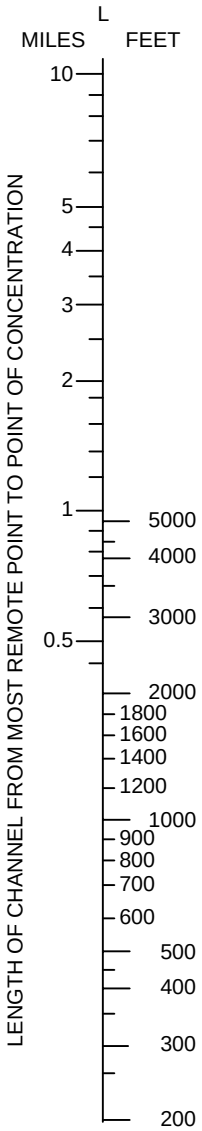
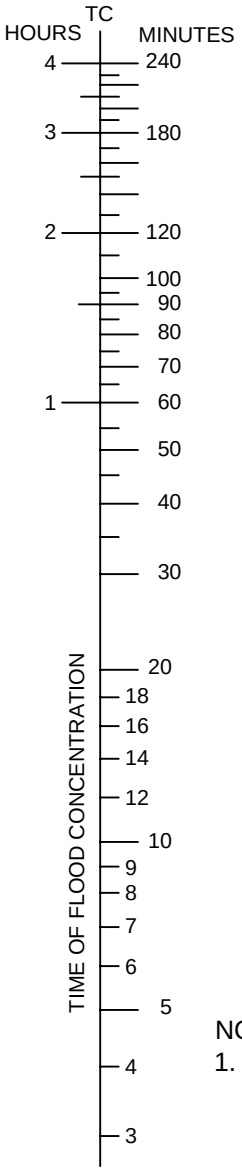
Revisions					
Description	Approved	Date	Description	Approved	Date









EQUATIONS FOR ESTIMATED "TIME OF CONCENTRATION"

$$Tc = \left(\frac{11.9L^3}{H}\right)^{0.385}$$

LEGEND:
Tc = TIME OF CONCENTRATION IN HOURS.
L = LENGTH OF CHANNEL IN MILES.
H = DIFFERENCE IN ELEVATION BETWEEN MOST REMOTE POINT AND THE POINT OF CONCENTRATION IN FEET.

NOTES:
1. THIS NOMOGRAPH IS TO BE LIMITED TO WATERSHED AREAS OF 200 ACRES OR LESS. FOR LARGER WATERSHEDS REFER TO THE DESIGN STANDARDS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TIME OF CONCENTRATION

FOR WATERSHEDS LESS THAN 200 ACRES

Scale:	Issued: Aug. 2006
Drawing No: H-2	
Sheet No: 1 OF 1	

Revisions					
Description	Approved	Date	Description	Approved	Date

TABLE 1: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR DEVELOPED AREAS

TYPE OF DEVELOPMENT	SOIL TYPE	SLOPE <2%	SLOPE 2% to 10%	SLOPE >10%	FOOT NOTE
RESIDENTIAL LOTS > 20,000 SF	C	0.35	0.40	0.50	1,2
	S	0.25	0.35	0.40	1,2
RESIDENTIAL LOTS 10,000 SF TO 19,999 SF	C	0.40	0.45	0.55	1,2
"	S	0.30	0.40	0.45	1,2
RESIDENTIAL LOTS 6,000 SF TO 9,999 SF	C	0.45	0.55	0.65	1,2
"	S	0.35	0.40	0.50	1,2
PLANNED DEVELOPMENTS (PUD)	C	0.65	0.70	0.75	1,2
"	S	0.60	0.65	0.70	1,2
APARTMENTS	C	0.50	0.60	0.70	2
"	S	0.40	0.50	0.60	2
INDUSTRIAL	C	0.55	0.65	0.75	2
"	S	0.45	0.55	0.65	2
COMMERCIAL	C	0.75	0.80	0.85	2
"	S	0.70	0.75	0.80	2

FOOT NOTES:
1. ESTIMATION OF COMPOSITE "C" VALUE USING ESTIMATED IMPERVIOUS AREAS AND STD. DWG. H-3a (TABLE 2) MAY BE REQUIRED BY THE DEPARTMENT. IMPERVIOUS AND PAVED AREAS SHALL USE C=0.95.
2, ALL VALUES SHOWN ARE INTENDED TO BE MINIMUMS. HIGHER VALUES MAY BE REQUIRED BY THE DEPARTMENT.

LEGEND:
C - CLAY, ADOBE, ROCK, OR IMPERVIOUS MATERIAL
S - SAND, GRAVEL, LOAM, OR PERVIOUS MATERIAL

NOTES:
1. COEFFICIENTS FOR RESIDENTIAL LOTS ASSUME TYPICAL SINGLE FAMILY RESIDENCE WITH ASSOCIATED GARAGE, DRIVEWAY, FLATWORK, AND LANDSCAPING. HIGHER DENSITY RESIDENTIAL DEVELOPMENTS MAY REQUIRE USING COMPOSITE COEFFICIENT EVALUATED BY THE DESIGN ENGINEER AND BASED ON PROPOSED DEVELOPMENT IMPERVIOUS AREAS.
2. FOR ALL TYPES OF DEVELOPMENT, COEFFICIENTS ARE INCLUSIVE OF ONLY THE LOT AREA OUTSIDE THE RIGHT-OF-WAY (NET LOT AREA). PAVED SURFACES BETWEEN ROAD CENTERLINE AND RIGHT-OF-WAY SHALL BE EVALUATED SEPARATELY AND INCLUDED TO DETERMINE A COMPOSITE "C" FACTOR.
3. ALL IMPERVIOUS AREAS AND PAVED AREAS SHALL USE C = 0.95.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RUNOFF COEFFICIENTS FOR DEVELOPED AREAS

Scale:	Issued: Aug. 2006
Drawing No:	H-3
Sheet No:	1 OF 2

Revisions					
Description	Approved	Date	Description	Approved	Date

TABLE 2: RATIONAL METHOD STANDARD RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

	EXTREME	HIGH	NORMAL	LOW
RELIEF	0.28 TO 0.35 STEEP, RUGGED TERRAIN WITH AVERAGE SLOPES ABOVE 30%	0.20 TO 0.28 HILLY, WITH AVERAGE SLOPES OF 10% TO 30%	0.14 TO 0.20 ROLLING, WITH AVERAGE SLOPE OF 5% TO 10%	0.08 TO 0.14 RELATIVELY FLAT LAND, WITH AVERAGE SLOPES OF 0% TO 5%
SOIL INFILTRATION	0.12 TO 0.16 NO EFFECTIVE SOIL COVER, EITHER ROCK OR THIN MANTLE OF NEGLIGIBLE INFILTRATION CAPACITY	0.08 TO 0.12 SLOW TO TAKE UP WATER, CLAY OR SHALLOW LOAM SOILS OF LOW INFILTRATION CAPACITY, IMPERFECTLY OR POORLY DRAINED	0.06 TO 0.08 NORMAL; WELL DRAINED LIGHT OR MEDIUM TEXTURED SOILS, SANDY LOAMS, SILT AND SILT LOAMS	0.04 TO 0.06 HIGH; DEEP SAND OR OTHER SOILS THAT TAKES UP WATER READILY, VERY LIGHT WELL DRAINED SOILS
VEGETAL COVER	0.12 TO 0.16 NO EFFECTIVE PLANT COVER, BARE OR VERY SPARSE COVER	0.08 TO 0.12 POOR TO FAIR; CULTIVATION CROPS, OR POOR NATURAL COVER, LESS THAN 20% OF DRAINAGE AREA OVER GOOD COVER	0.06 TO 0.08 FAIR TO GOOD; ABOUT 50% OF AREA IN GOOD GRASSLAND OR WOODLAND, NOT MORE THAN 50% OF AREA IN CULTIVATED CROPS	0.04 TO 0.06 GOOD TO EXCELLENT; ABOUT 90% OF DRAINAGE AREA IN GOOD GRASSLAND, WOODLAND, OR EQUIVALENT COVER
SURFACE STORAGE	0.10 TO 0.12 NEGLIGIBLE SURFACE DEPRESSIONS FEW AND SHALLOW, DRAINAGE WAYS STEEP AND SMALL, NO MARSHES	0.08 TO 0.10 LOW; WELL DEFINED SYSTEM OF SMALL DRAINAGE WAYS, NO PONDS OR MARSHES	0.06 TO 0.08 NORMAL; CONSIDERABLE SURFACE STORAGE, LAKES AND POND MARSHES	0.04 TO 0.06 HIGH; SURFACE STORAGE, HIGH DRAINAGE SYSTEM NOT SHARPLY DEFINED, LARGE FLOOD PLAIN STORAGE OR LARGE NUMBER OF PONDS OR MARSHES

(REFERENCES FIGURE 819.2A OF HIGHWAY DESIGN MANUAL)

EXAMPLE:

GIVEN: AN UNDEVELOPED WATERSHED CONSISTING OF:
1. ROLLING TERRAIN WITH AVERAGE SLOPES OF 5%
2. CLAY SOILS
3. GOOD GRASSLAND AREA
4. NORMAL SURFACE DEPRESSIONS

FIND: THE RUNOFF COEFFICIENT FOR THE ABOVE WATERSHED

SOLUTION:
1. RELIEF = 0.14
2. SOIL INFILTRATION = 0.08
3. VEGETAL COVER = 0.04
4. SURFACE STORAGE = 0.06

ANSWER: THE RUNOFF COEFFICIENT, C = 0.32

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RUNOFF COEFFICIENTS FOR UNDEVELOPED AREAS

Scale:	Issued: Aug. 2006
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Revisions					
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TABLE 1: ANNUAL RAINFALL < 14":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.00	0.90	0.60	0.40	0.26	0.22	0.18	0.14
5	1.40	1.20	0.80	0.50	0.37	0.32	0.25	0.20
10	1.70	1.40	1.00	0.60	0.44	0.38	0.30	0.23
25	2.00	1.70	1.10	0.70	0.54	0.47	0.37	0.28
50	2.20	1.90	1.30	0.80	0.60	0.53	0.44	0.34
100	2.40	2.10	1.40	0.90	0.65	0.59	0.48	0.36

TABLE 2: ANNUAL RAINFALL 14" TO 17":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.30	1.10	0.80	0.50	0.35	0.30	0.23	0.18
5	1.90	1.60	1.10	0.70	0.49	0.42	0.33	0.26
10	2.30	1.90	1.30	0.80	0.60	0.51	0.40	0.30
25	2.60	2.20	1.50	1.00	0.71	0.63	0.50	0.38
50	3.00	2.50	1.70	1.10	0.81	0.74	0.60	0.47
100	3.20	2.70	1.90	1.20	0.90	0.80	0.65	0.49

TABLE 3: ANNUAL RAINFALL 18" TO 21":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	1.70	1.40	1.00	0.65	0.44	0.37	0.29	0.22
5	2.30	1.90	1.30	0.85	0.60	0.52	0.41	0.33
10	2.80	2.40	1.60	1.03	0.74	0.64	0.50	0.38
25	3.20	2.70	1.90	1.20	0.92	0.80	0.64	0.50
50	3.70	3.10	2.10	1.40	1.05	0.92	0.74	0.58
100	4.00	3.40	2.30	1.50	1.13	1.00	0.80	0.62

TABLE 4: ANNUAL RAINFALL 22" TO 28":

Recurrence Interval (Years)	Duration							
	10 Min	15 Min	30 Min	1 Hr	2 Hr	3 Hr	6 Hr	10 Hr
2	2.10	1.80	1.20	0.77	0.55	0.47	0.36	0.28
5	2.80	2.50	1.70	1.05	0.76	0.64	0.52	0.42
10	3.60	3.00	2.10	1.30	0.92	0.81	0.64	0.48
25	3.90	3.50	2.40	1.50	1.10	0.98	0.78	0.60
50	4.50	3.90	2.60	1.70	1.28	1.15	0.94	0.72
100	5.00	4.30	2.90	1.85	1.40	1.25	0.98	0.76

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RAINFALL INTENSITY DATA

Scale:	Issued: Aug. 2006
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ROCK ENERGY DISSIPATER at CULVERT OUTLET

length, metric table (rock size, trench depth, RSP-fabric), determining rock size.

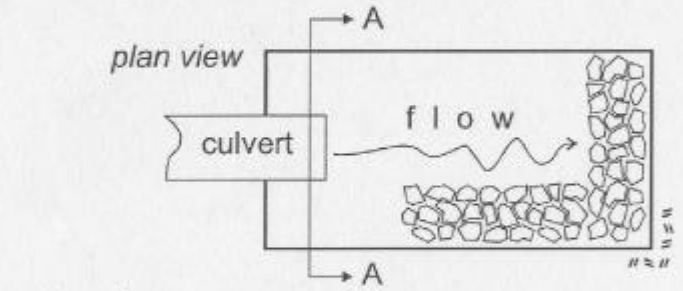
Design notes.

1. Determine **rock size** based on **culvert outlet velocity.**
   A. 1st trial rock size by N.K. Berry's equation (1948), see USBR EM-25 : $d = 0.0126\ V^2$ d diameter feet, V fps, specific gravity 2.65
   B. Compare to Caltrans Bank & Shore Equation 1. With 1V:1.5H (if H>1.5, size will be small) and specific gravity = 2.65

      STABLE ROCK WEIGHT (W) = $0.0000568\ V^6$ (equation 1)

      Equation 1 gives rock size on bank, usually smaller than size from Berry equation for bedload movement along channel bottom.
   C. Also compare above rock sizes to HEC-14 chart, Figure II-C-1, on page II-9 (1975), originally from Searcy (1967).
   D. Select final rock size based on engineering judgment and field experience at similar sites.
2. When downstream channel requires rock bank protection, compare dissipater rock size to bank rock size.
3. Adjust length (Increase or decrease) based on site-specific constraints.

Construction note. Length, width, depth dimensions are approximate, (squared-off excavation not required).



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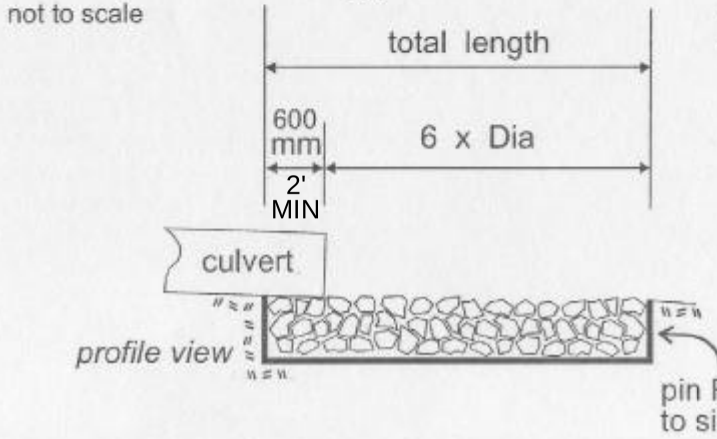
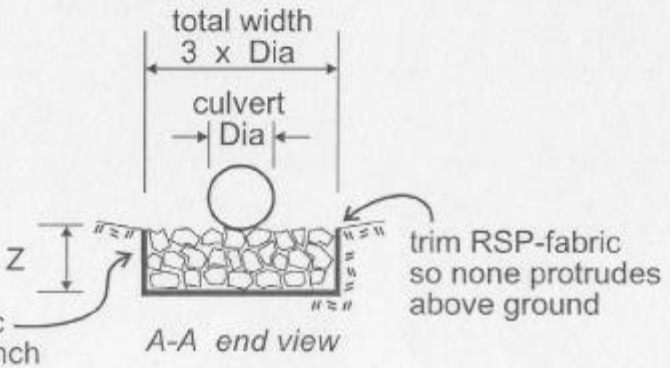


ROCK SIZE RSP-class	Z trench depth Range mm	Type of RSP-fabric nonwoven or woven
Backing No. 2	10" 250 - 400 16"	A or B
Backing No. 1	12" 300 - 450 18"	A or B
Light	18" 450 - 600 24"	B
1/4 T	30" 750 - 900 36"	B
1/2 T	36" 900 - 1100 42"	B
1 T	48" 1200 - 1500 60"	B



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

ROCK SLOPE PROTECTION SIZING

METHOD AT CULVERT OUTLETS

Scale:

Issued: Aug. 2006

Drawing No: H-5

Sheet No: 1 OF 2

Revisions

Description	Approved	Date
Description	Approved	Date

Revisions					
Description	Approved	Date	Description	Approved	Date

TABLE and SKETCHES for Rock Energy Dissipater at Culvert Outlet July 2005 Sheet 2 of 2

W50 standard rock weight. Select a W50 greater than determined stable rock weight W.	D50 feet of standard W50	Z trench depth in feet 1.5 times D50 of standard W50	RSP-class method B	RSP-fabric Type nonwoven or woven
25 pounds	0.66	1.0	Backing No. 2	A or B
75 pounds	0.95	1.5	Backing No. 1	A or B
200 pounds	1.32	2.0	Light	B
¼ ton	1.79	2.7	¼ ton	B
½ ton	2.26	3.4	½ ton	B
1 ton	2.85	4.3	1 ton	B

Basic dissipater dimensions (X, Y)

1. Determining stable rock weight W, design guidelines, see sheet 1 of 2.
2. Added 2 feet to dissipater, supports culvert end, prevents headcut.
3. Table (standard rock sizes, D50, Z, RSP-class, RSP-fabric Type).
4. RSP-fabric details.
5. Construction Detail Notes A, B, C, and D. Include them on contract plans.

Construction Detail Notes

A. Excavate and/or fill dissipater trench to dimensions (X, Y, Z) as shown on plans. Squared edges not required.

B. Place RSP-fabric loosely, and pin it to sides of trench.

C. Place RSP-class of dissipater rock in trench. Rock shall not protrude above culvert flowline or adjacent ground. Match dissipater grade with downstream flow line and adjacent ground.

D. Trim RSP-fabric so that none protrudes above ground.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

ROCK SLOPE PROTECTION SIZING METHOD AT CULVERT OUTLETS

Scale:	Issued: Aug. 2006
Drawing No: H-5a	
Sheet No: 2 OF 2	

Revisions					
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"Engineering Firm's Name, Address, & Phone Number"			
PUBLIC IMPROVEMENT PLANS FOR "Project Identification (Tract No., Parcel No., etc.)"			
"Sheet Title"			
Design/Drawn	County Plan Checker	APPROVED FOR COUNTY REQUIREMENTS Development Services Engineer / Date	
Job No.	County W.O. No. 201R11-XXXX	"Engineer's Name and Registration Number" / Date	
California Coordinates N XXX E XXXX		County Road No.	Sheet X Of XX

NOTES:
1. THE COUNTY TITLE BLOCK SHALL BE LOCATED IN THE LOWER RIGHT CORNER OF EACH SHEET WITHIN THE SET WITH EACH SHEET BEING STAMPED, SIGNED, AND DATED BY THE PROJECT ENGINEER.

BLOCK 1: COUNTY TITLE BLOCK

RECORD DRAWINGS	
"Engineer's Name & Registration No."	DATE
REVISIONS THIS SHEET:	
1	
2	
3	
4	
5	

NOTES:
1. EACH SHEET SHALL SHALL HAVE A RECORD DRAWING BLOCK AND BE SIGNED AND DATED BY THE ENGINEER OF WORK.
2. THE ENGINEER OF WORK SHALL WET STAMP AND SIGN EACH RECORD DRAWING SHEET IF (a) THE ORIGINAL LICENSE HAS EXPIRED, OR (b) THE ENGINEER OF WORK IS DIFFERENT THAN THE PROJECT ENGINEER.
3. REVISION NUMBERS SHALL BE USED ONLY ONCE WITHIN ALL SHEETS OF A SET. EACH ADDITIONAL REVISION SHALL HAVE ITS OWN UNIQUE NUMBER WITHIN THE SET.

BLOCK 2: COUNTY RECORD DRAWING BLOCK

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD COUNTY TITLE BLOCKS

Scale:	Issued: Aug. 2006
Drawing No:	L-1
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Description	Approved	Date	Description	Approved	Date

AB - AGGREGATE BASE
ABN - ABANDON
AC - ASPHALT CONCRETE
ACD - ASPHALT CONCRETE DIKE
ADJ - ADJUST
ADT - AVERAGE DAILY TRIPS
ANG - ANGLE
APROX - APPROXIMATE
ASBLY - ASSEMBLY
AV - AIR VACUUM
AVO - AVOCADO TREE
BLDG - BUILDING
BM - BENCHMARK
BTM - BOTTOM
BVC - BEGIN VERTICAL CURVE
BW - BACK OF WALK (GRADE)
CATV - CABLE TELEVISION (LINE)
CB - CATCH BASIN
CIP - CAST IRON PIPE
CL - CENTERLINE
CMU - CONCRETE MASONRY UNIT
CNTR - CENTER
CO - CLEANOUT
COM - COMMUNICATIONS
CONC - CONCRETE
CSP - CORRUGATED STEEL PIPE
D/W - DRIVEWAY
DDCV - DOUBLE DETECTOR CHECK VALVE
DI - DROP INLET
EJ - EXPANSION JOINT
ELEC - ELECTRICAL
ELEV - ELEVATION
EP - EDGE OF PAVEMENT
ESMT - EASEMENT
ETW - EDGE OF TRAVELED WAY
EUC - EUCALYPTUS TREE
EVC - END VERTICAL CURVE
EXIST OR (E)- EXISTING
FG - FINISHED GRADE
FH - FIRE HYDRANT
FL - FLOWLINE
FM - FORCE MAIN
FNC - FENCE
FS - FINISHED SURFACE
FUT - FUTURE
G - GAS
GB - GRADE BREAK
GM - GAS METER
GP - GRADING PLAN
GR - GRATE
GV - GAS VALVE
HDPE - HIGH DENSITY POLYETHYLENE
HORZ - HORIZONTAL
HP - HIGH POINT
HW - HEADWALL
ICV - IRRIGATION CONTROL VALVE
INV - INVERT
IPR - IRRIGATION PRESSURE REDUCER
IRR - IRRIGATION
JB - JUNCTION BOX
JP - JUNCTION POLE
LAT - LATERAL
LF - LINEAR FEET
LP - LOW POINT
LT - LEFT
MAX - MAXIMUM
MH - MANHOLE
MIN - MINIMUM
MON - MONUMENT
NTS - NOT TO SCALE
OAE - OR APPROVED EQUAL
OG - ORIGINAL (EXISTING) GROUND
OHW - OVERHEAD WIRE
OPT - OPTION
OS - ORIGINAL SURFACE
UG - UNDERGROUND
PCC - PORTLAND CEMENT CONCRETE
PCCL - POINT OF COMPOUND CURVE LEFT
PCCR - POINT OF COMPOUND CURVE RIGHT
PI - POINT OF INTERSECTION
PL - PROPERTY LINE
POC - POINT OF CONNECTION
PRC - POINT OF REVERSE CURVE
PRCL - POINT OF REVERSE CURVE LEFT
PRCR - POINT OF REVERSE CURVE RIGHT
PVC - POLYVINYL CHLORIDE
PVMT - PAVEMENT
RAD (R) - RADIUS
RCP - REINFORCED CONCRETE PIPE
RD - ROAD
REF - REFERENCE
REQ - REQUIRED
ROW (R/W) - RIGHT OF WAY
RSP - ROCK SLOPE PROTECTION
RT - RIGHT
S/W - SIDEWALK
SD - STORM DRAIN
SHLDR - SHOULDER
SHT - SHEET
SLOCO - SAN LUIS OBISPO COUNTY
SS - SANITARY SEWER
STA - STATION
STD - STANDARD
TB - THRUST BLOCK
TBA - TO BE ABANDONED IN PLACE
TBM - TEMPORARY BENCHMARK
TBR - TO BE REMOVED
TBP - TO BE PROTECTED
TC - TOP OF CURB
TEL - TELEPHONE
TEMP - TEMPORARY
TF - TOP OF FOOTING
TG - TOP OF GRATE
TRVLD - TRAVELED (LANE)
TYP - TYPICAL
TW - TOP OF WALL
UD - UNDER DRAIN
UP - UTILITY POLE
VERT - VERTICAL
VC - VERTICAL CURVE
VCP - VITRIFIED CLAY PIPE
VLT - VAULT
VLV - VALVE
WL - WATER LINE
WM - WATER METER BOX
WPJ - WEAKENED PLANE JOINT
WS - WATER SERVICE
W.S. - WATER SURFACE
WV - WATER VALVE
WW - WING WALL
WWM - WELDED WIRE MESH
± - APPROXIMATE
Ø - DIAMETER

NOTES:

1. STATE STANDARD ABBREVIATIONS MAY BE USED IN CONJUNCTION OR IN SUBSTITUTION OF THE DEPARTMENT'S STANDARD ABBREVIATIONS. THE PROJECT ENGINEER MAY SUBSTITUTE COUNTY/STATE ABBREVIATIONS WITH THEIR OWN, HOWEVER, AN ABBREVIATION LEGEND SHALL BE PROVIDED ON THE TITLE SHEET OF THE CONSTRUCTION PLANS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD ABBREVIATIONS

Scale:	Issued: Aug. 2006
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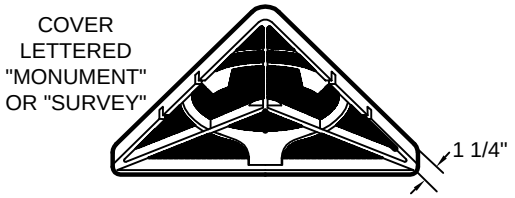
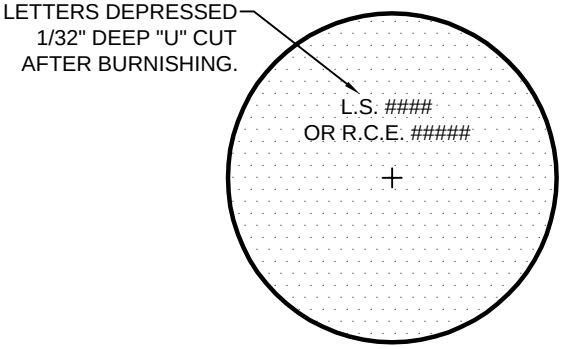
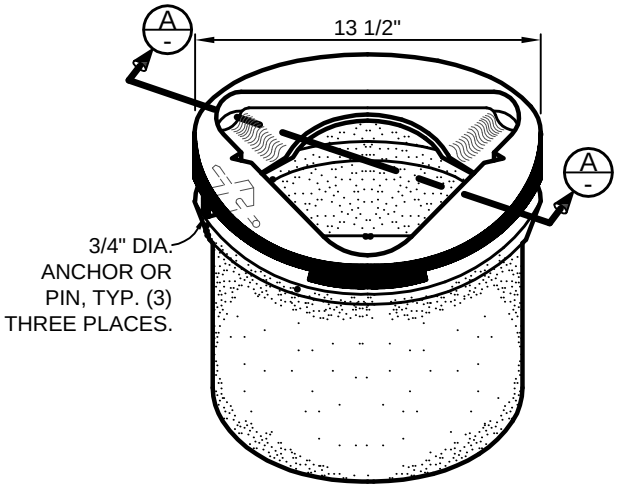


COVER (BOTTOM)



CAP PLAN



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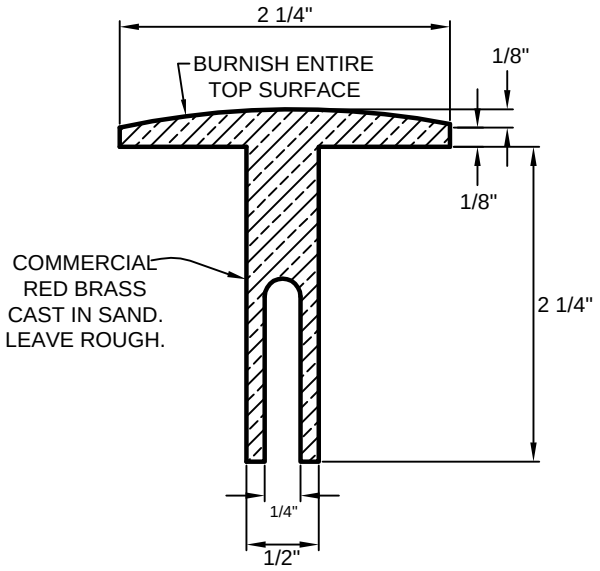
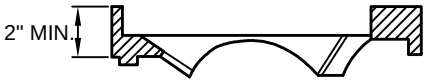
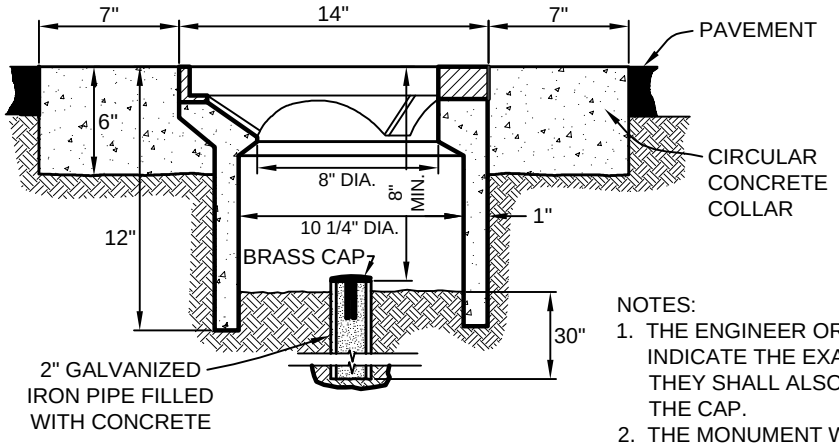


CAP SECTION



RISER RING



SECTION A-A

NOTES:
1. THE ENGINEER OR SURVEYOR SETTING THE MONUMENT SHALL INDICATE THE EXACT POINT BY MARKING A CROSS ON THE CAP. THEY SHALL ALSO STAMP THEIR LICENSE TYPE AND NUMBER ON THE CAP.
2. THE MONUMENT WELL SHALL BE BROOKS PRODUCTS No. 4TT, OR DEPARTMENT APPROVED EQUAL.
3. BRASS CAPS ARE AVAILABLE FOR PURCHASE FROM THE COUNTY PUBLIC WORKS DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD STREET MONUMENT

FOR PAVED ROADS

Scale:	Issued:
NTS	Aug. 2006
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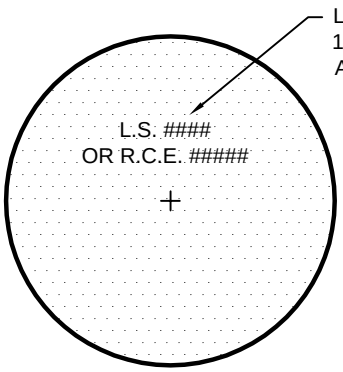
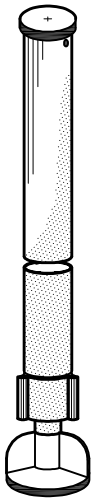
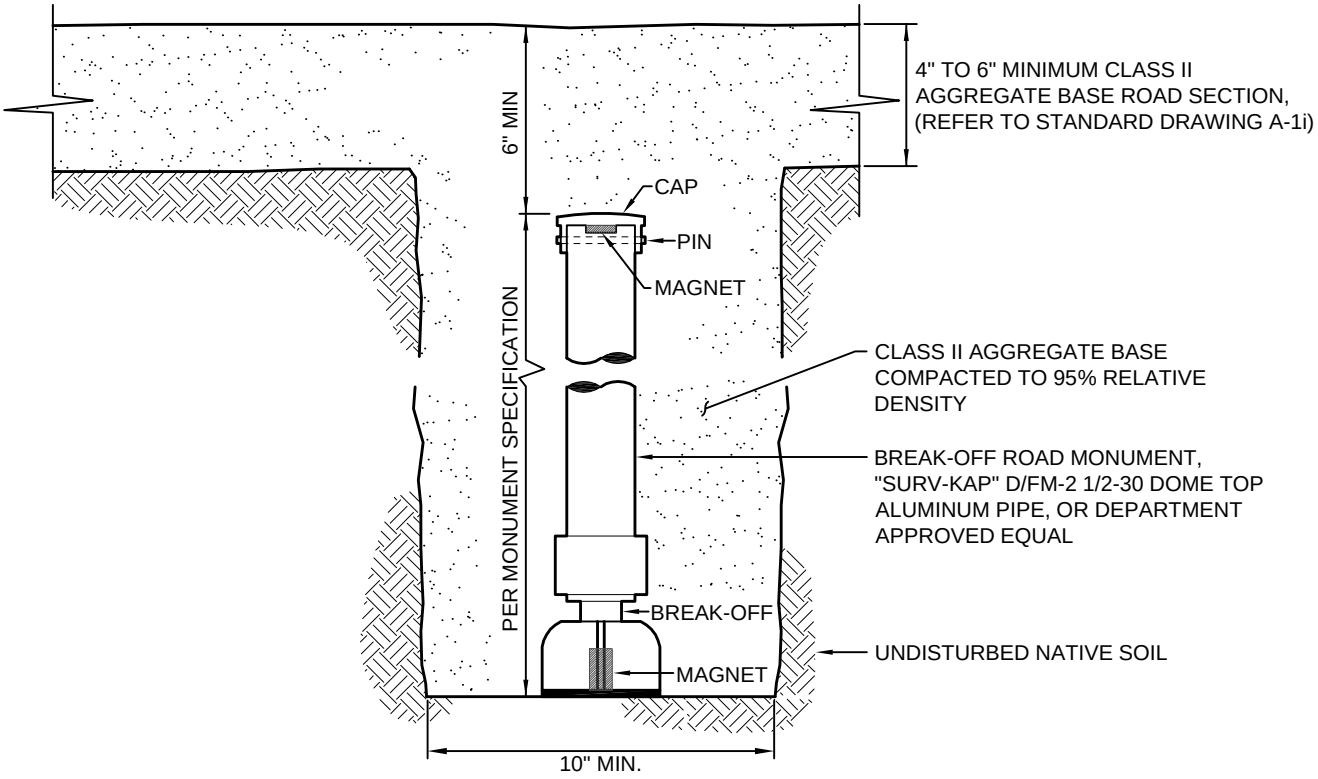


CAP PLAN



ISOMETRIC VIEW



NOTES:

1. BREAK-OFF MONUMENTS ARE DESIGNED TO BREAK OFF AT A PRE-DETERMINED POINT, LEAVING A PORTION OF THE BASE CONTAINING THE MAGNET FOR RELOCATING THE ORIGINAL SURVEY POINT.
2. BREAK-OFF MONUMENTS MAY BE SPECIFIED TO MONUMENT CENTERLINE OF COUNTY RURAL GRAVEL ROADS, (REFER TO STANDARD DRAWING A-1i).
3. NOT FOR USE IN PAVED ROADS (REFER TO STANDARD DRAWING M-1).

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD STREET MONUMENT

FOR GRAVEL ROADS

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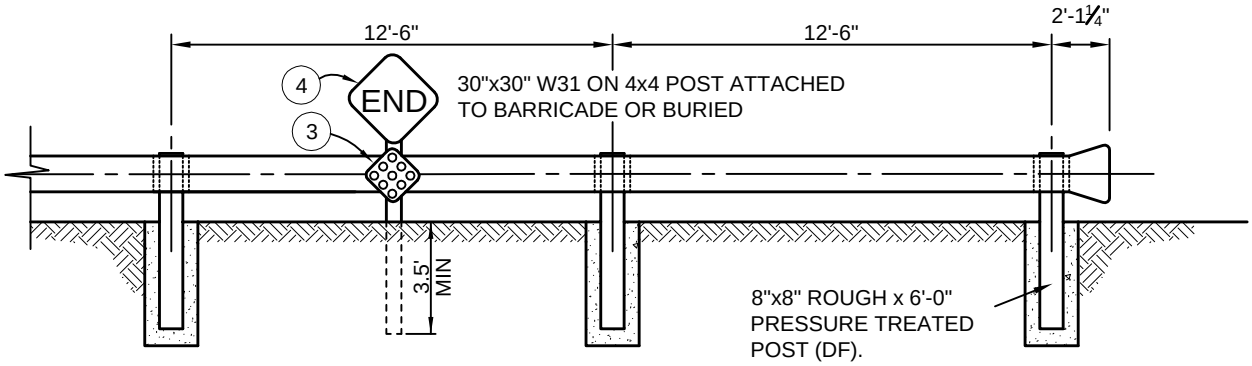
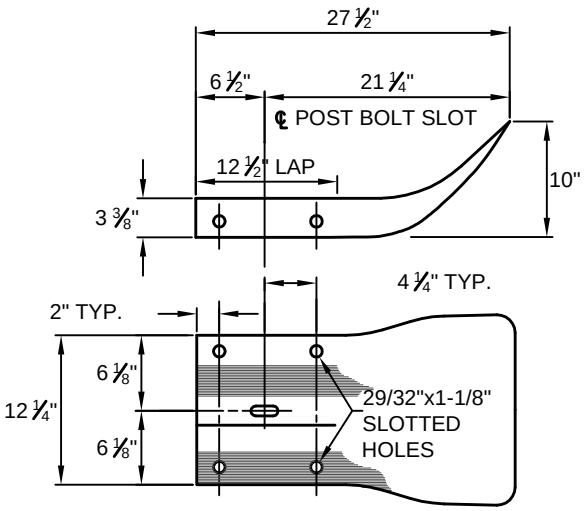
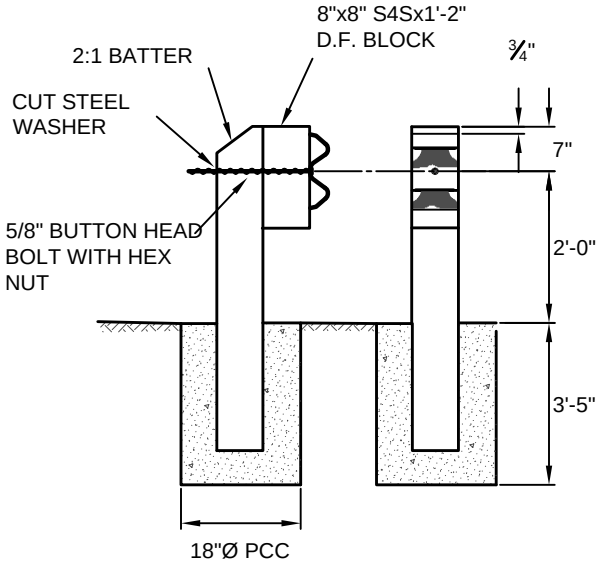
THE NUMBER OF BAYS MAY VARY WITH PAVEMENT WIDTH



METAL BEAM BARRICADE



TERMINAL SECTION



POST DETAIL

NOTES:
1. REFER TO STATE SPECIFICATIONS FOR LATEST GUARDRAIL STANDARDS.
2. USED ONLY WITH APPROVAL BY THE DEPARTMENT.
3. STANDARD "N2-RED RETROREFLECTIVE BACKGROUND WITH BLACK BORDER" MARKER TO BE BOLTED TO GUARD RAILING AS SHOWN.
4. 30"x30" W31 BOLTED TO 4x4 POST AND INSTALLED BEHIND BARRICADE PER STATE STANDARDS.
5. REFER TO STATE STANDARDS FOR SIGN REQUIREMENTS.

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METAL BEAM BARRICADE

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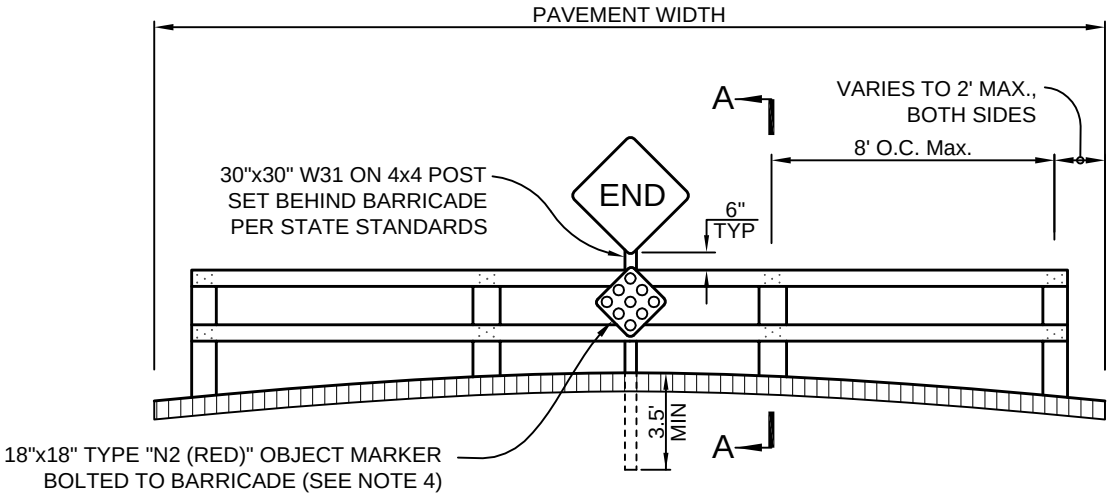
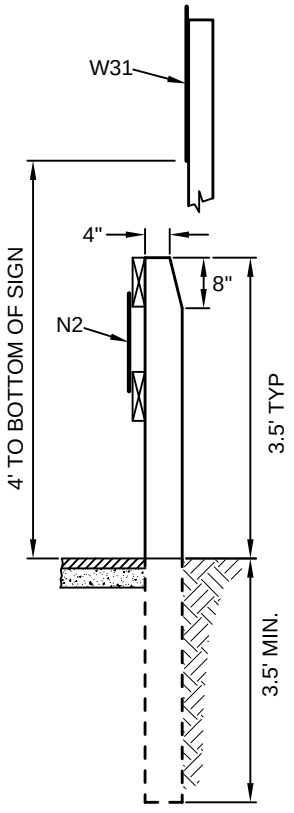
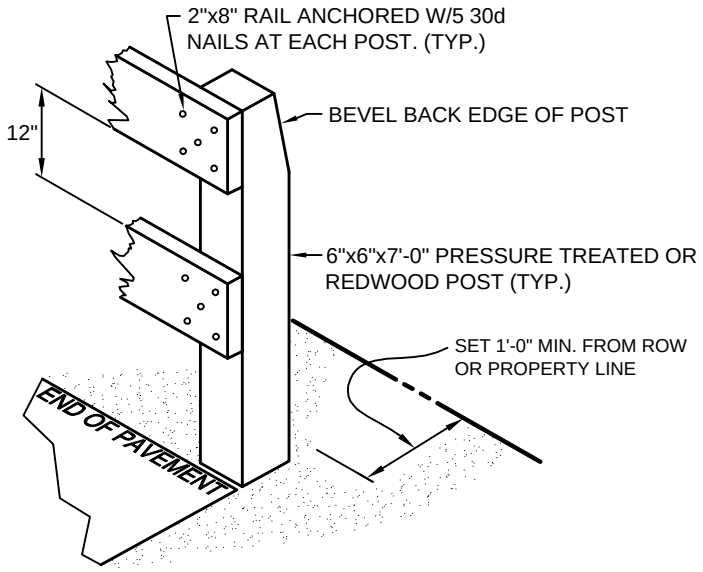


WOOD BEAM BARRICADE



SECTION A-A



POST DETAIL

NOTES:
1. RAILS TO BE 2"x8" CLEAR DOUGLAS FIR S4S AND POSTS TO BE 6"x6"x7'-0" PRESSURE TREATED OR REDWOOD.
2. BUTT ALL RAIL JOINTS TO CENTER OF POST.
3. ALL EXPOSED WOOD SHALL BE PAINTED EXTERIOR WHITE, 2 COATS.
4. STANDARD "N2-RED RETROREFLECTIVE BACKGROUND WITH BLACK BORDER" MARKER TO BE LOCATED AS SHOWN (REFER TO STATE STANDARDS).
5. USED ONLY WITH THE APPROVAL OF THE DEPARTMENT WHERE BARRICADE WILL ONLY BE IN PLACE A MAXIMUM OF FIVE (5) YEARS.
6. REFER TO STATE STANDARDS FOR W-31 SIGN.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TEMPORARY WOOD BEAM BARRICADE

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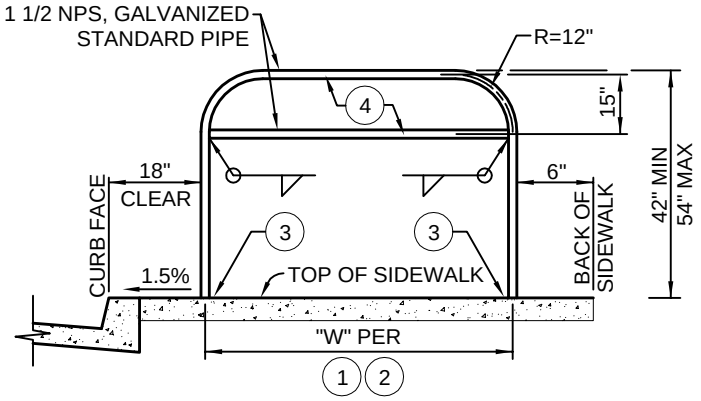
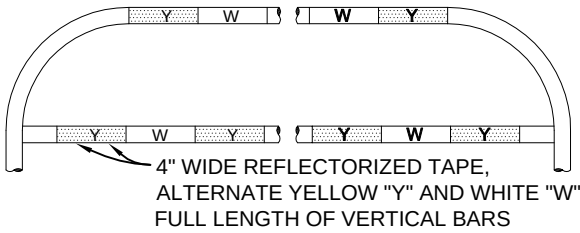
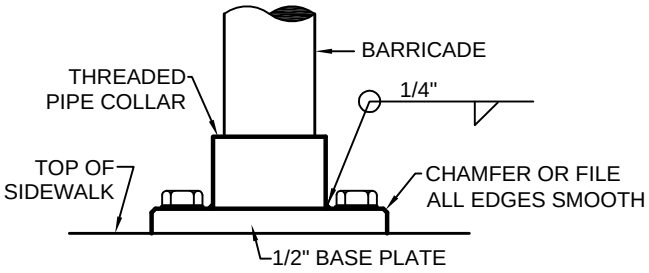


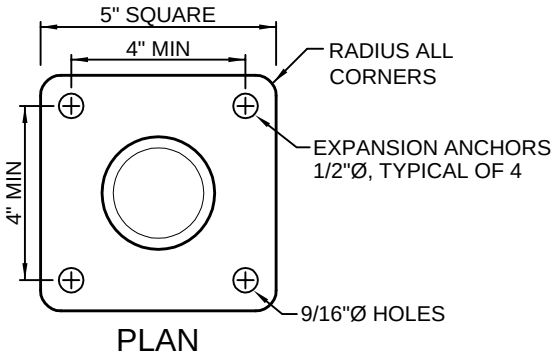
PEDESTRIAN BARRICADE
END OF SIDEWALK EXAMPLE



REFLECTIVE TAPING DETAIL

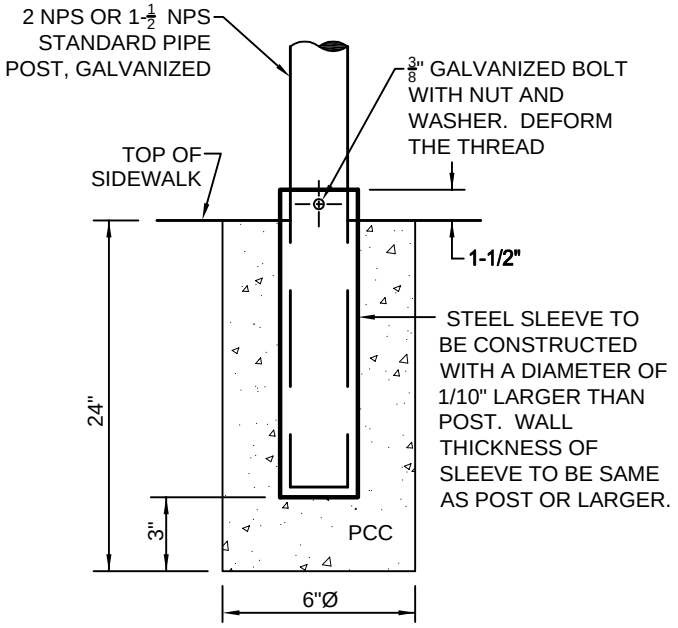


ELEVATION



PLAN

POST ANCHOR DETAIL
FOR TEMPORARY INSTALLATIONS



POST SLEEVE DETAIL
FOR PERMANENT INSTALLATIONS

NOTES:
1. FOR END OF SIDEWALK APPLICATIONS THE PIPE POST SHALL BE 18-INCHES BEHIND FACE OF CURB AND 6-INCH INSIDE BACK OF SIDEWALK. "W" VARIES BASED ON SIDEWALK WIDTH.
2. TO RESTRICT CROSSINGS AT INTERSECTIONS, THE BARRICADE SHALL BE 18-INCHES BEHIND CURB FACE, "W" SHALL BE 6-FEET (UNLESS NOTED OTHERWISE), AND SIGNAGE SHALL BE PROVIDED TO DIRECT PEDESTRIANS.
3. FOR TEMPORARY APPLICATIONS USE THE POST ANCHOR DETAIL FOR MOUNTING THE BARRICADE. FOR PERMANENT APPLICATIONS USE THE POST SLEEVE DETAIL.
4. WRAP BARRICADE RAILS WITH 4-INCH WIDE REFLECTIVE SAFETY TAPE, ALTERNATING YELLOW & WHITE PER DETAIL.
5. FOR MINIMUM PIPE DIAMETERS AND WALL THICKNESS, REFER TO ASTM A6M.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK BARRICADE

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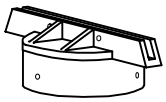
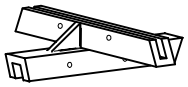


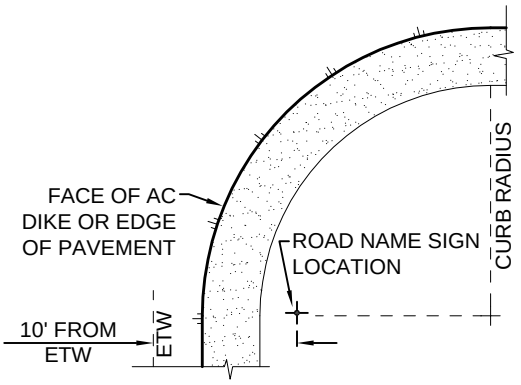
POST-TO-SIGN



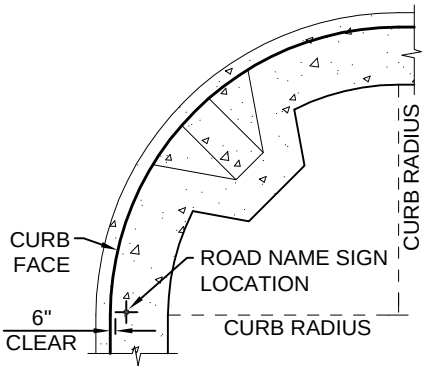
SIGN-TO-SIGN

STREET NAME SIGN BRACKET DETAILS

SIGN SADDLE BRACKET DETAIL



RURAL CONDITIONS

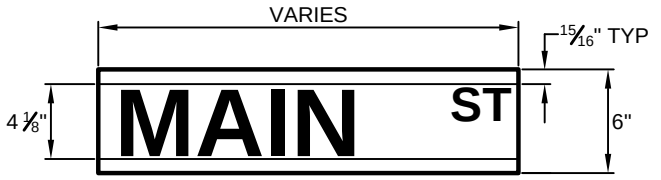


URBAN CONDITIONS

STREET SIGN PLACEMENT DETAIL

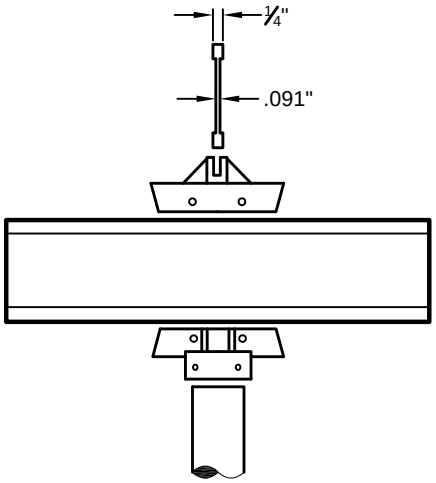
NOTES:

1. STREET NAME SIGN BLADES TO BE EXTRUDED ALUMINUM, 6063-T6 ALLOY, DEGREASED AND ETCHED WITH GREEN SCOTCHLITE APPLIED TO BOTH SURFACES.
2. POST-TO-SIGN BRACKET TO BE DIE-CAST, #360 ALLOY WITH TWO ANGLED GUSSETS EACH SIDE FOR STRENGTH. TO FIT 2-3/8" O.D. GALVANIZED PIPE (2" I.D.). SIGN-TO-SIGN BRACKET TO BE SIMILAR CONSTRUCTION WITH 90° AND 45° SEPARATION.
3. CAPITAL LETTERS TO BE DIE-CUT SILVER SCOTCHLITE, SERIES B.
4. SCREWS FOR SECURING BRACKETS TO BE ZINC PLATED HEX SOCKET HEAD SCREWS 1/4"x1/2".
5. SIGN SADDLE BRACKET TO BE EXTRUDED ALUMINUM, TO FIT 2-3/8" O.D. PIPE, FASTEN WITH A VANDAL PROOF NUT SET (HAWKINS TRAFFIC M2G-S2S, OR APPROVED EQUAL).

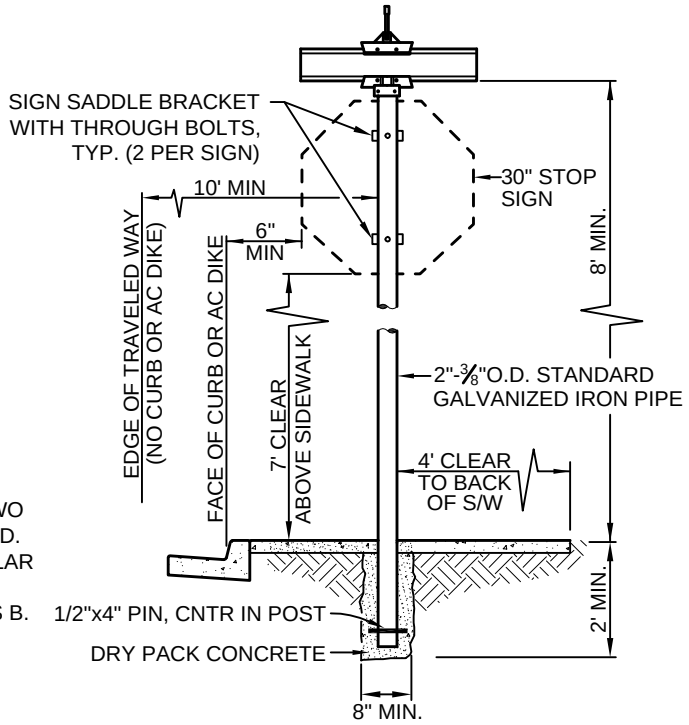


FOR COUNTY MAINTAINED ROADS, SIGN SHALL BE WHITE LETTERS ON A GREEN BACKGROUND. FOR ALL OTHER ROADS THE SIGN SHALL BE GREEN LETTERS ON A WHITE BACKGROUND.

STREET NAME SIGN DETAIL



STREET NAME SIGN ASSEMBLY DETAIL



SIGN INSTALLATION

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

STANDARD STREET SIGN

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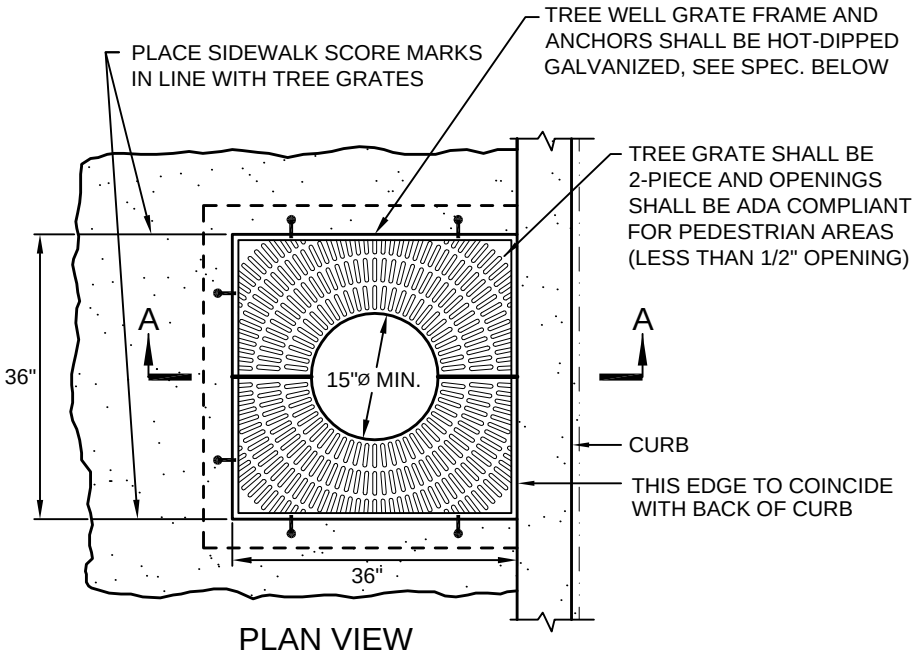
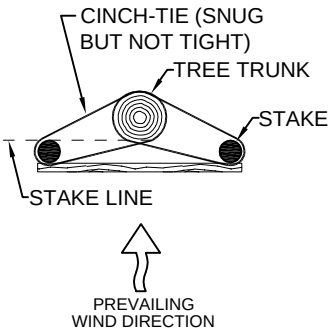


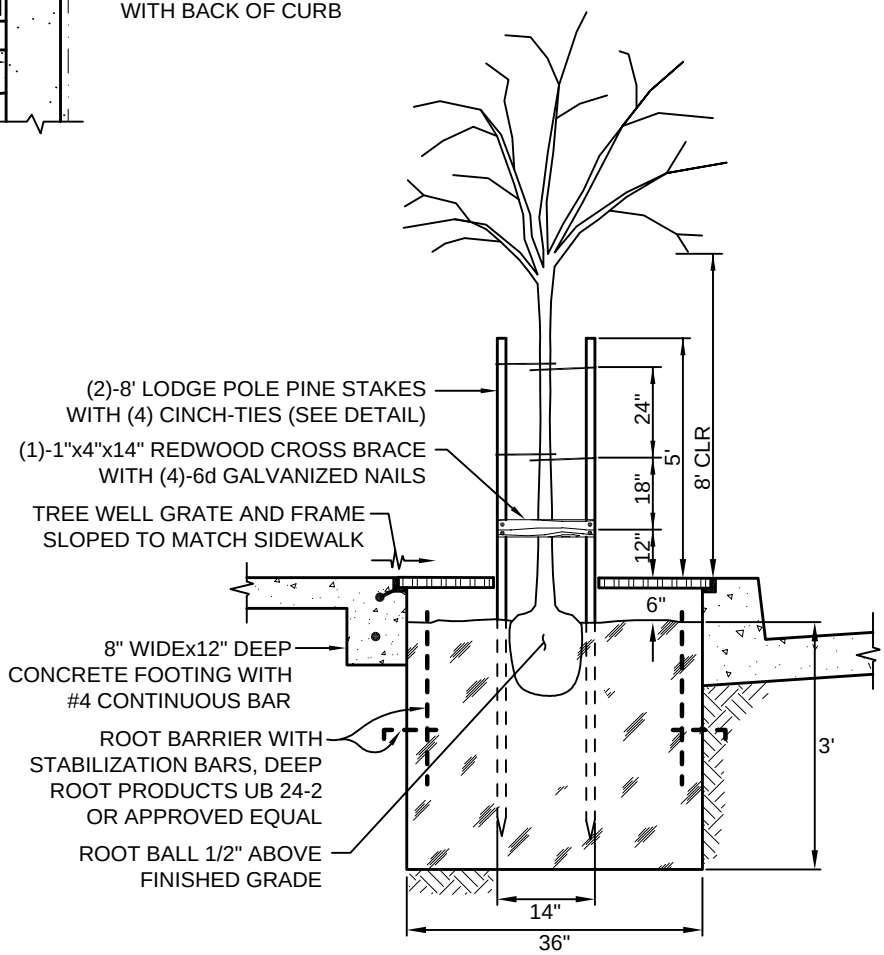
PLAN VIEW



CINCH-TIE DETAIL

NOTES:

1. AN ENCROACHMENT PERMIT SHALL BE REQUIRED FOR ALL PLANTINGS WITHIN THE PUBLIC RIGHT OF WAY. THE PERMIT SHALL DEFINE RESPONSIBILITY FOR MAINTENANCE AND REMOVAL IF REQUIRED.
2. TREES SHALL BE SPACED A MIN. OF 25' FT. APART AS DIRECTED BY ENCROACHMENT PERMIT, TREES SHALL BE AT LEAST 50 FEET FROM CURB RETURNS, ALL TRAFFIC SIGNALS AND SIGNS SHALL REMAIN VISIBLE
3. TREE SIZE TO BE COMPARABLE TO STANDARD 24-INCH BOX TREE, NURSERY STOCK.
4. TREES ARE TO BE SELECTED FROM A LIST OF THOSE APPROVED BY THE COUNTY PLANNING DEPARTMENT.
5. BACKFILL HOLE WITH 50/50 MIX OF COMMERCIAL PLANTING MIX AND NATIVE SOIL. LOOSEN ROOT BALL, TAMP SOIL TO ELIMINATE AIR SPACES, AND WATER SLOWLY TO PENETRATE ROOT BALL.
6. INSTALL DUCTILE CAST IRON TREE WELL GRATES, 36" SQUARE WITH MINIMUM 15" Ø CENTER OPENING.
7. INSTALL PERIMETER ROOT BARRIER WITH A MINIMUM DEPTH OF 24" FROM FINISH GRADE.
8. MAINTENANCE IS THE RESPONSIBILITY OF THE FRONTING PROPERTY OWNER. RESPONSIBILITY MUST BE TRANSFERRED TO SUBSEQUENT OWNERS BY TITLE. THE TREE SHALL BE REMOVED BY PROPERTY OWNER IF DIRECTED BY THE DEPARTMENT.



SECTION A-A

GRATE AND FRAME SPECIFICATIONS:

1. OLYMPIC FOUNDRY STA 36 w/ CI STYLE GALVANIZED FRAME WITH ANCHORS, OR NEENAH FOUNDRY R8704-A DUCTILE CAST IRON GRATE AND GALVANIZED FRAME WITH ANCHORS, OR DEPARTMENT APPROVED EQUAL.
2. ALL GRATES SHALL BE COMPLIANT WITH THE LATEST ADA RECOMMENDATIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SIDEWALK TREE PLANTER DETAIL

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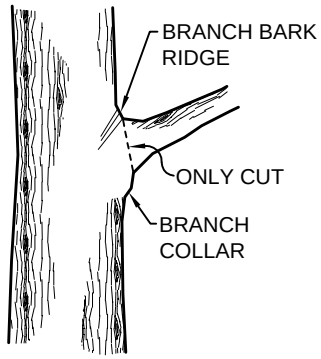
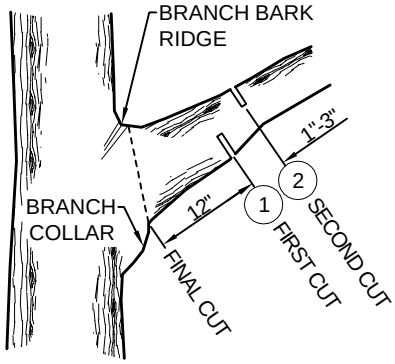
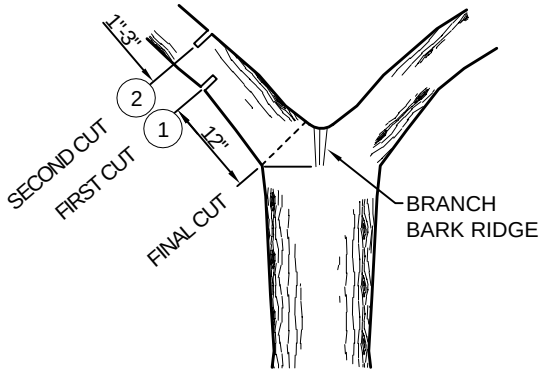


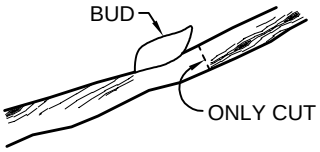
SMALL LIMB



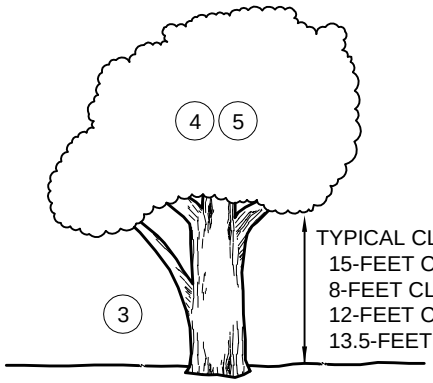
LARGE LIMB



CO-DOMINANT STEM



BRANCHES



TYPICAL CLEARANCES:
15-FEET CLEAR ABOVE ROADWAYS
8-FEET CLEAR ABOVE SIDEWALKS
12-FEET CLEAR ABOVE MULTIUSE TRAILS
13.5-FEET CLEAR ABOVE DRIVEWAYS (CDF)

NOTES:
1. FIRST CUT SHOULD BE TO A DEPTH OF 1/3 THE BRANCH DIAMETER.
2. SECOND CUT, LIMB SHOULD SPLIT AWAY CLEANLY.
3. REMOVAL OF LARGER LOWER BRANCHES SHOULD BE MINIMIZED TO AVOID:
   A. MAKING THE TREE TOP HEAVY AND MORE SUSCEPTIBLE TO "BLOW OVERS",
   B. REDUCING THE NUMBER OF LARGE BRANCH CUTS MINIMIZES TREE SUSCEPTIBILITY TO DISEASE.
   C. PROVIDE WILDLIFE SHELTER.
   D. RETAIN GROUND SHADE TO MAINTAIN SOIL MOISTURE UNDER THE TREE.
   E. RETAIN THE NATURAL SHAPE OF THE TREE
4. REMOVAL OF THE CANOPY BRANCHES SHOULD BE DONE IN A SYMMETRICAL MANNER SO AS NOT TO UNBALANCE THE TREE.
5. TO MINIMIZE STRESS TO THE TREE LIMIT THE AMOUNT OF TRIMMING DONE IN ONE SEASON TO:
   A. 10% OF CANOPY FOR OAK TREES
   B. 25% OF CANOPY FOR OTHER SPECIES
6. 1/3 RULE:
   A. NEVER REMOVE MORE THAN 1/3 OF A TREES CROWN.
   B. ENCOURAGE SIDE BRANCHES THAT FORM ANGLES THAT ARE 1/3 OFF THE VERTICAL, THE 10:00 AND 2:00 O'CLOCK POSITIONS
   C. FOR MOST DECIDUOUS TREES, DON'T PRUNE UP FROM THE BOTTOM ANY MORE THAN 1/3 OF THE TREE'S TOTAL HEIGHT.
7. AFTER PRUNING, IT IS NOT NECESSARY TO USE A WOUND DRESSING. WOUND DRESSINGS HAVE NOT BEEN SHOWN TO IMPROVE THE RECOVERY OF THE TREE, AND IN SOME CASES DO ACTUAL DAMAGE TO THE TREE.
8. TREE TRIMMING SHOULD OCCUR ONLY OCCUR DURING THE DRY SEASON AND AT THE DIRECTION OF THE PROJECT ARBORIST.
9. ALL WORK SHALL BE DONE IN ACCORDANCE WITH RECOGNIZED STANDARDS OF GOOD ARBORICULTURAL PRACTICES.
10. THOROUGHLY CLEAN EQUIPMENT PRIOR TO COMMENCING WORK AND BETWEEN TRIMMING SEPARATE TREES.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TREE TRIMMING METHODS

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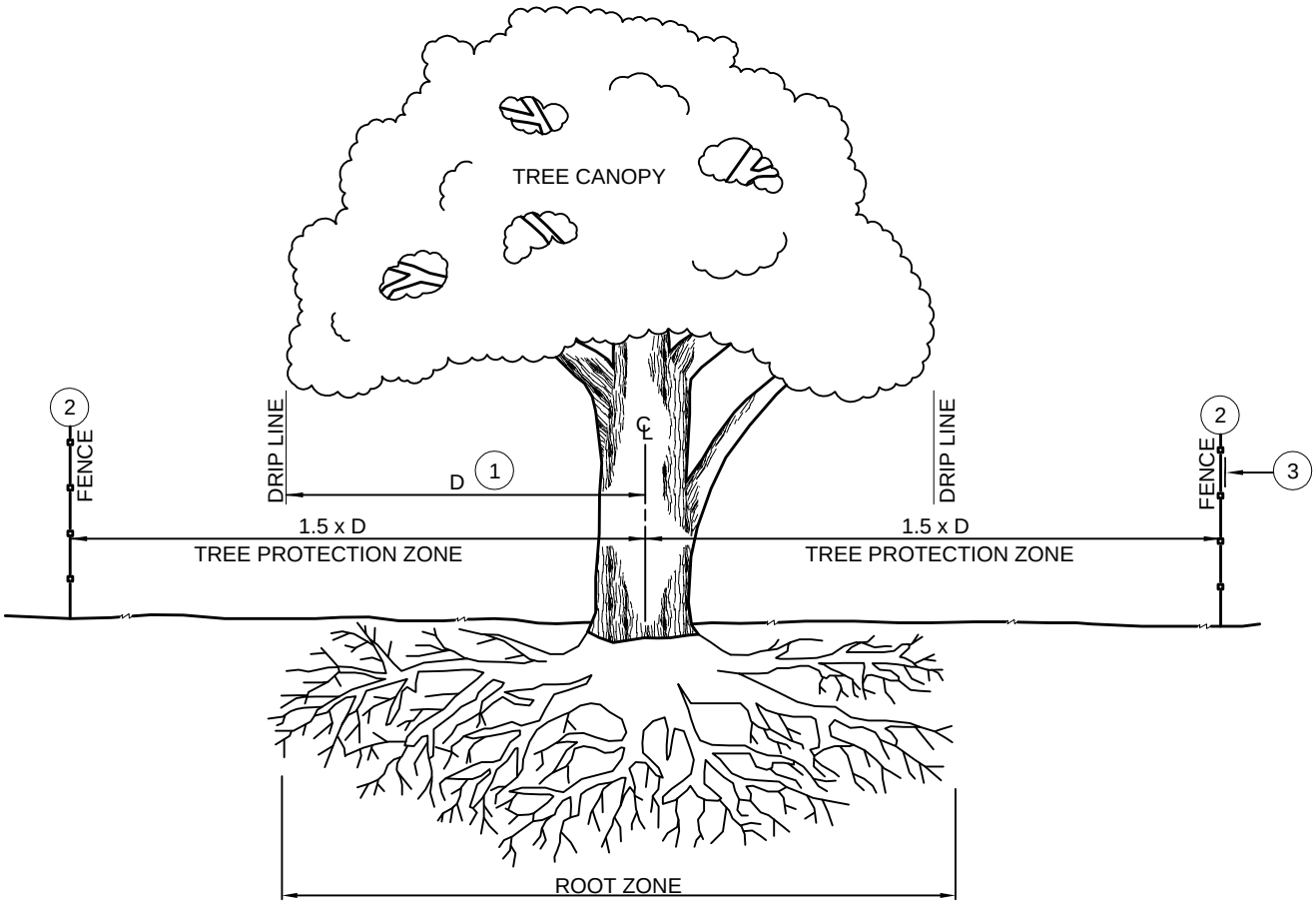

NOTES:

1. "D" EQUALS THE GREATEST MEASURED DISTANCE FROM THE CENTER OF THE TREE TRUNK TO THE FURTHEST POINT OF THE TREE CANOPY (DRIP LINE).
2. TREE PROTECTION FENCING SHALL BE ORANGE PLASTIC "SNOW FENCE" OR APPROVED EQUAL, A MINIMUM OF 3-FEET HIGH, AND INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.
3. AT LEAST ONE (1) WEATHERPROOF SIGN SHALL BE PLACED ON EACH FENCED AREA AND IN A VISIBLE LOCATION. THE SIGN SHALL READ "TREE PROTECTION AREA - STAY OUT" WITH LETTER SIZE NO LESS THAN 4-INCHES TALL. FOR LARGER FENCED AREAS SIGNS SHALL BE PLACED AT NO FURTHER THAN 50-FEET APART.
4. PRIOR TO COMMENCING WORK, TREE PROTECTION FENCING SHALL BE INSTALLED AT ALL TREES IDENTIFIED TO BE EITHER PROTECTED OR IMPACTED, AND AT ALL TREES WHICH ARE WITHIN 50-FEET OF THE PERMITTED WORK ACTIVITIES.
5. FOR APPROVED CHANGES TO THE LIMITS OF WORK, TREE PROTECTION FENCING SHALL BE MODIFIED PER NOTE 4.
6. WHERE WORK IS PERMITTED WITHIN THE TREE PROTECTION ZONE (IMPACTED TREES) ALL EFFORTS SHALL BE MADE (AND IDENTIFIED ON PLANS) TO MINIMIZE ENCROACHMENT AND IMPACT TO THE ROOT ZONE. THIS MAY REQUIRE THAT ALL WORK BE DONE BY HAND AND UNDER THE DIRECTION OF THE PROJECT ARBORIST.
7. ADDITIONAL TREE PROTECTION REQUIREMENTS MAY BE REQUIRED PER THE DESIGN STANDARDS AND/OR WHEN LOCATED WITHIN THE PUBLIC RIGHT-OF-WAY.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TREE PROTECTION DETAIL

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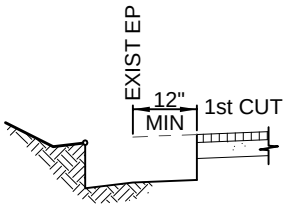
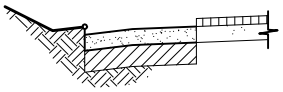
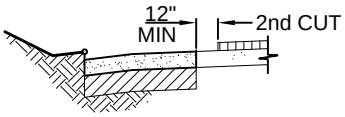


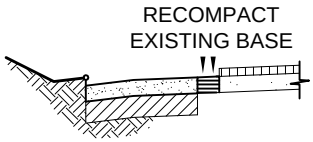
STEP 1: SAWCUT PER NOTE 1 AND REMOVE MATERIAL TO REQUIRED DEPTH.



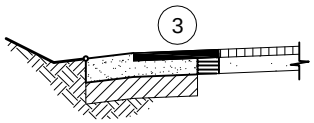
STEP 2: CONSTRUCT NEW SUBGRADE & BASE PER DEPARTMENT APPROVED SECTION.



STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE

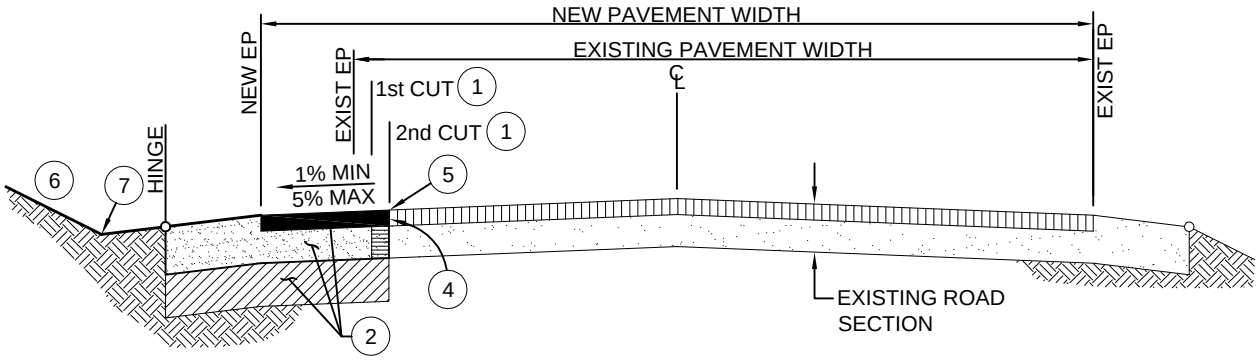


STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 5: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION.

WIDENING PROCEDURE



TYPICAL RURAL ROAD WIDENING SECTION

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED). WHERE EXISTING PAVEMENT IS 3.5-INCHES THICK OR GREATER SEE STANDARD DRAWING R-1a FOR RURAL ROAD WIDENING REQUIREMENTS.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
7. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
8. ROAD SECTIONS WITH ASPHALT CONCRETE DIKE (REFER TO STANDARD DRAWING C-3) SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL ROAD WIDENING

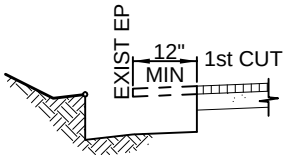
EXISTING AC PAVEMENT LESS THAN 3.5" THICK

Scale:	Issued:
NTS	Aug. 2006

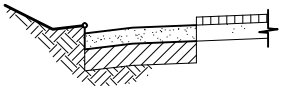
Drawing No: R-1

Sheet No: 1 OF 1

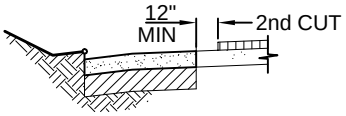
Revisions					
Description	Approved	Date	Description	Approved	Date



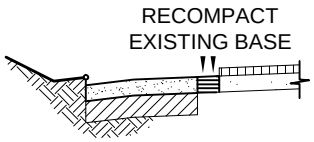
STEP 1: SAWCUT PER NOTE 1 AND REMOVE MATERIAL TO REQUIRED DEPTH.



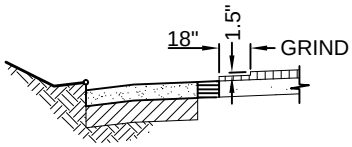
STEP 2: CONSTRUCT NEW SUBGRADE & BASE PER DEPARTMENT APPROVED SECTION.



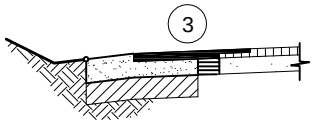
STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.

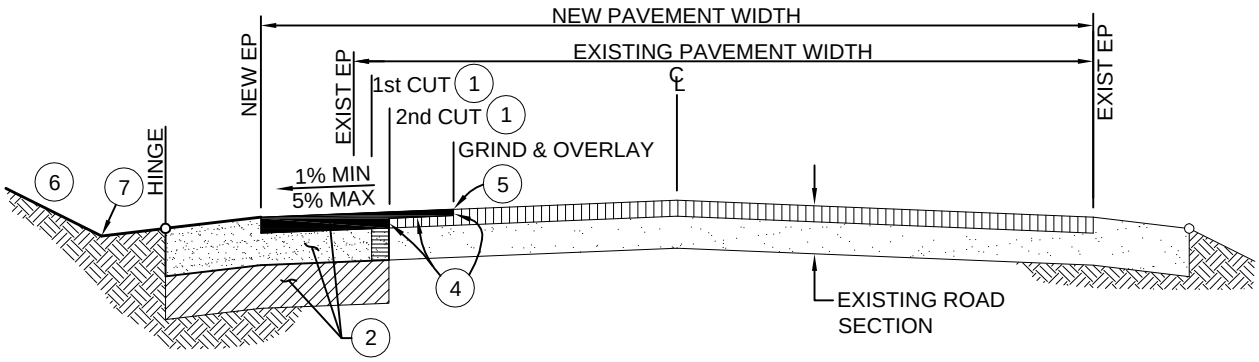


STEP 5: WHEN EXISTING AC IS **P** 3.5" THICK, GRIND 18" WIDE x 1.5" DEEP OF OFF EXISTING ASPHALT SURFACE.



STEP 6: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION (MAXIMUM OF 3" AC LIFT COMPACTED, MINIMUM 2 LIFTS).

WIDENING PROCEDURE



TYPICAL RURAL ROAD WIDENING SECTION

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
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   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.
7. THE PROJECT ENGINEER SHALL ACCOMMODATE FOR ROADSIDE DRAINAGE SUCH THAT IT DOES NOT ERODE THE AGGREGATE SHOULDER. DESIGN AND CONSTRUCTION SHALL BE TO THE SATISFACTION OF THE DEPARTMENT.
8. ROAD SECTIONS WITH ASPHALT CONCRETE DIKE (REFER TO STANDARD DRAWING C-3) SHALL BE REQUIRED BY THE DEPARTMENT WHERE NEEDED TO CONTROL DRAINAGE OR EROSION AND ON LONGITUDINAL GRADES OF 3% OR GREATER.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

RURAL ROAD WIDENING

EXISTING AC PAVEMENT 3.5" THICK OR GREATER

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Drawing No: R-1a

Sheet No: 1 OF 1

Revisions

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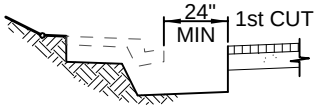
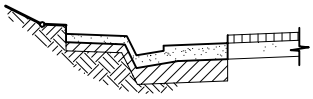
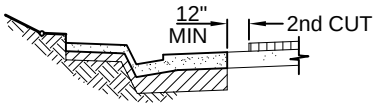


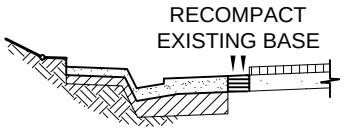
STEP 1: SAWCUT PER NOTE 1 AND REMOVE MATERIAL TO REQUIRED DEPTH.



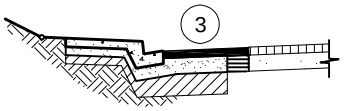
STEP 2: CONSTRUCT NEW SUBGRADE & BASE PER DEPARTMENT APPROVED SECTION.



STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE

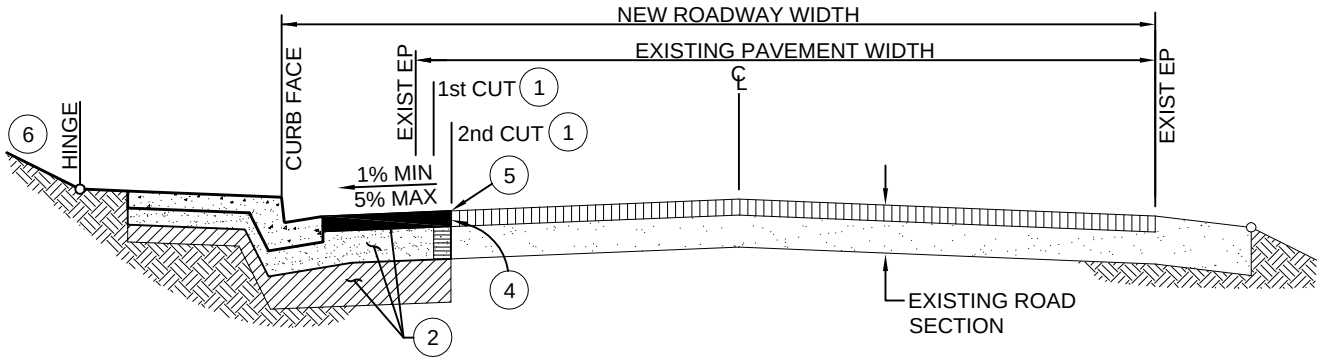


STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 6: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION.

WIDENING PROCEDURE



TYPICAL URBAN STREET WIDENING SECTION

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
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   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED). WHERE EXISTING PAVEMENT IS 3.5-INCHES THICK OR GREATER SEE STANDARD DRAWING R-2a FOR RURAL ROAD WIDENING REQUIREMENTS.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN STREET WIDENING

EXISTING AC PAVEMENT LESS THAN 3.5" THICK

Scale:	Issued:
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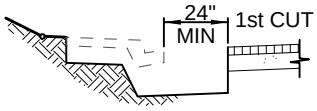
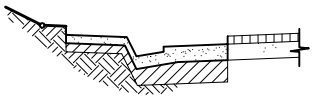
Drawing No: R-2

Sheet No: 1 OF 1

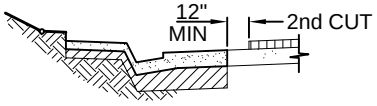
Revisions					
Description	Approved	Date	Description	Approved	Date



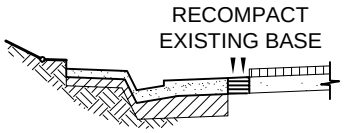
STEP 1: SAWCUT PER NOTE 1 AND REMOVE MATERIAL TO REQUIRED DEPTH.



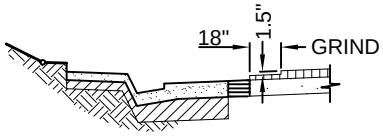
STEP 2: CONSTRUCT NEW SUBGRADE & BASE PER DEPARTMENT APPROVED SECTION.



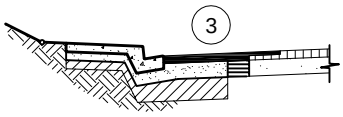
STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.

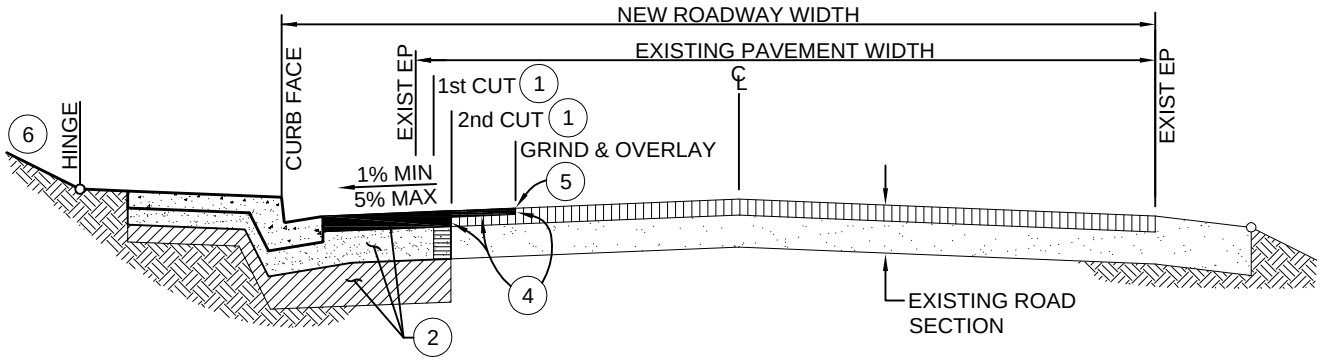


STEP 5: WHEN EXISTING AC IS **P** 3.5" THICK, GRIND 18" WIDE x 1.5" DEEP OF OFF EXISTING ASPHALT SURFACE.



STEP 6: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION (MAXIMUM OF 3" AC LIFT COMPACTED, MINIMUM 2 LIFTS).

WIDENING PROCEDURE



TYPICAL URBAN STREET WIDENING SECTION

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF PAVEMENT AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD WIDENING SECTION SHALL BE DETERMINED AT THE TIME OF CONSTRUCTION BASED ON THE SUBGRADE R-VALUE AND THE TRAFFIC INDEX (TI) AS PROVIDED BY THE DEPARTMENT. IF THE EXISTING ROAD STRUCTURAL SECTION IS GREATER THAN THE DETERMINED ROAD STRUCTURAL SECTION, THEN THE EXISTING STRUCTURAL SECTION THICKNESS SHALL BE MATCHED. TYPICAL ROAD WIDENING SECTION SHALL BE:
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   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. CUT AND FILL SLOPES BEYOND ROADWAY HINGE POINTS SHALL NOT EXCEED 2 HORIZONTAL:1 VERTICAL (OR 3h:1v IN NATIVE SAND) WITHOUT PRIOR APPROVAL BY THE DEPARTMENT.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

URBAN STREET WIDENING

EXISTING AC PAVEMENT 3.5" THICK OR GREATER

Scale:	Issued:
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Drawing No: R-2a

Sheet No: 1 OF 1

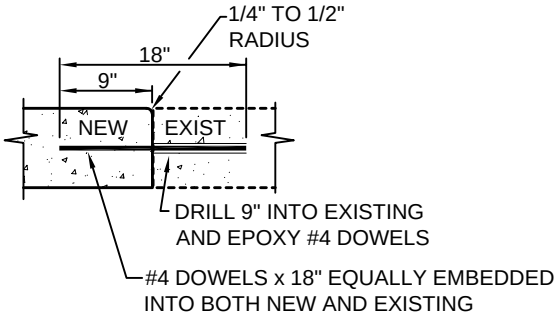
Revisions					
Description	Approved	Date	Description	Approved	Date

NOTES:

1. WHEN REMOVING EXISTING CURB & GUTTER, AND/OR SIDEWALK FOR REPAIR OR CONSTRUCTION OF A DRIVEWAY, CURB RAMP, OR OTHER IMPROVEMENT THE CURB & GUTTER, SIDEWALK, AND 24-INCHES MINIMUM OF ADJACENT ROADWAY PAVEMENT SHALL BE SAWCUT AND REMOVED.
2. ALL SAWCUTTING SHALL BE DONE WITH AN ABRASIVE TYPE CUTTING WHEEL THAT PROVIDES A CLEAN JOIN EDGE. SAWCUTTING SHALL ALWAYS BE PERPENDICULAR OR PARALLEL TO EXISTING CURB & GUTTER AND SIDEWALK.
3. WHEN REPLACING EXISTING CURB & GUTTER AND/OR SIDEWALK, SAWCUTTING SHALL BE DONE AT THE NEAREST EXISTING EXPANSION JOINT OR WEAKENED PLANE JOINT FOR REMOVAL OF ENTIRE PANEL(S). NEW CURB & GUTTER AND SIDEWALK SHALL BE CONSTRUCTED TO THE RESPECTIVE COUNTY STANDARD.
4. WHEN REMOVING EXISTING CURB & GUTTER AND SIDEWALK TO INSTALL NEW DRIVEWAYS, CURB RAMP, OR OTHER IMPROVEMENTS THEN SAWCUTTING SHALL BE DONE AT THE NEAREST EXISTING EXPANSION JOINT OR WEAKENED PLANE JOINT FOR REMOVAL OF ENTIRE PANEL(S). NEW IMPROVEMENTS SHALL BE INSTALLED PER THEIR RESPECTIVE STANDARD DRAWING.
5. THE ROAD STRUCTURAL SECTION ADJACENT TO THE REPAIR OR REPLACEMENT SHALL, AT A MINIMUM MATCH THE EXISTING ROAD STRUCTURAL SECTION. THE DEPARTMENT MAY IMPOSE ADDITIONAL PAVEMENT REQUIREMENTS. COMPACTION TESTS ON THE BASE MATERIAL SHALL BE REQUIRED BY THE DEPARTMENT PRIOR TO PAVING.
6. IN ALL CASES, EXPANSION JOINTS SHALL BE REPLACED PER STANDARD DRAWING C-1, AND WEAKENED PLANE JOINTS SHALL BE REPLACE WITH CONSTRUCTION JOINTS.

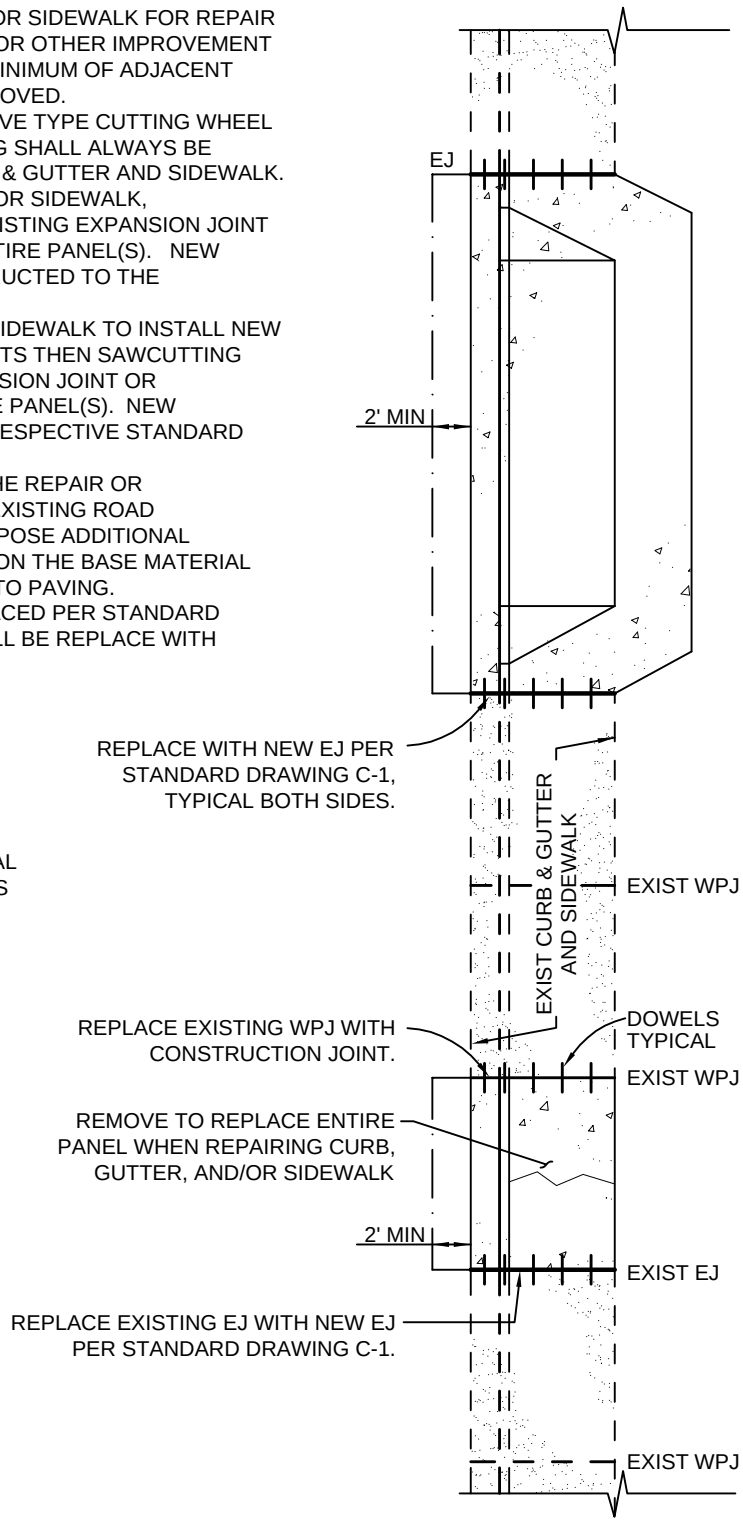
REPAIR REQUIREMENTS:

1. REPAIR OF EXISTING IMPROVEMENTS SHALL BE REQUIRED WHEN THE VERTICAL DIFFERENTIAL (LIFT) IS 1/4" OR GREATER, AND/OR THE HORIZONTAL DIFFERENTIAL (GAP) IS 1/2" OR GREATER, OR IF IT IS REQUIRED BY THE DEPARTMENT.



#4 DOWELS, 1 EACH IN GUTTER, 1 EACH IN CURB FACE, AND 1 EVERY 18" ON-CENTER IN SIDEWALK AND OTHER FLATWORK

CONSTRUCTION (COLD) JOINT AT SAWCUT



SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

CURB, GUTTER & SIDEWALK REPAIR

Scale:	Issued:
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Drawing No: R-3

Sheet No: 1 OF 1

Revisions					
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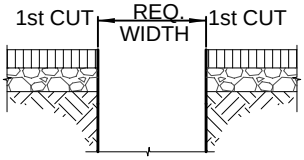
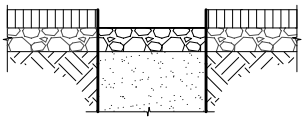
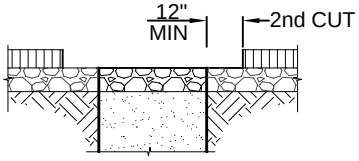


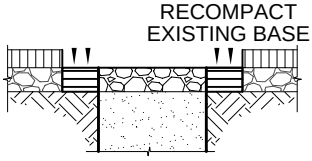
STEP 1: SAWCUT PER TO CONSTRUCT TRENCH PER U-4. SAWCUT SHALL FOLLOW ALIGNMENT OF STRUCTURE.



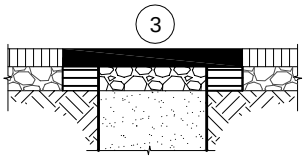
STEP 2: BACKFILL & COMPACT NEW TRENCH TO TOP OF EXIST BASE SECTION PER U-4.



STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE.

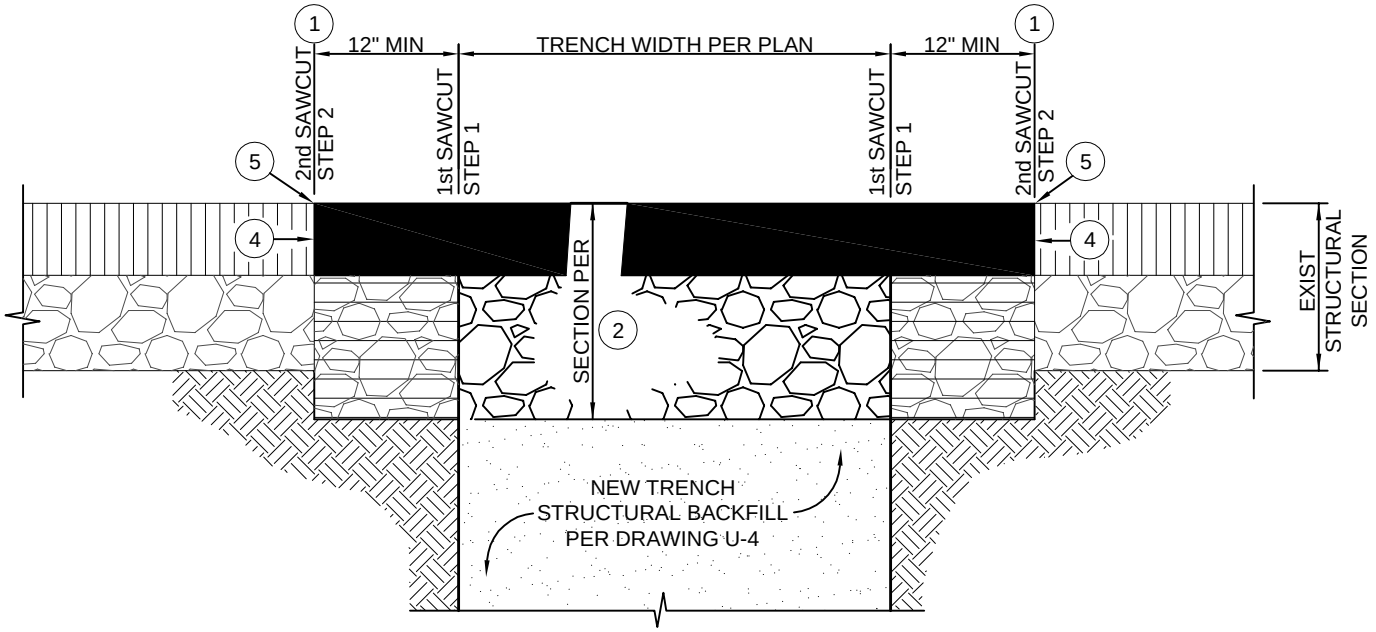


STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.



STEP 5: PAVE ROADWAY PER DEPARTMENT APPROVED SECTION.

PAVEMENT REPAIR PROCEDURE



SECTION VIEW

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. TYPICAL ROAD WIDENING SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED). WHERE EXISTING PAVEMENT IS 3.5-INCHES THICK OR GREATER SEE STANDARD DRAWING R-4a FOR TRENCH REPAIR REQUIREMENTS.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH REPAIR

EXISTING AC PAVEMENT LESS THAN 3.5" THICK

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Drawing No: R-4

Sheet No: 1 OF 1

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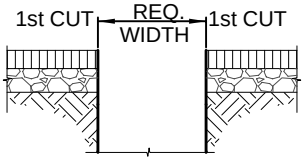
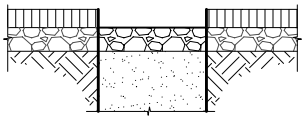
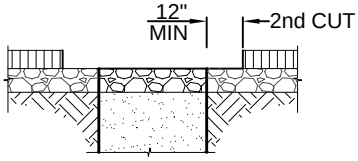


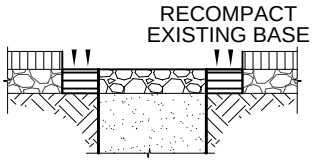
STEP 1: SAWCUT PER TO CONSTRUCT TRENCH PER U-4. SAWCUT SHALL FOLLOW ALIGNMENT OF STRUCTURE



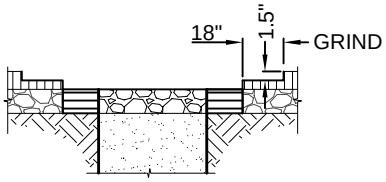
STEP 2: BACKFILL & COMPACT NEW TRENCH TO TOP OF EXIST BASE SECTION PER U-4



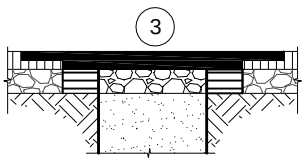
STEP 3: SAWCUT PER NOTE 1 TO REMOVE AN ADDITIONAL 12" MIN OF ASPHALT SURFACE



STEP 4: RECOMPACT EXISTING BASE SECTION TO 95% RELATIVE COMPACTION.

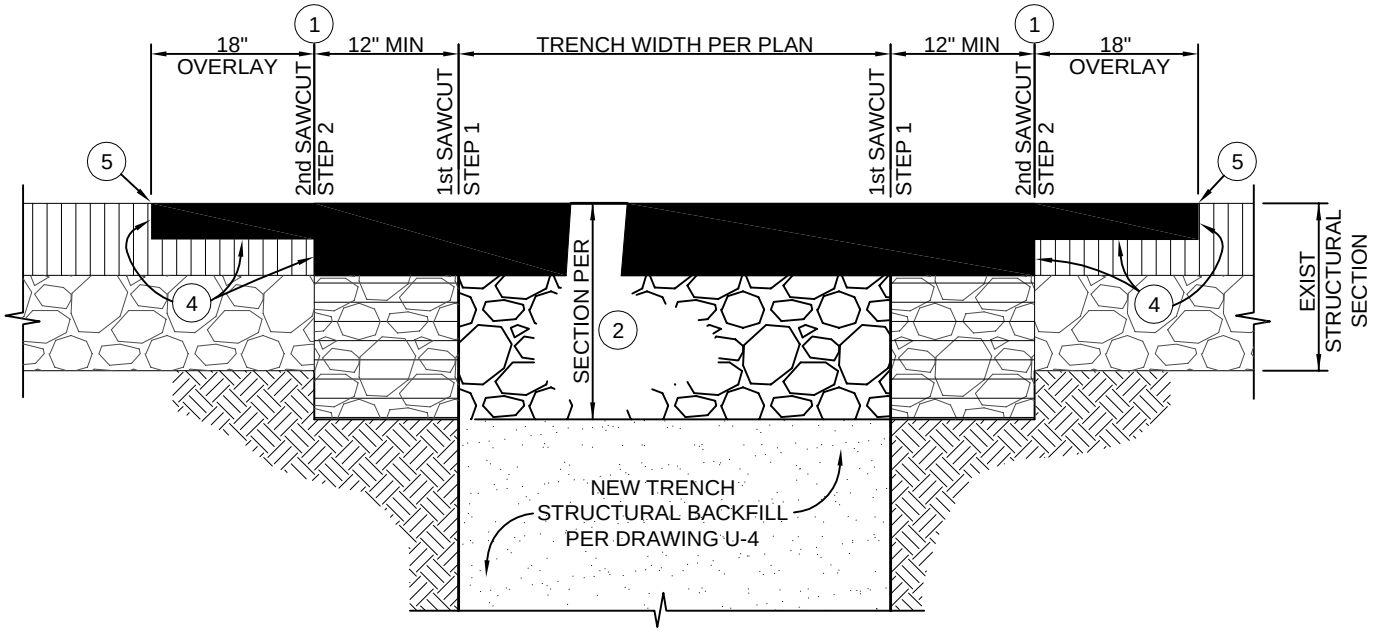


STEP 5: WHEN EXISTING AC IS **P**3.5" THICK, GRIND 18" WIDE x 1.5" DEEP OF OFF EXISTING ASPHALT SURFACE.



STEP 6: PAVE ROADWAY TO MATCH EXISTING SECTION OR AS REQUIRED BY THE DEPARTMENT.

PAVEMENT REPAIR PROCEDURE



SECTION VIEW

NOTES:

1. SAWCUT TO REMOVE DAMAGED OR FAILED PAVEMENT SECTION ADJACENT TO THE EDGE OF TRENCH AS NECESSARY TO PROVIDE A CLEAN JOIN LINE. ALL SAWCUTS SHALL BE PERPENDICULAR OR PARALLEL TO CENTERLINE, OUTSIDE THE NORMAL VEHICLE TIRE PATH WITHIN A TRAVEL LANE, AND SHALL NOT BE ALLOWED WITHIN DESIGNATED BICYCLE LANES. CUT EDGES SHALL BE VERTICAL WITH SQUARE CORNERS AND SHALL BE STRAIGHT AND NEAT IN APPEARANCE. ALL SAWCUTS SHALL BE TO MINIMUM SHOWN OR TO COMPETENT PAVEMENT SECTION.
2. THE STRUCTURAL ROAD REPAIR SECTION SHALL MATCH THE EXISTING STRUCTURAL SECTION THICKNESS OR AS REQUIRED BY THE DEPARTMENT. TYPICAL ROAD WIDENING SECTION SHALL BE:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - TRENCH SECTION PER DRAWING U-4 (STRUCTURAL BACKFILL TO 95% MIN RELATIVE COMPACTION)
3. NEW PAVEMENT SHALL BE PLACED IN LIFTS NOT EXCEEDING 3-INCHES (COMPACTED), WITH A MINIMUM LIFT NOT LESS THAN 1.5-INCHES.
4. A TACK COAT SHALL BE APPLIED TO ALL HORIZONTAL AND VERTICAL CONFORM SURFACES PRIOR TO PAVING.
5. AFTER PAVING, APPLY "CRAFCO SUPERFLEX" TO ALL SURFACE SEAMS PER MANUFACTURER'S RECOMMENDATIONS.
6. THE DEPARTMENT SHALL PROVIDE ADDITIONAL REQUIREMENTS WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH REPAIR

EXISTING AC PAVEMENT 3.5" THICK OR GREATER

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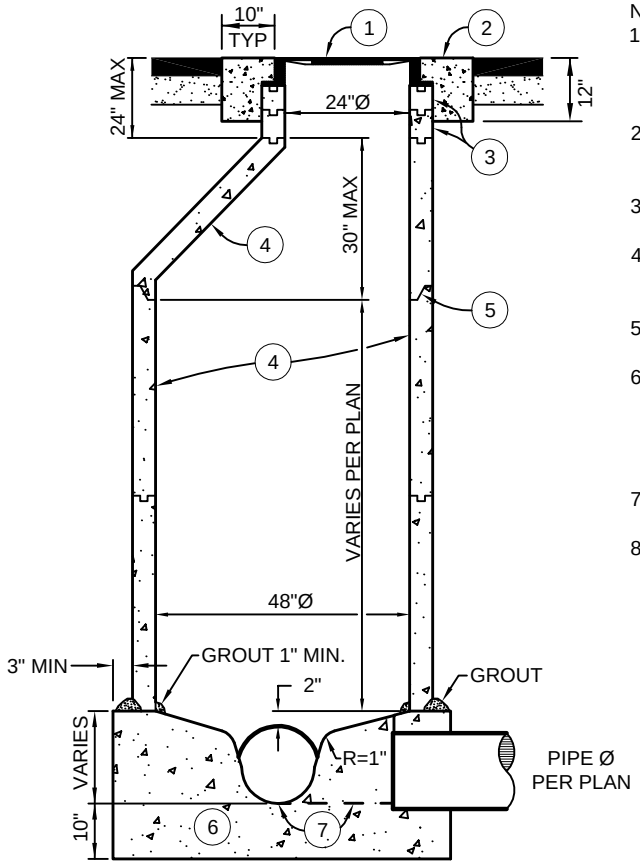
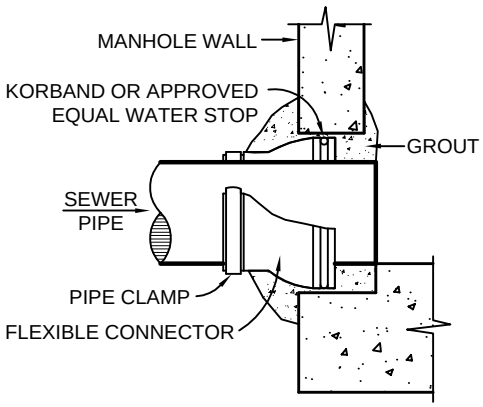


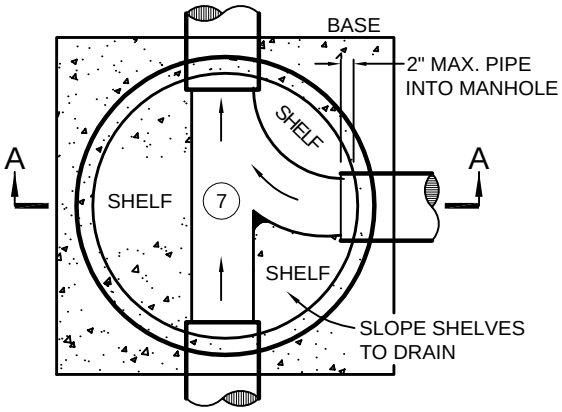
SECTION A-A

NOTES:

1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24" Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE A BLIND PICKHOLE, WATERTIGHT GASKET, AND BE LETTERED "SANITARY SEWER".
2. COLLAR SHALL BE CLASS A PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE 3" OR 6" (9" MAX) ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE.
4. PRECAST SHAFT(S) AND ECCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. MANHOLE BASE SHALL BE PORTLAND CEMENT CONCRETE PER THE DESIGN STANDARDS, AND REST UPON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROOVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
7. CONCRETE CHANNEL SHALL BE STEEL TROWEL FINISH AND SHELF AREAS SHALL BE MONOLITHICALLY PLACED.
8. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



TYPICAL CONNECTION DETAIL



PLAN VIEW

PINKERTON A-640 WITH SKID RESISTANT SURFACE, BLIND PICKHOLE, WATER TIGHT GASKET, AND HS-20 TRAFFIC LOADING, OR APPROVED EQUAL, MARKED "SANITARY SEWER"

LID DETAIL

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SEWER MANHOLE

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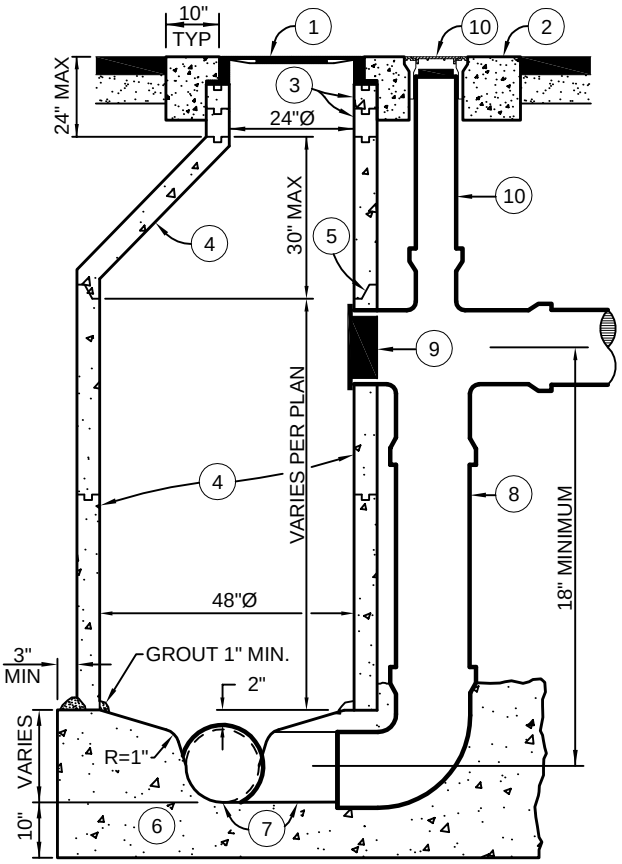
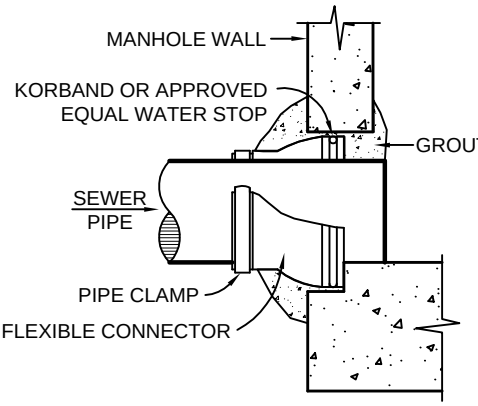
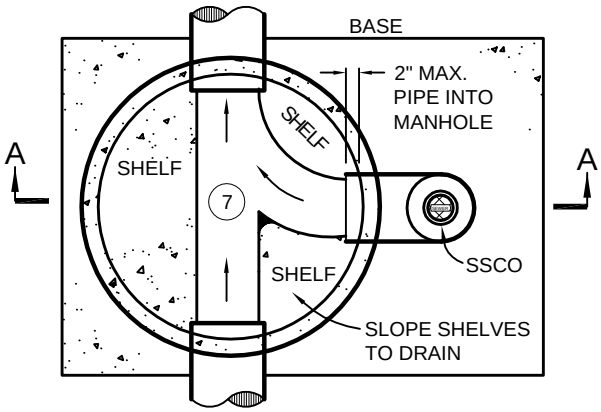


SECTION A-A

NOTES:
1. MANHOLE COVER AND FRAME SHALL HAVE A MINIMUM 24" Ø OPENING AND CONFORM TO HS-20 TRAFFIC LOADING. LID SHALL HAVE A BLIND PICKHOLE, WATERTIGHT GASKET, AND BE LETTERED "SANITARY SEWER".
2. COLLAR SHALL BE CLASS A PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
3. PROVIDE 3" OR 6" (9" MAX) ADJUSTING RINGS AS NEEDED, GROUTED ON THE INSIDE.
4. PRECAST SHAFT(S) AND ECCENTRIC CONE SHALL MEET ASTM C-478 61T FOR CLASS 2 REINFORCED CONCRETE PIPE, OR AS APPROVED BY THE DEPARTMENT.
5. JOINTS SHALL BE WATERTIGHT, SET WITH BUTYL RUBBER SEALANT (RUB'R-NEK OR EQUAL).
6. MANHOLE BASE SHALL BE PORTLAND CEMENT CONCRETE PER DESIGN STANDARDS, AND REST UPON UNDISTURBED MATERIAL. BOTTOM SHAFT SHALL BE WET-SET OR SET IN FORMED GROOVE. PRECAST BASES MAY BE USED WITH PRIOR APPROVAL OF THE DEPARTMENT AND SHALL MEET ASTM C-478 61T.
7. CONCRETE CHANNEL SHALL BE STEEL TROWEL FINISH AND SHELF AREAS SHALL BE MONOLITHICALLY PLACED.
8. LATERAL CONNECTION OVER 5' TO BE P.V.C. FOR DROP TEE, PIPE, AND 90° BEND.
9. INSTALL REMOVABLE PLUG.
10. SEWER CLEANOUT BOX PER STANDARD DRAWING S-2.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.



TYPICAL CONNECTION DETAIL



PLAN VIEW

PINKERTON A-640 WITH SKID RESISTANT SURFACE, BLIND PICKHOLE, WATER TIGHT GASKET, AND HS-20 TRAFFIC LOADING, OR APPROVED EQUAL, MARKED "SANITARY SEWER"

LID DETAIL

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SEWER DROP MANHOLE

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Drawing No: S-1a

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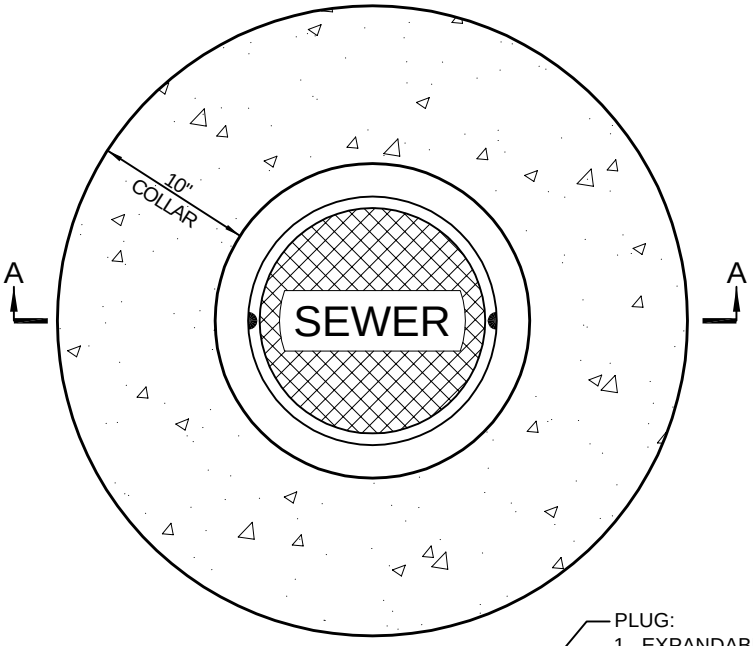
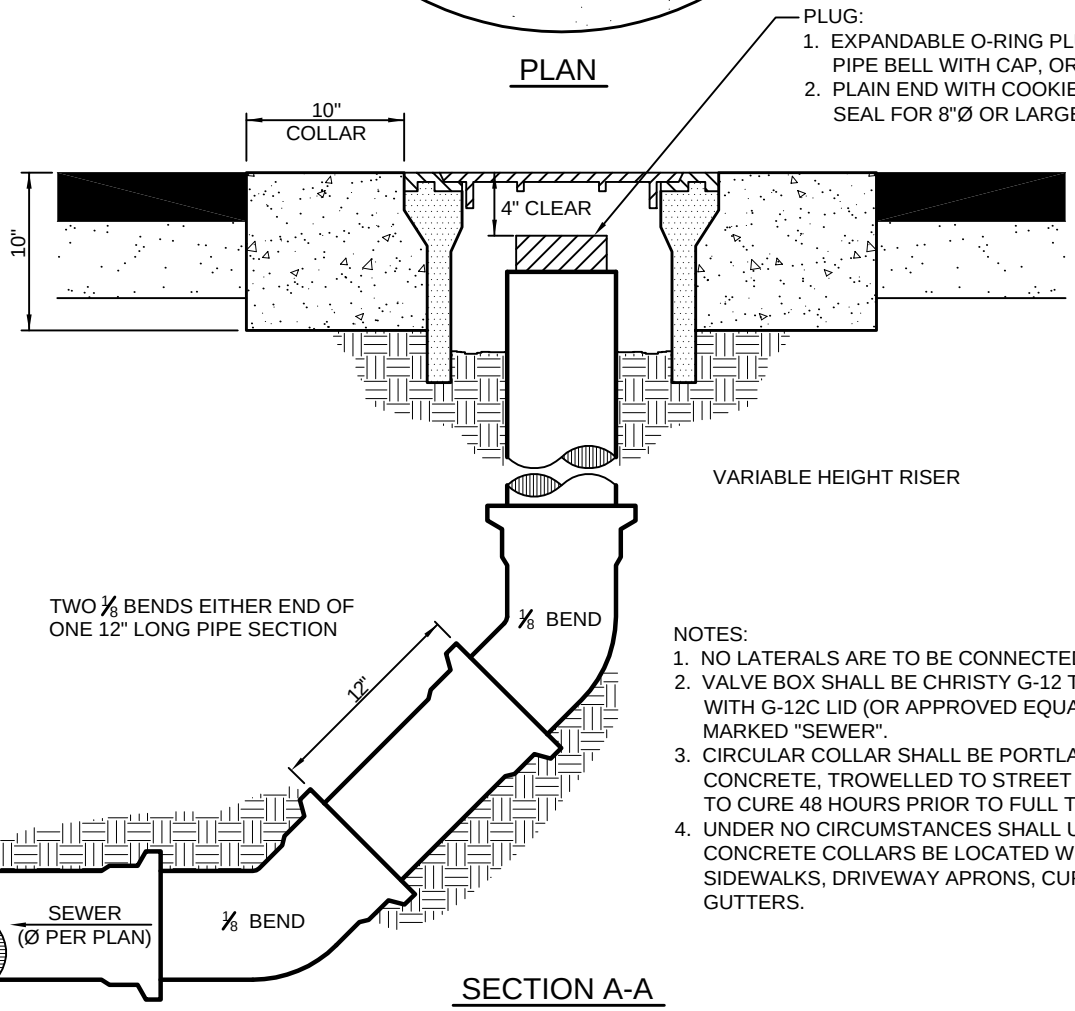


PLAN



SECTION A-A

NOTES:
1. NO LATERALS ARE TO BE CONNECTED TO CLEANOUTS.
2. VALVE BOX SHALL BE CHRISTY G-12 TRAFFIC VALVE BOX WITH G-12C LID (OR APPROVED EQUAL). COVER SHALL BE MARKED "SEWER".
3. CIRCULAR COLLAR SHALL BE PORTLAND CEMENT CONCRETE, TROWELLED TO STREET GRADE, AND ALLOWED TO CURE 48 HOURS PRIOR TO FULL TRAFFIC USE.
4. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

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SEWER MAIN CLEANOUT

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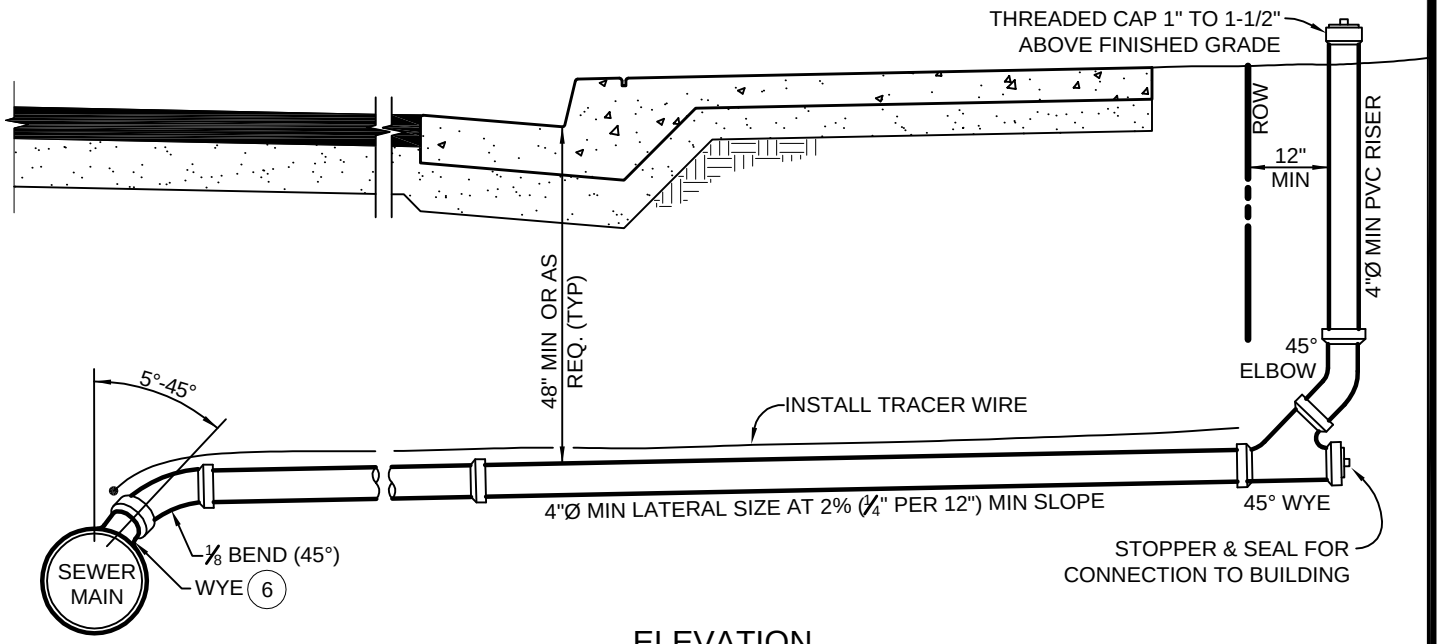
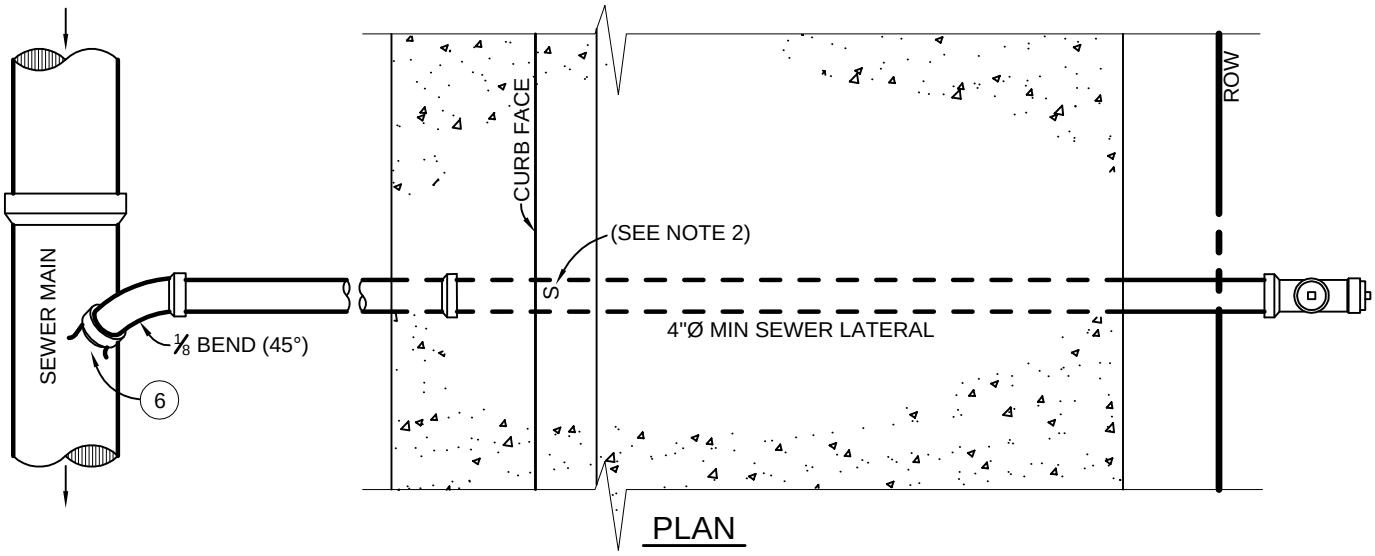


ELEVATION



PLAN

NOTES:

1. SEWER LATERAL SHALL BE 4"Ø PVC PIPE AND SHALL MEET ASTM STANDARD D 3034, SDR 35.
2. AN "S" SHALL BE STAMPED OR CHISELED ON THE CURB OVER THE SEWER LATERAL WHEN CURB AND GUTTER IS EITHER CONSTRUCTED OR EXISTING. THE "S" SHALL BE A MINIMUM OF 3" HIGH x 2" WIDE x 3/16" DEEP.
3. MAINTAIN A 5' MINIMUM SEPARATION BETWEEN WATER AND SEWER SERVICE LATERALS.
4. SEWER LATERALS SHALL NOT BE LOCATED UNDER DRIVEWAYS.
5. SADDLE CONNECTIONS ARE NOT PERMITTED ON NEW SEWER MAINS.
6. FACTORY-FABRICATED WYE IN SEWER MAIN WITH 1/8 (45°) BEND. BEND SHALL POINT DOWNSTREAM AND ENTER MAIN AT A VERTICAL ANGLE OF NOT LESS THAN 5° OR MORE THAN 45°. FOR SEWER LATERALS CONNECTING ONTO EXISTING SEWER MAIN A SADDLE TEE-BRANCH MAYBE USED IF APPROVED BY THE DEPARTMENT.
7. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

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SEWER LATERAL

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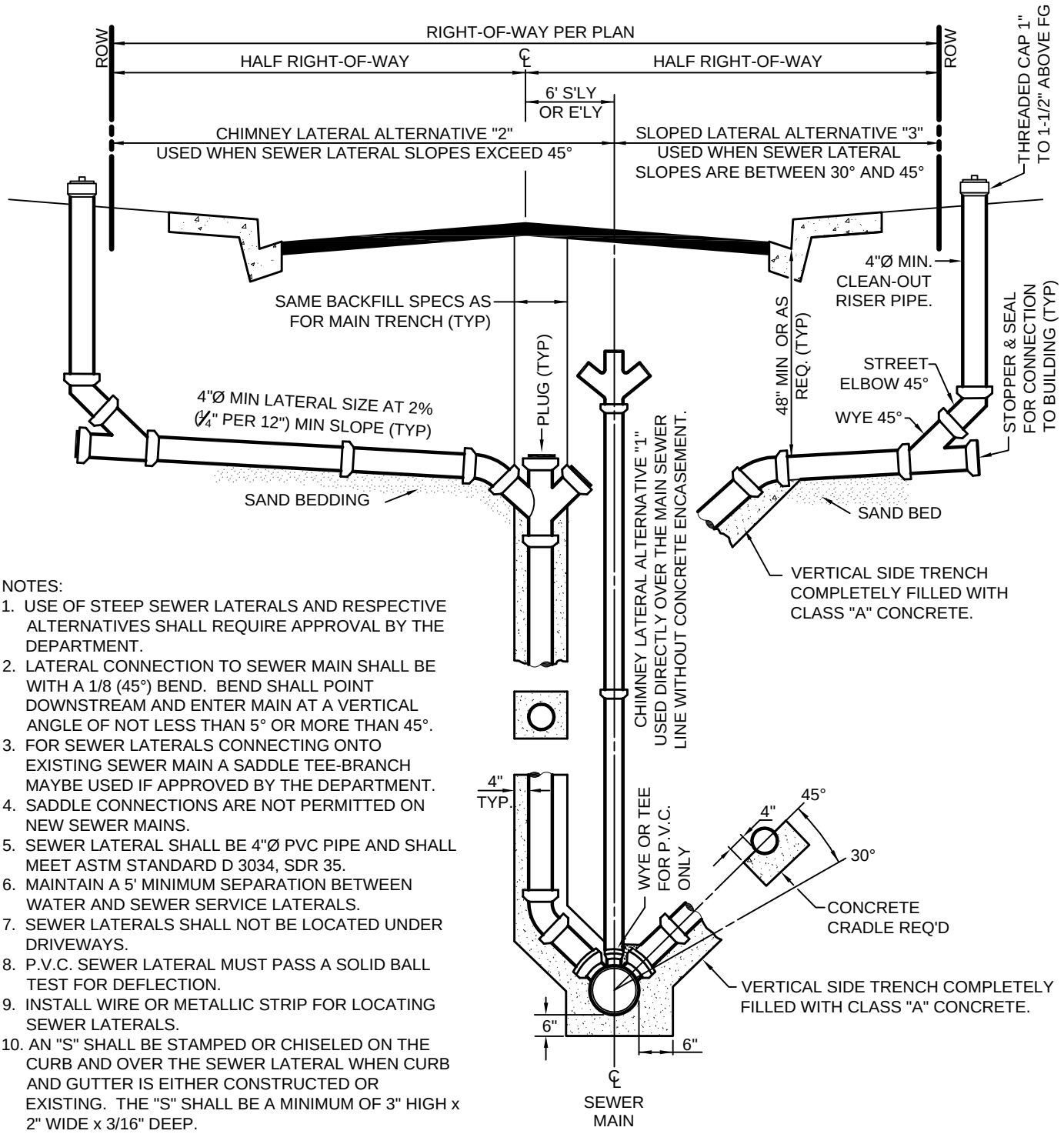

NOTES:

1. USE OF STEEP SEWER LATERALS AND RESPECTIVE ALTERNATIVES SHALL REQUIRE APPROVAL BY THE DEPARTMENT.
2. LATERAL CONNECTION TO SEWER MAIN SHALL BE WITH A 1/8 (45°) BEND. BEND SHALL POINT DOWNSTREAM AND ENTER MAIN AT A VERTICAL ANGLE OF NOT LESS THAN 5° OR MORE THAN 45°.
3. FOR SEWER LATERALS CONNECTING ONTO EXISTING SEWER MAIN A SADDLE TEE-BRANCH MAYBE USED IF APPROVED BY THE DEPARTMENT.
4. SADDLE CONNECTIONS ARE NOT PERMITTED ON NEW SEWER MAINS.
5. SEWER LATERAL SHALL BE 4"Ø PVC PIPE AND SHALL MEET ASTM STANDARD D 3034, SDR 35.
6. MAINTAIN A 5' MINIMUM SEPARATION BETWEEN WATER AND SEWER SERVICE LATERALS.
7. SEWER LATERALS SHALL NOT BE LOCATED UNDER DRIVEWAYS.
8. P.V.C. SEWER LATERAL MUST PASS A SOLID BALL TEST FOR DEFLECTION.
9. INSTALL WIRE OR METALLIC STRIP FOR LOCATING SEWER LATERALS.
10. AN "S" SHALL BE STAMPED OR CHISELED ON THE CURB AND OVER THE SEWER LATERAL WHEN CURB AND GUTTER IS EITHER CONSTRUCTED OR EXISTING. THE "S" SHALL BE A MINIMUM OF 3" HIGH x 2" WIDE x 3/16" DEEP.
11. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SEWER LATERAL FOR DEEP MAINS

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Drawing No: S-3a

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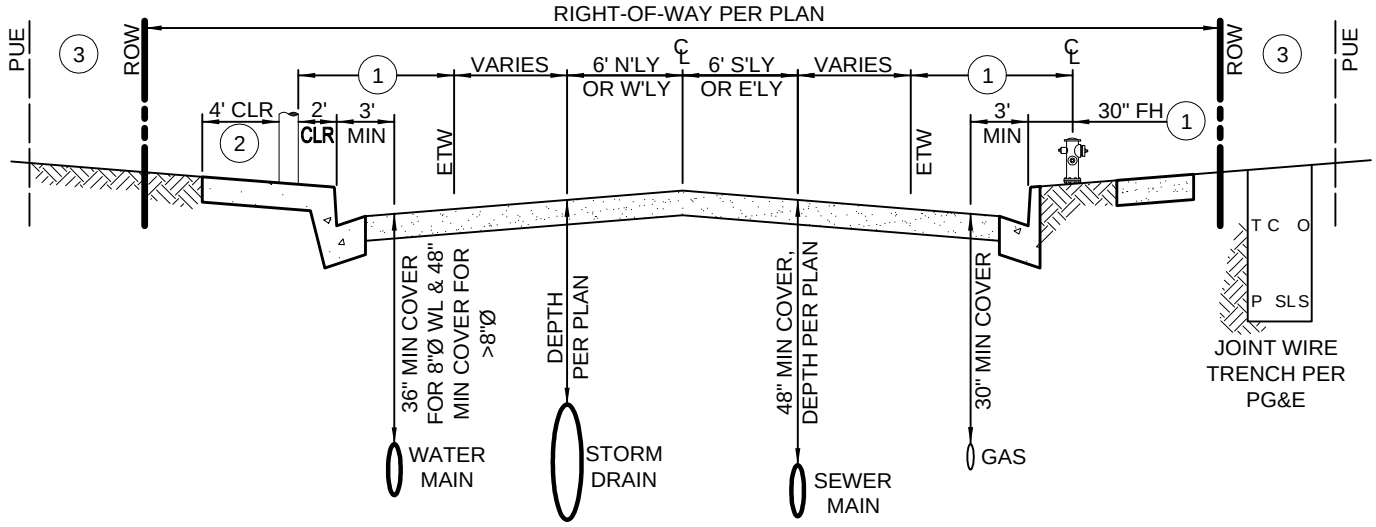
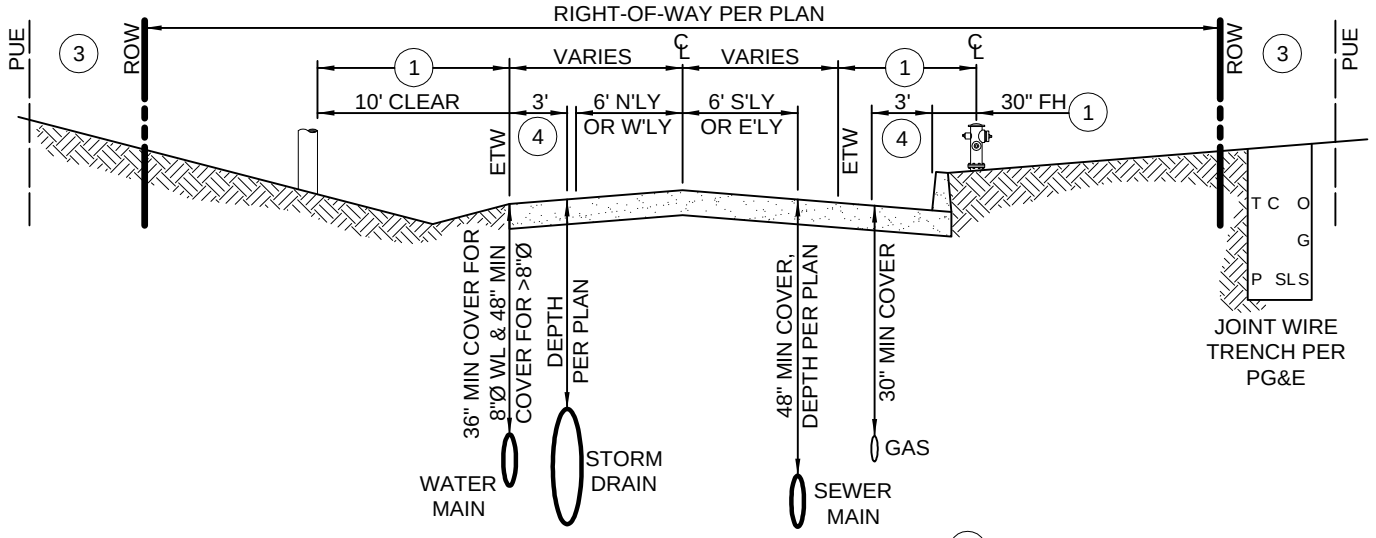


URBAN ROAD UTILITY LOCATIONS



RURAL ROAD UTILITY LOCATIONS 5

NOTES:

1. ABOVE GRADE OBSTACLES (UTILITY POLES, LIGHT STANDARDS, ETC) SHALL BE LOCATED AT LEAST 10-FEET CLEAR FROM THE EDGE OF TRAVELED WAY, OR 24-INCHES CLEAR FROM FACE OF CURB OR AC DIKE (FIRE HYDRANTS SHALL BE LOCATED PER DRAWING W-2, SIGNS SHALL BE LOCATED PER M-4).
2. PROVIDE 4-FOOT UNOBSTRUCTED CLEARANCE BETWEEN ALL ABOVE GRADE OBSTACLES AND THE BACK OF SIDEWALK (MAY REQUIRE ADDITIONAL SIDEWALK WIDENING).
3. LOCATE UTILITY VAULTS, METER BOXES, PEDESTALS, TRANSFORMERS, ETC. WITHIN PUE AND NOT WITHIN THE SIDEWALK.
4. FOR RURAL ROAD CONDITIONS, GAS AND WATER LINES SHALL BE LOCATED AT 3-FEET OFF FACE OF DIKE OR AT EDGE OF PAVEMENT.
5. THE DEPARTMENT MAY REQUIRE URBAN ROAD UTILITY STANDARD LOCATIONS FOR RURAL ROADS.
6. STREET CROSSINGS OF WIRE AND GAS UTILITIES SHALL REQUIRE A MINIMUM 30" OF COVER AND SHALL BE AT RIGHT ANGLES TO THE ROADWAY CENTERLINE.
7. ABOVE GRADE UTILITY APPURTENANCES SHALL BE LOCATED AS TO MEET DEPARTMENT SIGHT DISTANCE REQUIREMENTS (REFER TO A-5 SERIES DRAWINGS).
8. REFER TO STANDARD DRAWING U-2 FOR LOCATION OF SERVICE LATERALS AND WATER METER BOXES.
9. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

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LOCATION OF UTILITIES

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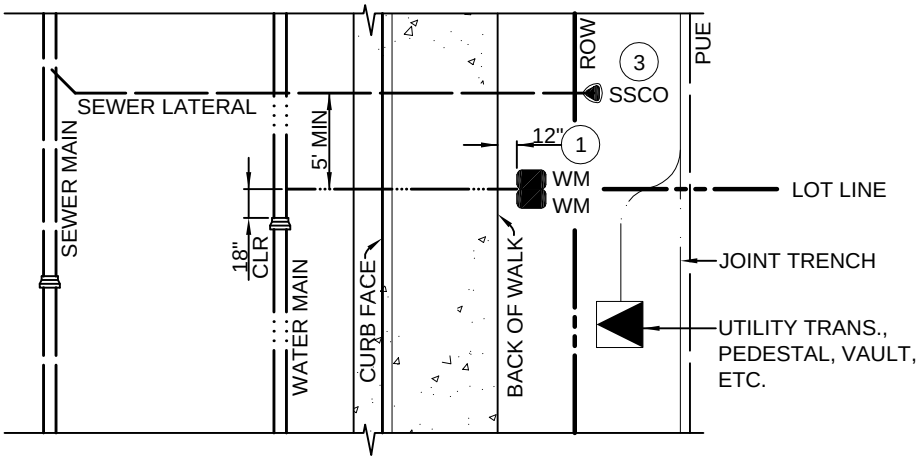
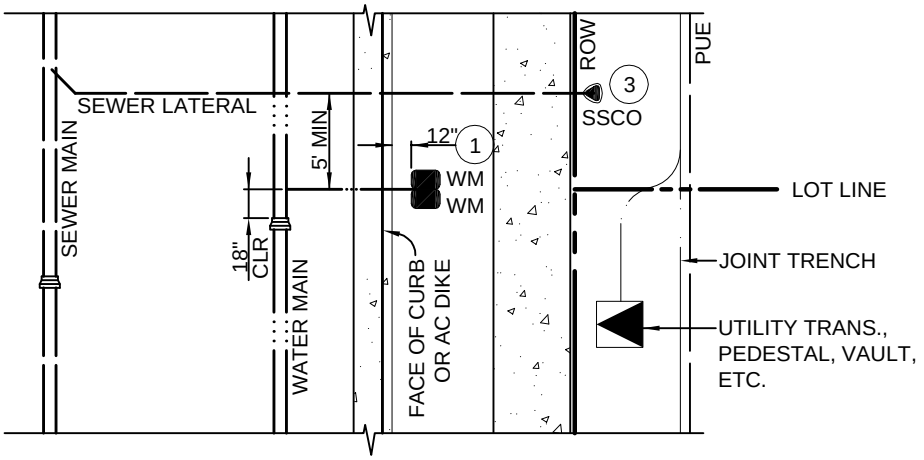
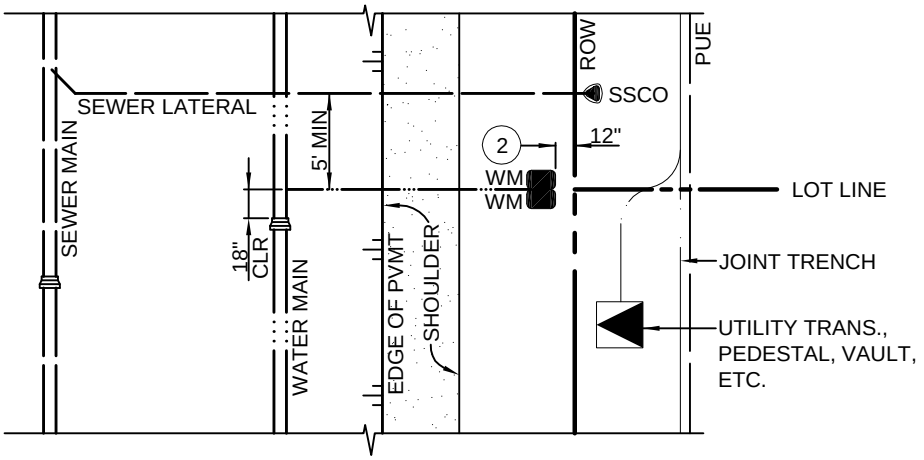


CURB, GUTTER & SIDEWALK



CURB OR AC DIKE ONLY OR DETACHED SIDEWALK



EDGE OF PAVEMENT

NOTES:
1. LOCATE WATER METER VAULT 12" BEHIND BACK OF CURB OR BACK OF AC DIKE.
2. LOCATE WATER METER VAULT 12" INSIDE RIGHT-OF-WAY.
3. SEWER CLEAN-OUTS SHALL BE LOCATED OUTSIDE OF SIDEWALK AND DRIVEWAY AREAS.
4. ALL WATER METER VAULTS (BOXES) SHALL BE PER STANDARD DRAWINGS.
5. WIRE UTILITY JOINT TRENCH AND APPURTENANCES ARE SHOWN FOR REFERENCE ONLY. REFER TO THE RESPECTIVE UTILITY COMPANY'S HANDOUT PACKAGE FOR ACTUAL ALIGNMENTS AND CONSTRUCTION REQUIREMENTS.
6. WATER AND SEWER SERVICE LATERALS SHALL BE PERPENDICULAR TO THEIR RESPECTIVE MAIN LINES FOR EASE OF LOCATION. ALL WATER LINE TRENCHES SHALL HAVE BOTH TRACE WIRE AND TAPE, REFER TO STANDARD TRENCH DRAWINGS.
7. FOR UNPAVED AREAS, THE WATER METER BOX SHALL BE SET 1" TO 1-1/2" ABOVE FINISHED GRADE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

LOCATION OF SERVICE LATERALS

Scale:	Issued:
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Drawing No: U-2

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NOTES:
THE "CALIFORNIA WATERWORKS STANDARDS" SETS FORTH THE MINIMUM SEPARATION REQUIREMENTS FOR WATER MAINS AND SEWER LINES AS CONTAINED IN SECTION 64630, TITLE 22, CALIFORNIA ADMINISTRATIVE CODE. THE FOLLOWING IS A SUMMARY OF THOSE REQUIREMENTS:

1. PARALLEL CONSTRUCTION: THE HORIZONTAL DISTANCE BETWEEN PRESSURE WATER MAINS AND SEWER LINES SHALL BE AT LEAST 10-FEET MEASURED FROM THE NEAREST EDGES OF THE FACILITIES.

2. PERPENDICULAR CONSTRUCTION (CROSSING): PRESSURE WATER MAINS SHALL BE AT LEAST 12-INCHES ABOVE SANITARY SEWER LINES WHERE THESE LINES MUST CROSS MEASURED FROM THE NEAREST EDGES OF THE FACILITIES.

3. COMMON TRENCH: WATER MAINS AND SEWER LINES SHALL NOT BE INSTALLED IN THE SAME TRENCH.
4. WHEN ADEQUATE PHYSICAL SEPARATION CANNOT BE ATTAINED, AN INCREASE IN THE FACTOR OF SAFETY SHOULD BE PROVIDED BY INCREASING THE STRUCTURAL INTEGRITY OF BOTH THE PIPE MATERIALS AND JOINTS.

5. LOCAL CONDITIONS MAY CREATE A SITUATION WHERE THERE IS NO ALTERNATIVE BUT TO INSTALL WATER MAINS OR SEWER LINES AT A DISTANCE LESS THAN THAT REQUIRED BY THE BASIC SEPARATION STANDARDS. IN SUCH CASES, ALTERNATIVE CONSTRUCTION CRITERIA AS SPECIFIED IN THIS STANDARD SHALL BE FOLLOWED.

6. DUE TO SPECIAL HAZARDS, INSTALLATIONS OF WATER MAINS AND SEWER LINES 24-INCHES DIAMETER OR LARGER SHALL BE REVIEWED AND APPROVED BY THE HEALTH AGENCY PRIOR TO CONSTRUCTION.

7. THE CONSTRUCTION CRITERIA SHOULD APPLY TO THE HOUSE LATERALS THAT CROSS ABOVE A PRESSURE WATER MAIN BUT NOT TO THOSE HOUSE LATERALS THAT CROSS BELOW A PRESSURE WATER MAIN.

ALTERNATIVE CRITERIA FOR CONSTRUCTION THE CONSTRUCTION CRITERIA FOR SEWER LINES OR WATER MAINS WHERE THE BASIC SEPARATION STANDARDS CANNOT BE ATTAINED ARE SHOWN AS CASE 1 & CASE 2 ON SHEETS 2 AND 3 OF U-3.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

UTILITY SEPARATION CRITERIA

Scale:	Issued: Aug. 2006
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Revisions					
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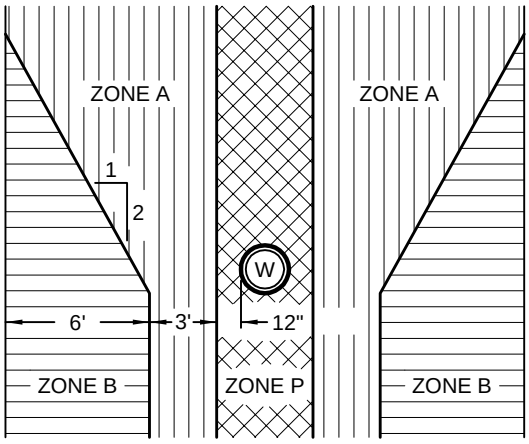
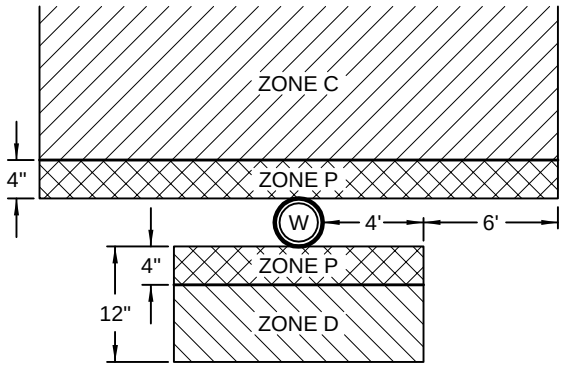


PARALLEL



CROSSING

ZONE	SPECIAL CONSTRUCTION REQUIRED FOR SEWER:
A	SEWER LINES PARALLEL TO WATER MAINS SHALL NOT BE PERMITTED IN THIS ZONE WITHOUT APPROVAL FROM THE RESPONSIBLE HEALTH AGENCY AND WATER SUPPLIER.
B	A SEWER LINE PLACED PARALLEL TO A WATER LINE SHALL BE CONSTRUCTED OF: 1. CLASS 4000, TYPE II, ASBESTOS-CEMENT PIPE WITH RUBBER GASKET JOINTS. 2. PLASTIC SEWER PIPE WITH RUBBER RING JOINTS (PER ASTM D3034) OR EQUIVALENT. 3. CAST OR DUCTILE IRON PIPE WITH COMPRESSION JOINTS. 4. REINFORCED CONCRETE PRESSURE PIPE WITH COMPRESSION JOINTS (PER AWWA C302-74).
C	A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING AND MECHANICAL JOINTS. 2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA C900) PLASTIC PIPE, OR EQUIVALENT, CENTERED OVER THE PIPE BEING CROSSED. 3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED OVER THE PIPE BEING CROSSED. 4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE.
D	A SEWER LINE CROSSING A WATER MAIN SHALL BE CONSTRUCTED OF: 1. A CONTINUOUS SECTION OF DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. A CONTINUOUS SECTION OF CLASS 200 (DR 14 PER AWWA C900) PLASTIC PIPE OR EQUIVALENT, CENTERED OVER THE PIPE BEING CROSSED. 3. A CONTINUOUS SECTION OF REINFORCED CONCRETE PRESSURE PIPE (PER AWWA C302-74) CENTERED OVER THE PIPE BEING CROSSED. 4. ANY SEWER PIPE WITHIN A CONTINUOUS SLEEVE. 5. ANY SEWER PIPE SEPARATED BY A 10-FOOT BY 10-FOOT, 4-INCH THICK REINFORCED CONCRETE SLAB.
P	ZONE P IS A PROHIBITED ZONE, SECTION 64630(E)(2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22.

CASE 1: NEW SEWER MAIN

ALTERNATIVE CONSTRUCTION CRITERIA
APPLIES TO NEW SEWER MAINS & NEW OR EXISTING WATER MAINS

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

UTILITY SEPARATION CRITERIA

CASE 1: NEW SEWER MAINS

Scale:	Issued:
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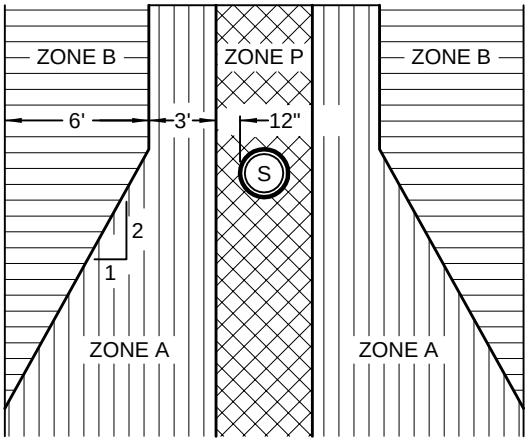
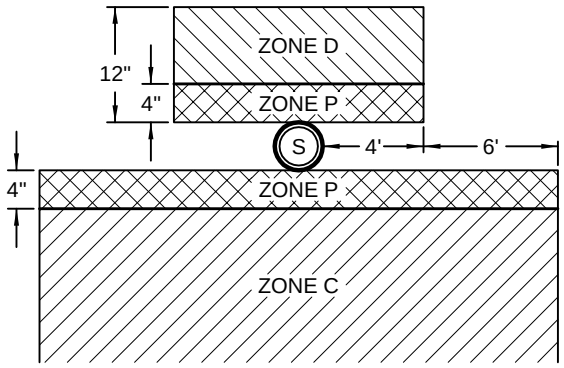
Drawing No: U-3a

Sheet No: 2 OF 3

Revisions					
Description	Approved	Date	Description	Approved	Date



PARALLEL



CROSSING

ZONE	SPECIAL CONSTRUCTION REQUIRED FOR WATER:
A	NO WATER MAINS PARALLEL TO SEWERS SHALL BE CONSTRUCTED WITHOUT APPROVAL FROM THE HEALTH AGENCY.
B	IF THE SEWER PARALLELING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE B REQUIREMENTS, THE WATER MAIN SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
C	IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE C REQUIREMENTS, THE WATER MAIN SHALL HAVE NO JOINTS IN ZONE C AND BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
D	IF THE SEWER CROSSING THE WATER MAIN DOES NOT MEET THE CASE 1, ZONE D REQUIREMENTS, THE WATER MAIN SHALL HAVE NO JOINTS WITHIN 4-FEET FROM EITHER SIDE OF THE SEWER AND SHALL BE CONSTRUCTED OF: 1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING. 2. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
P	ZONE P IS A PROHIBITED ZONE, SECTION 64630(E)(2) CALIFORNIA ADMINISTRATIVE CODE, TITLE 22.

CASE 2: NEW WATER MAIN

ALTERNATIVE CONSTRUCTION CRITERIA
APPLIES TO NEW WATER MAINS OR EXISTING SEWER MAINS

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

UTILITY SEPARATION CRITERIA

CASE 2: NEW WATER MAINS

Scale:	Issued:
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Drawing No: U-3b

Sheet No: 3 OF 3

Revisions					
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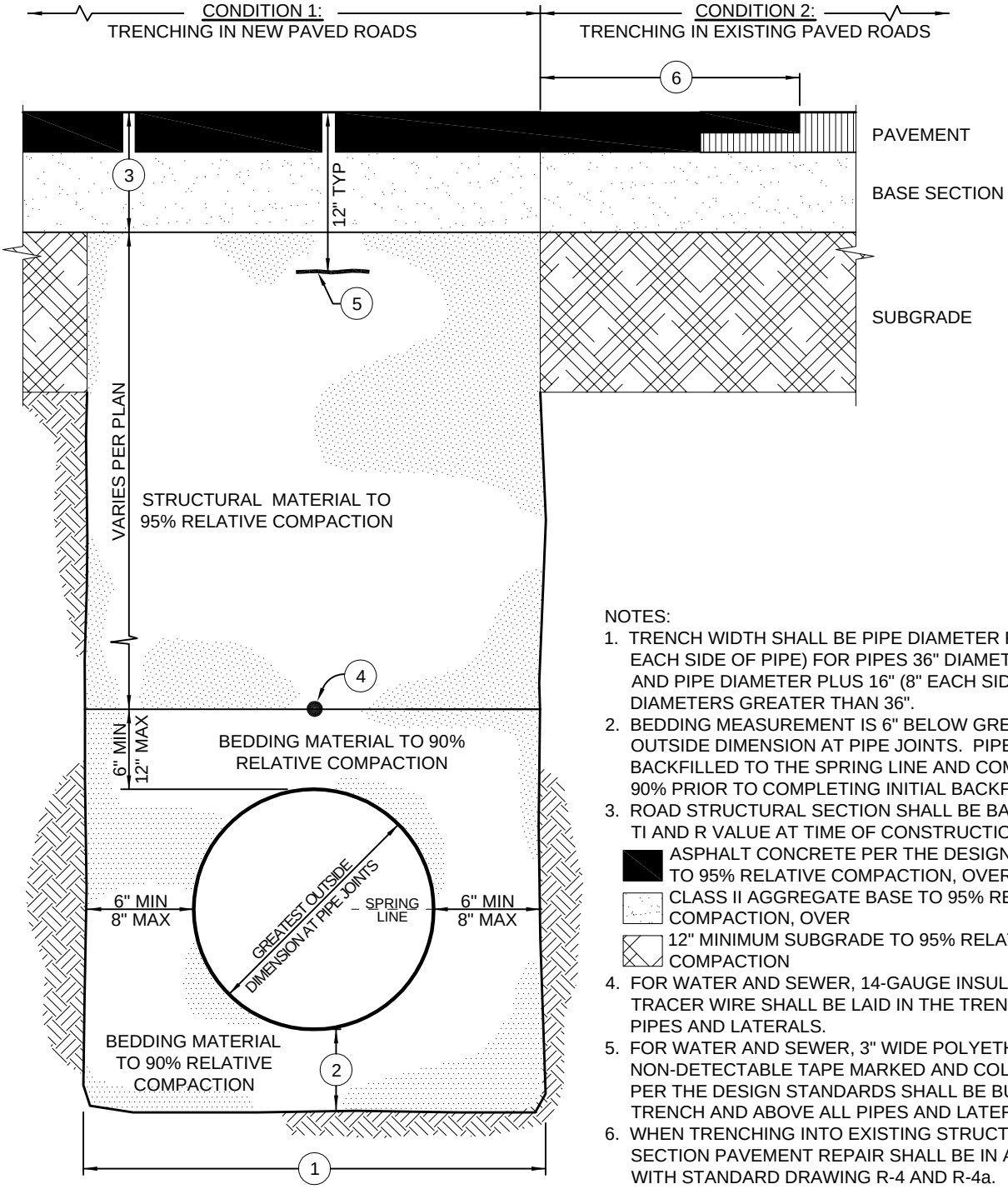

NOTES:

1. TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" (6" EACH SIDE OF PIPE) FOR PIPES 36" DIAMETER OR LESS, AND PIPE DIAMETER PLUS 16" (8" EACH SIDE) FOR PIPE DIAMETERS GREATER THAN 36".
2. BEDDING MEASUREMENT IS 6" BELOW GREATEST OUTSIDE DIMENSION AT PIPE JOINTS. PIPE SHALL BE BACKFILLED TO THE SPRING LINE AND COMPACTED TO 90% PRIOR TO COMPLETING INITIAL BACKFILL.
3. ROAD STRUCTURAL SECTION SHALL BE BASED ON THE TI AND R VALUE AT TIME OF CONSTRUCTION:
   - ASPHALT CONCRETE PER THE DESIGN STANDARDS TO 95% RELATIVE COMPACTION, OVER
   - CLASS II AGGREGATE BASE TO 95% RELATIVE COMPACTION, OVER
   - 12" MINIMUM SUBGRADE TO 95% RELATIVE COMPACTION
4. FOR WATER AND SEWER, 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE ALL PIPES AND LATERALS.
5. FOR WATER AND SEWER, 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED AND COLOR CODED PER THE DESIGN STANDARDS SHALL BE BURIED IN THE TRENCH AND ABOVE ALL PIPES AND LATERALS.
6. WHEN TRENCHING INTO EXISTING STRUCTURAL SECTION PAVEMENT REPAIR SHALL BE IN ACCORDANCE WITH STANDARD DRAWING R-4 AND R-4a.
7. REFER TO STANDARD DRAWINGS U-3 TO U-3b FOR ADDITIONAL REQUIREMENTS FOR WATER AND SEWER TRENCHES.
8. THE DEPARTMENT SHALL REQUIRE ADDITIONAL WORK WHEN TRENCHING INTO EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

BEDDING MATERIAL

SIEVE SIZES	PERCENT PASSING
1"	100%
No. 4	80% - 100%
No. 200	0% - 15%

STRUCTURAL MATERIAL

SIEVE SIZES	PERCENT PASSING
3"	100%
No. 4	35% - 100%
No. 30	20% - 100%

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH DETAIL

EXISTING AND NEW PAVED ROADS

Scale:	Issued:
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Drawing No: U-4

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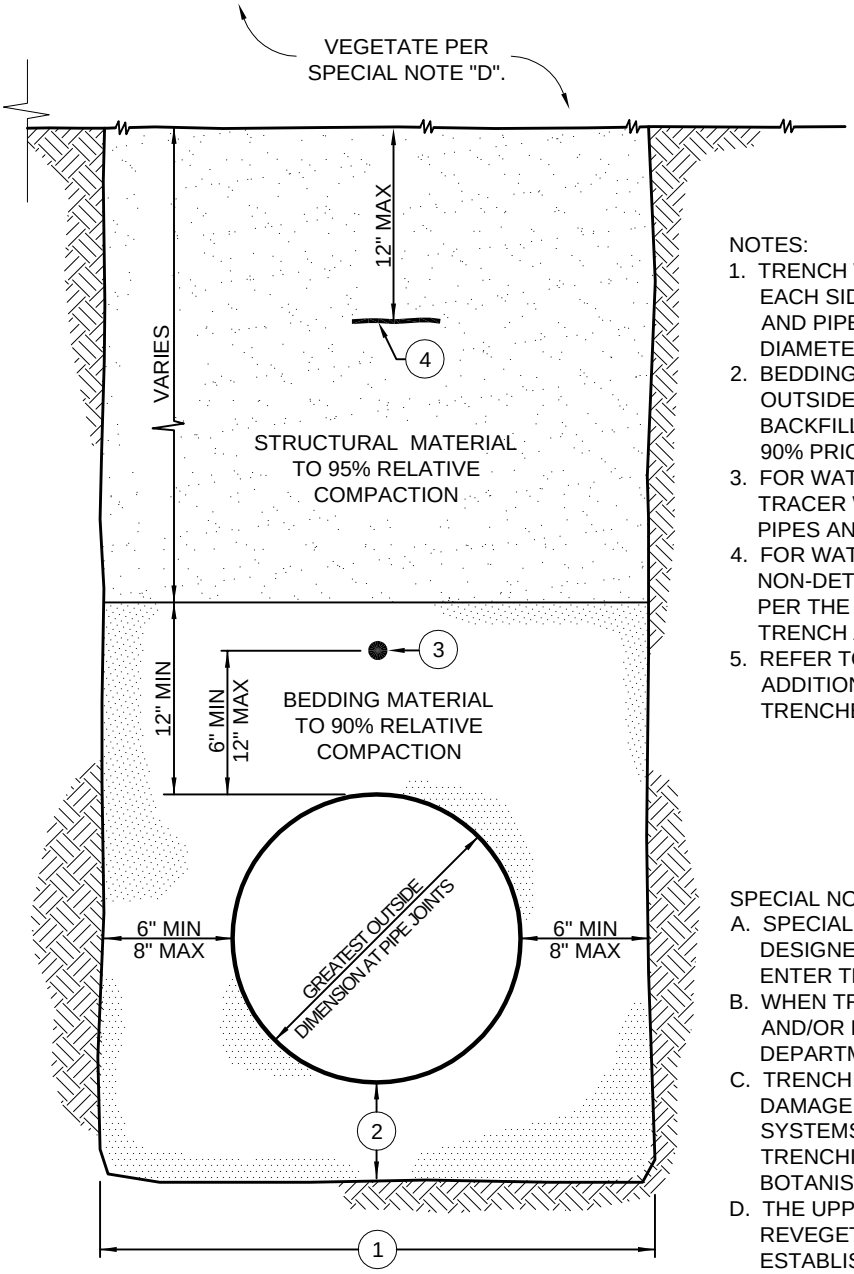

NOTES:

1. TRENCH WIDTH SHALL BE PIPE DIAMETER PLUS 12" (6" EACH SIDE OF PIPE) FOR PIPES 36" DIAMETER OR LESS, AND PIPE DIAMETER PLUS 16" (8" EACH SIDE) FOR PIPE DIAMETERS GREATER THAN 36".
2. BEDDING MEASUREMENT IS 6" BELOW GREATEST OUTSIDE DIMENSION AT PIPE JOINTS. PIPE SHALL BE BACKFILLED TO THE SPRING LINE AND COMPACTED TO 90% PRIOR TO COMPLETING INITIAL BACKFILL.
3. FOR WATER AND SEWER, 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE ALL PIPES AND LATERALS.
4. FOR WATER AND SEWER, 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED AND COLOR CODED PER THE DESIGN STANDARDS SHALL BE BURIED IN THE TRENCH AND ABOVE ALL PIPES AND LATERALS.
5. REFER TO STANDARD DRAWINGS U-3 TO U-3b FOR ADDITIONAL REQUIREMENTS FOR WATER AND SEWER TRENCHES.

SPECIAL NOTES:

A. SPECIAL CONSIDERATION SHALL BE TAKEN BY THE DESIGNER TO ENSURE SURFACE DRAINAGE WILL NOT ENTER THE TRENCH.
B. WHEN TRENCHING ON STEEP SLOPES, CUT-OFF WALLS AND/OR PIPE ANCHORS MAY BE REQUIRED BY THE DEPARTMENT AND SHALL BE DETAILED ON THE PLANS.
C. TRENCHING ALIGNMENT SHALL BE DESIGNED TO AVOID DAMAGE TO EXISTING TREES AND THEIR ROOT SYSTEMS. WHEN ADJACENT TO TREES THEN THE TRENCHING RECOMMENDATIONS OF THE PROJECT BOTANIST SHALL BE FOLLOWED.
D. THE UPPER SURFACE SHALL BE SCARIFIED AND REVEGETATED. VEGETATIVE COVER SHALL BE ESTABLISHED PRIOR TO ACCEPTANCE OF WORK.

BEDDING MATERIAL

SIEVE SIZES	PERCENT PASSING
1"	100%
No. 4	80% - 100%
No. 200	0% - 15%

STRUCTURAL MATERIAL

SIEVE SIZES	PERCENT PASSING
3"	100%
No. 4	35% - 100%
No. 30	20% - 100%

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

TRENCH DETAIL

NON-PAVED AREAS

Scale:	Issued:
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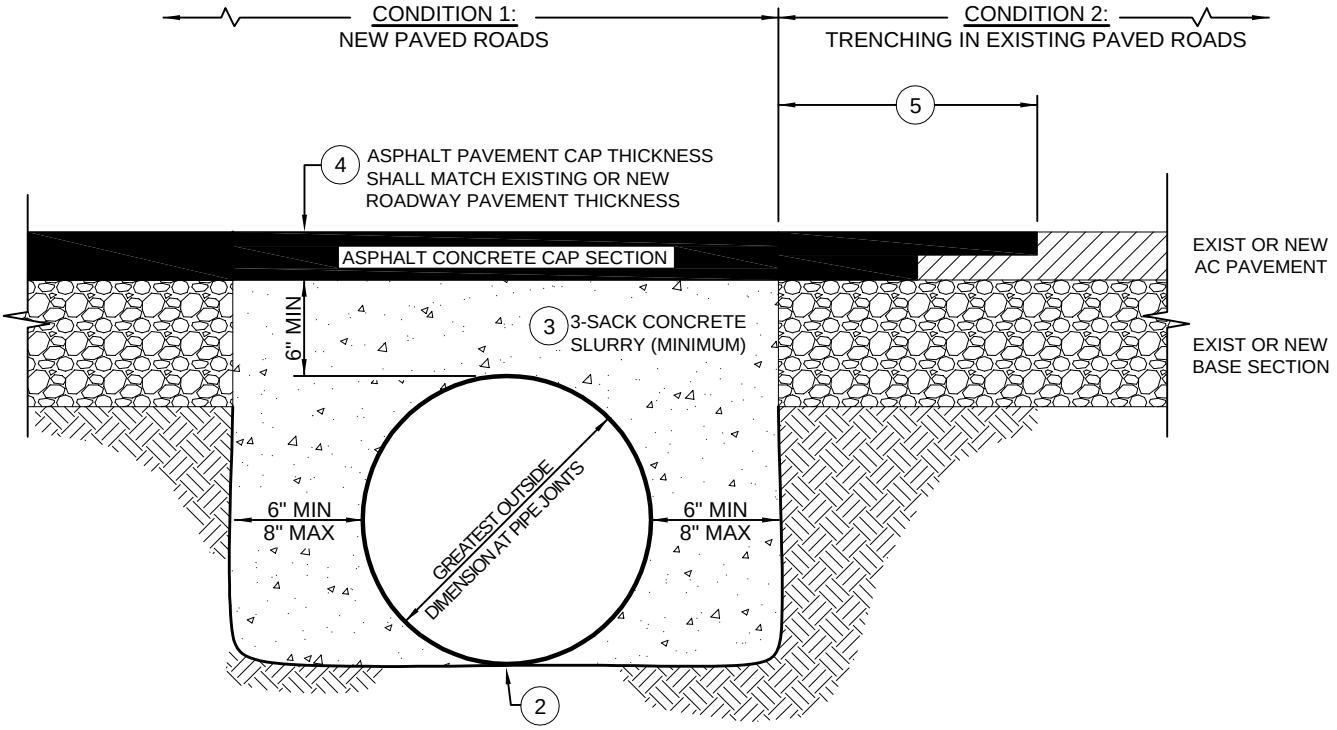

NOTES:

1. USE OF THIS STANDARD DRAWING REQUIRES PRIOR DEPARTMENT APPROVAL AND SHALL ONLY BE ALLOWED IF REQUIRED COVER CANNOT BE ATTAINED.
2. PIPE SHALL BE PLACED ON UNDISTURBED NATIVE MATERIAL UNLESS EXISTING SOILS CONDITIONS REQUIRE ADDITIONAL MEASURES.
3. BACKFILL TRENCH WITH MINIMUM THREE (3) SACK CONCRETE SLURRY TO SURFACE OF BASE COURSE SECTION. DO NOT PLACE AGGREGATE BASE ABOVE SLURRY BACKFILL.
4. ASPHALT CONCRETE PAVEMENT THICKNESS TO MATCH EXISTING PAVEMENT SECTION OR MATCH APPROVED PAVEMENT THICKNESS FOR NEW ROADS.
5. WHEN TRENCHING INTO EXISTING STRUCTURAL SECTION PAVEMENT REPAIR SHALL BE IN ACCORDANCE WITH STANDARD DRAWING R-4 OR R-4a.
6. PIPE SHALL BE SECURED IN PLACE TO KEEP LINE AND GRADE WHILE CONCRETE SLURRY IS PLACED AND UNTIL THE SLURRY HAS SET.
7. THE DEPARTMENT MAY REQUIRE ADDITIONAL WORK WHEN TRENCHING IN EXISTING ROADS HAVING CONCRETE STRUCTURAL SECTIONS.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

SHALLOW TRENCH DETAIL

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THRUST AT FITTINGS AT 100 PSI WATER PRESSURE (lbs)					
PIPE DIA	PIPE CLASS	TEES	90 BEND	45 BEND	22.5 BEND
4"	100	1,720	2,440	1,320	660
4"	150	1,850	2,610	1,420	720
4"	200	1,850	2,610	1,420	720
6"	100	3,560	5,030	2,720	1,380
6"	150	3,800	5,370	2,910	1,470
6"	200	3,800	5,370	2,910	1,470
8"	100	6,140	8,680	4,700	2,380
8"	150	6,580	9,300	5,040	2,550
8"	200	6,580	9,300	5,040	2,550
10"	100	9,380	13,270	7,190	3,640
10"	150	10,750	15,200	8,240	4,170
10"	200	10,750	15,200	8,240	4,170
12"	100	13,300	18,860	10,240	5,170
12"	150	15,310	21,640	11,720	5,940
12"	200	15,310	21,640	11,720	5,940
14"	100	17,930	25,360	13,740	6,960
14"	150	20,770	29,360	15,910	8,060
14"	200	20,700	29,360	15,910	8,060
16"	100	23,210	32,820	17,880	9,000
16"	150	26,880	38,010	20,590	10,430
16"	200	26,880	38,010	20,590	10,430

TABLE 1

HORIZONTAL BEARING STRENGTHS	
SOIL TYPE	HORIZONTAL BEARING STRENGTH (lbs/sf)
MUCK	0
SOFT CLAY	1,000
SILT	1,500
SANDY SILT	3,000
SAND	4,000
SANDY CLAY	6,000
HARD CLAY	9,000

TABLE 2

Source: DIPRA - Thrust Restraint Design

NOTE:

1. ALTHOUGH THE ABOVE BEARING STRENGTH VALUES HAVE BEEN USED SUCCESSFULLY IN THE DESIGN OF THRUST BLOCKS AND ARE CONSIDERED TO BE CONSERVATIVE, THEIR ACCURACY IS TOTALLY DEPENDENT ON ACCURATE SOIL IDENTIFICATION AND EVALUATION. THE ULTIMATE RESPONSIBILITY FOR SELECTING THE PROPER BEARING STRENGTH OF A PARTICULAR SOIL TYPE SHALL BE THE RESPONSIBILITY OF THE PROJECT ENGINEER.
2. ALL THRUST BLOCK AREAS SHALL BE PROVIDED ON THE APPROVED PLANS.

EXAMPLE:
DETERMINE THE THRUST BLOCK AREA FOR A 90° BEND, 8" CLASS 150 PIPE IN CLAY.
PRESSURE = 150 + 50 (TEST PRESSURE) = 200 psi. CHOOSE 9,300 lbs FROM TABLE 1 AND ADJUST TO 18,600 lbs FOR 200 psi.
CHOOSE 1,000 lbs/sf FROM TABLE 2.
RESULT: 18,600 lbs / 1,000 lbs/sf = 18.6 sf

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

THRUST BLOCK REQUIREMENTS

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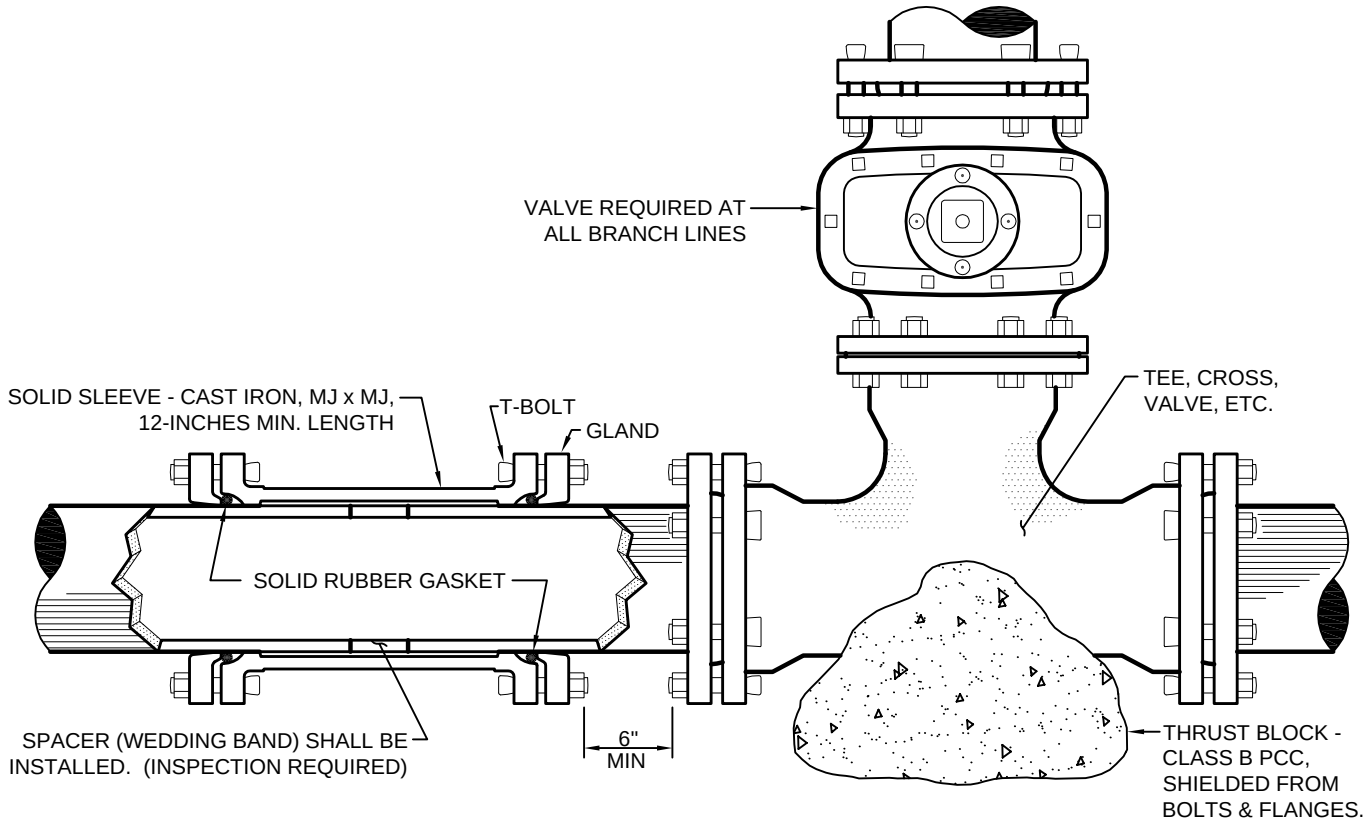
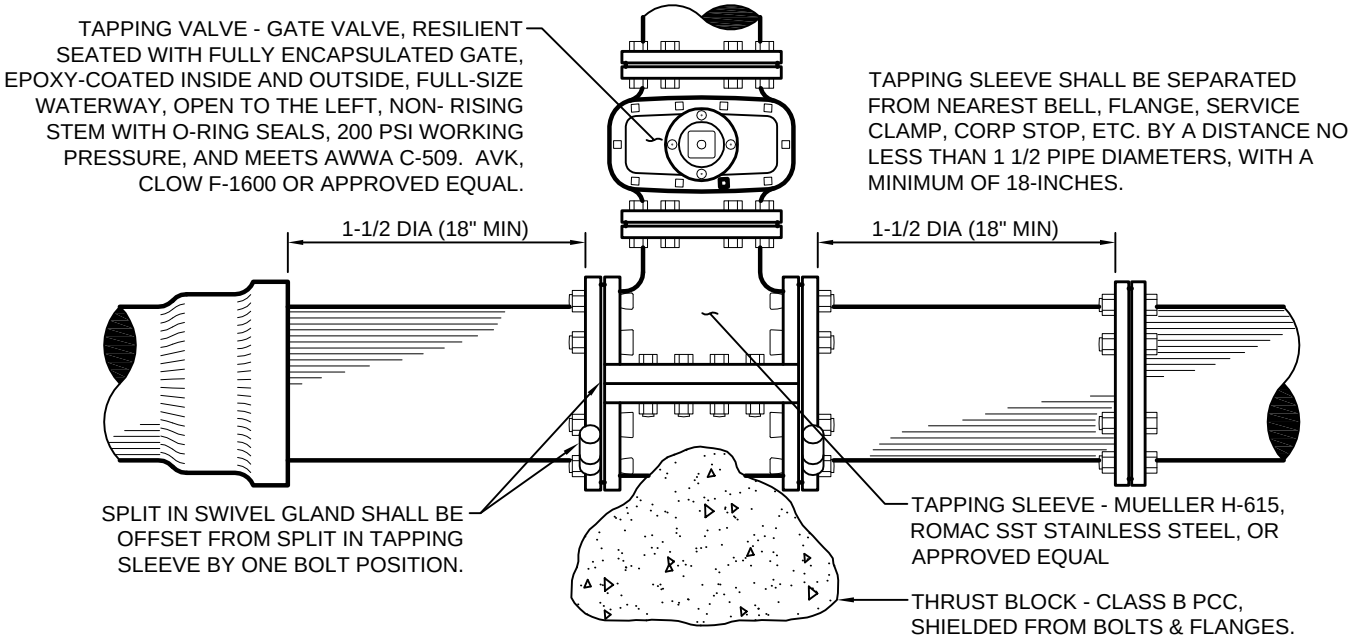


CUT-IN TEE



HOT TAP ASSEMBLY

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

WATERLINE CUT-IN TEE & HOT TAP ASSEMBLY

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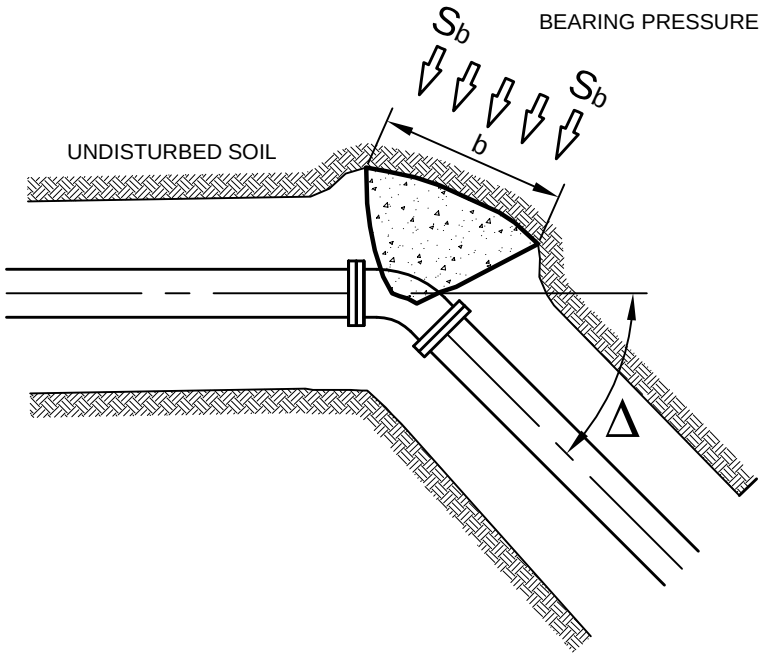

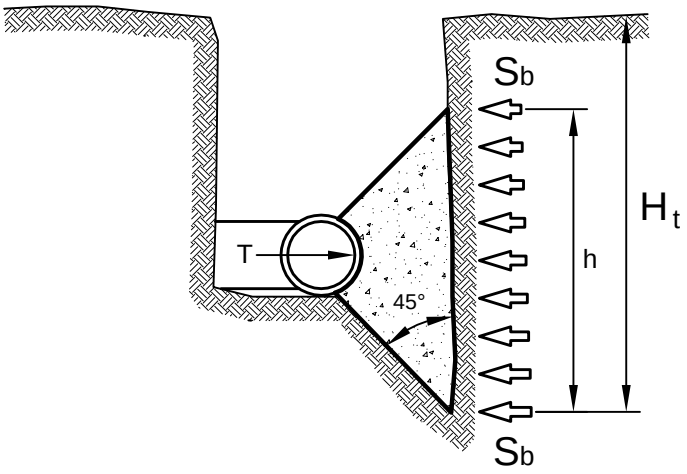

THE REQUIRED BEARING BLOCK AREA IS

$A_b = hb = \frac{Sf\ T}{Sb}$

THEN, FOR A HORIZONTAL BEND,

$b = \frac{Sf\ 2\ PA \sin(\Delta/2)}{h\ Sb}$

LEGEND:
A = INTERNAL AREA, in²
P = INTERNAL PRESSURE, psi
S_f = Safety Factor
T = THRUST, lbs

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THRUST BLOCK DETAILS

Scale:	Issued:
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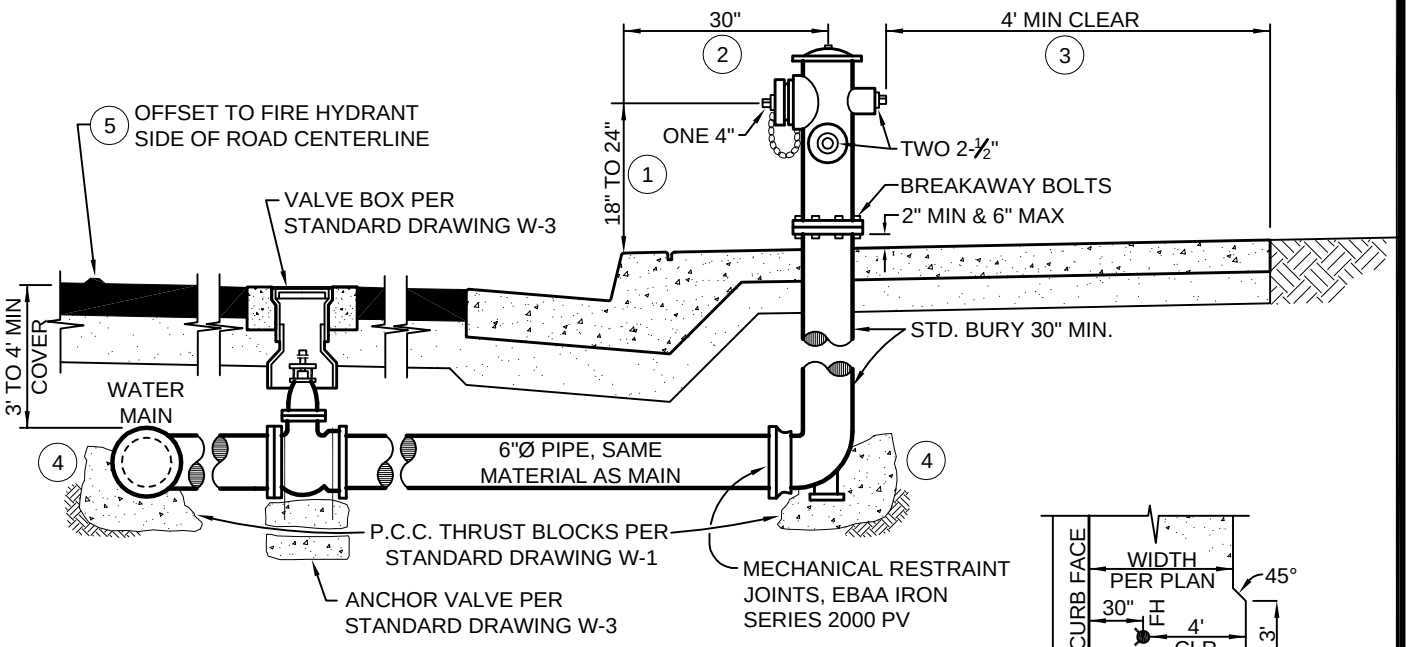
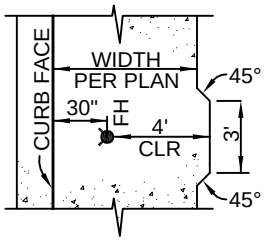
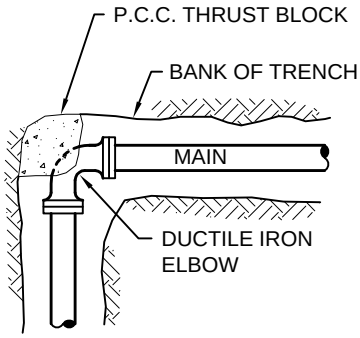
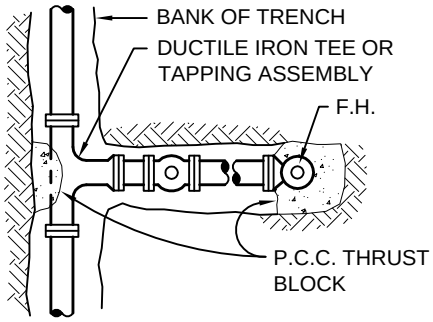




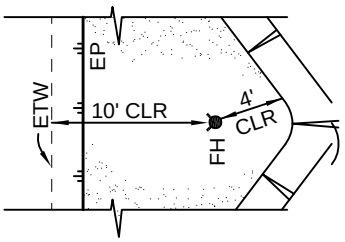
CONDITION 1



DETAIL AT BEND



DETAIL AT FIRE HYDRANT



CONDITION 2

NOTES:

1. HEIGHT SHALL BE MEASURED FROM EDGE OF PAVEMENT WHEN CONCRETE CURB OR ASPHALT DIKE ARE NOT REQUIRED PER THE DESIGN STANDARDS.
2. DISTANCE SHALL BE INCREASED TO 10-FEET CLEAR FROM THE EDGE OF TRAVELED WAY (ETW) WHEN CONCRETE CURB OR ASPHALT DIKE ARE NOT REQUIRED PER THE DESIGN STANDARDS.
3. IN RURAL AREAS A 4' MINIMUM RADIUS CLEAR AND LEVEL ZONE SURROUNDING THE FIRE HYDRANT SHALL BE REQUIRED.
4. THRUST BLOCKS SHALL BE PORTLAND CEMENT CONCRETE PER DESIGN STANDARDS, POURED AGAINST UNDISTURBED SOIL AND SHIELDED FROM FLANGES AND BOLTS.
5. EACH HYDRANT SHALL BE IDENTIFIED BY A REFLECTORIZED BLUE RAISED PAVEMENT MARKER PER SECTION 10.301c OF THE UNIFORM FIRE CODE.
6. THE HYDRANT CAP AND OUTLET NOZZLE SHALL BE PAINTED IN ACCORDANCE WITH TABLE 6.6 OF 6.2.1.D.2.
7. THE CONCRETE CURB OR ASPHALT DIKE SHALL BE PAINTED RED 15-FEET EITHER SIDE OF THE FIRE HYDRANT.
8. HYDRANT SHALL BE CLOW F2060, OR APPROVED EQUAL.
9. EACH HYDRANT SHALL HAVE TWO 2-1/2" OUTLETS AND ONE 4" OUTLET WITH EXTERNAL NSF THREAD.
10. ALL FITTINGS SHALL BE CEMENT MORTAR LINED IN ACCORDANCE WITH AWWA STANDARD C-104.
11. HYDRANT LATERAL SHALL BE OF THE SAME MATERIAL AS THE MAIN.
12. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE, BROUGHT ABOVE GRADE AND SECURED TO THE HYDRANT BOLT FLANGE.
13. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.

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FIRE HYDRANT INSTALLATION

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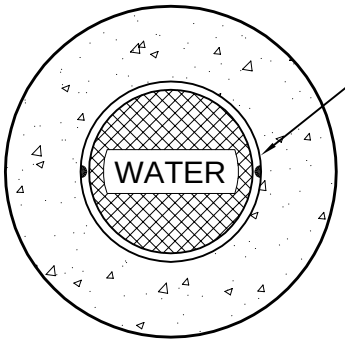
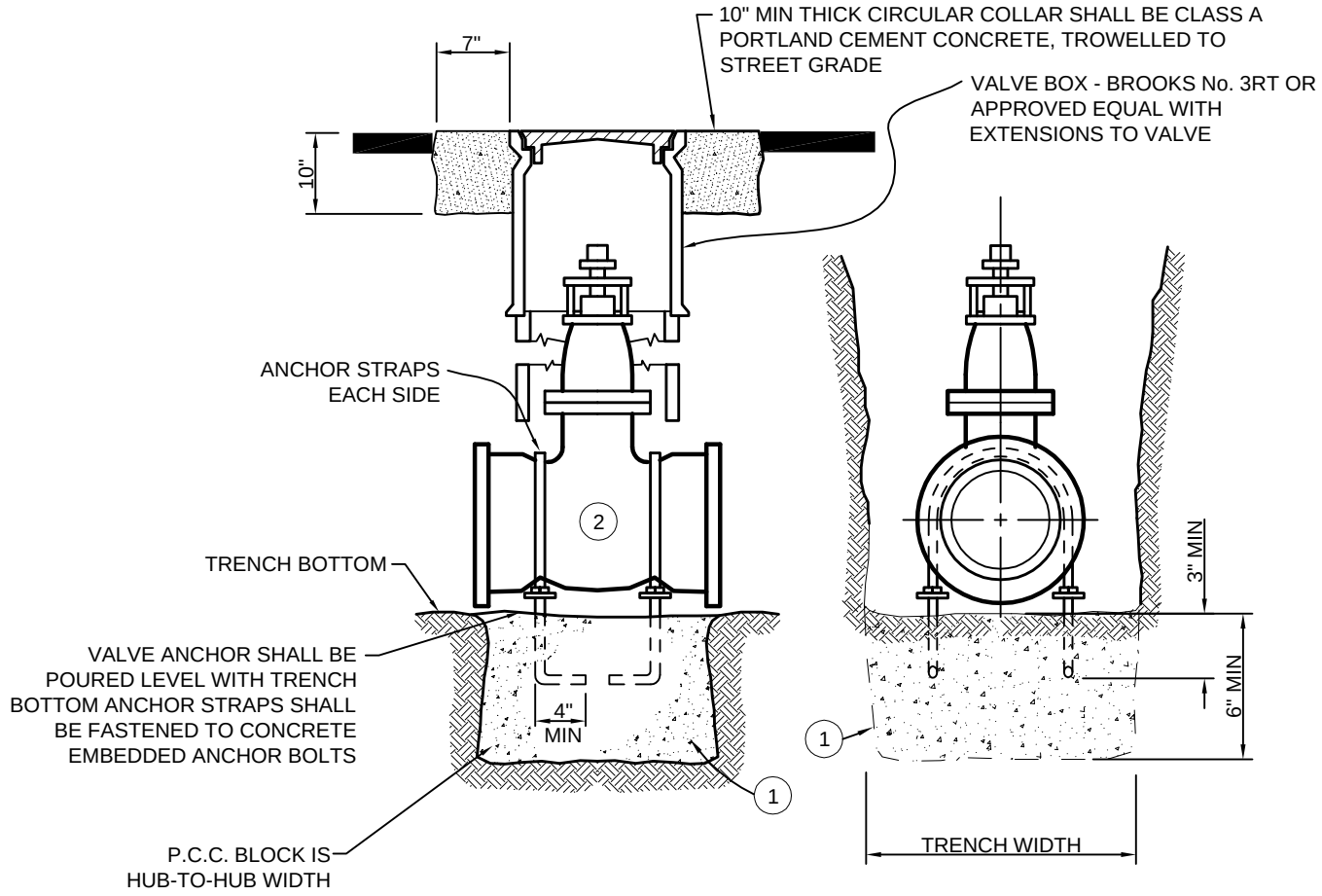


VALVE BOX LID MARKED "WATER"

LID



NOTES:

1. THRUST BLOCKS SHALL BE NOT LESS THAN 5-SACK PORTLAND CEMENT CONCRETE AND POURED AGAINST UNDISTURBED NATIVE SOIL.
2. VALVES SHALL HAVE NON-RISING STEM, RESILIENT WEDGE, RESILIENT SEAT, AND BE EPOXY COATED.
3. ALL MATERIALS AND INSTALLATION SHALL CONFORM WITH THE APPLICABLE SECTIONS OF THE DESIGN STANDARDS.
4. ALL FITTINGS SHALL BE WRAPPED IN POLYETHYLENE SHEET AND ALL FLANGES AND BOLTS SHALL BE SHIELDED FROM CONCRETE PER THE DESIGN STANDARDS.
5. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

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VALVE ANCHOR & BOX

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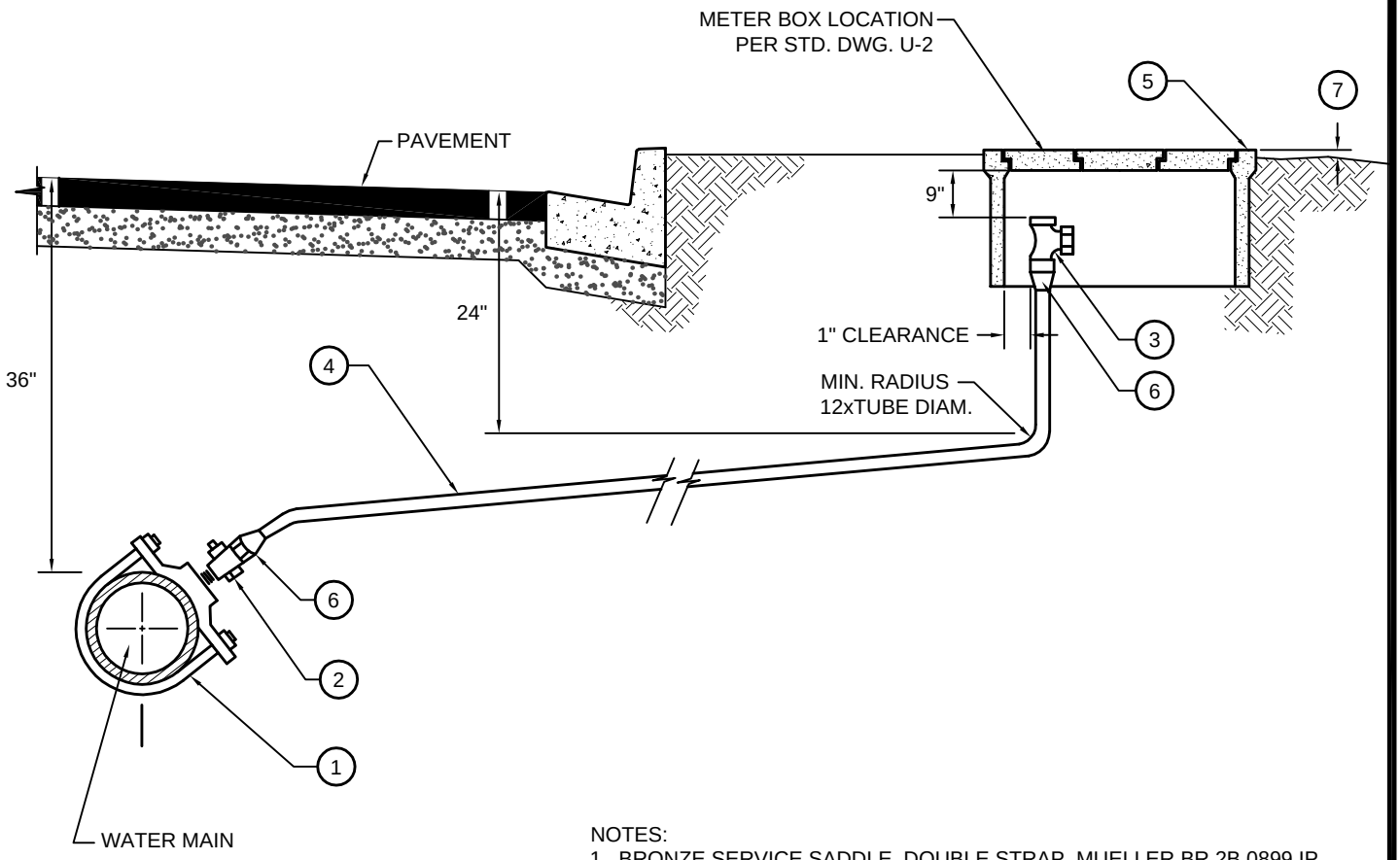

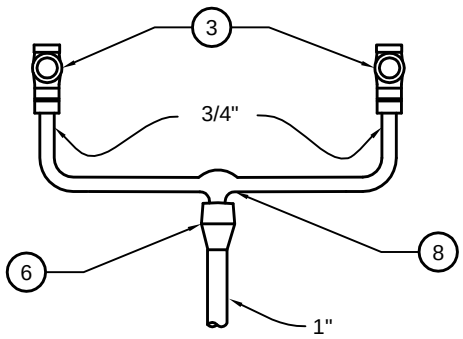

DOUBLE SERVICE CONNECTION

NOTES:

1. BRONZE SERVICE SADDLE, DOUBLE STRAP, MUELLER BR 2B 0899 IP, 075 or 100, O.A.E.
2. CORPORATION STOP w/ IP THREADS, MUELLER H-10012, O.A.E.
3. ANGLE METER STOP, JONES J-1966W, 3/4" or 1", O.A.E.
4. POLYETHYLENE PIPE, 3/4" MIN. I.D. FOR SINGLE SERVICE 1" MIN. I.D. FOR DOUBLE SERVICE.
5. METER BOX, BROOKS PRODUCT 37-S, O.A.E.
6. MUELLER INSTA-TITE CONNECTION H-15426(male) O.A.E. H-15456 (female).
7. IN UNPAVED AREA SET METER BOX 1" to 1-1/2" ABOVE FINISHED GRADE.
8. U-BRANCH CONNECTION, MUELLER H-15365, O.A.E.
9. O.A.E. = "OR APPROVED EQUAL".
10. WATER METER AND CUSTOMER SIDE SHUT OFF VALVE TO BE INSTALLED BY THE WATER PURVEYOR.
11. CORPORATION STOPS SHALL NOT BE SPACED CLOSER THAN 12" MEASURED ALONG THE CENTERLINE OF THE PIPE.
12. 3/4" SINGLE SERVICE LINE, 1" DOUBLE SERVICE LINES, USE 16" X 21" DUAL METER BOX (BROOKS PRODUCT OR APPROVED EQUAL) FOR DOUBLE SERVICE.
13. SERVICES LARGER THAN 1" MAY BE PVC SCHEDULE 80 PIPE.
14. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
15. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.

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WATER SERVICE CONNECTION

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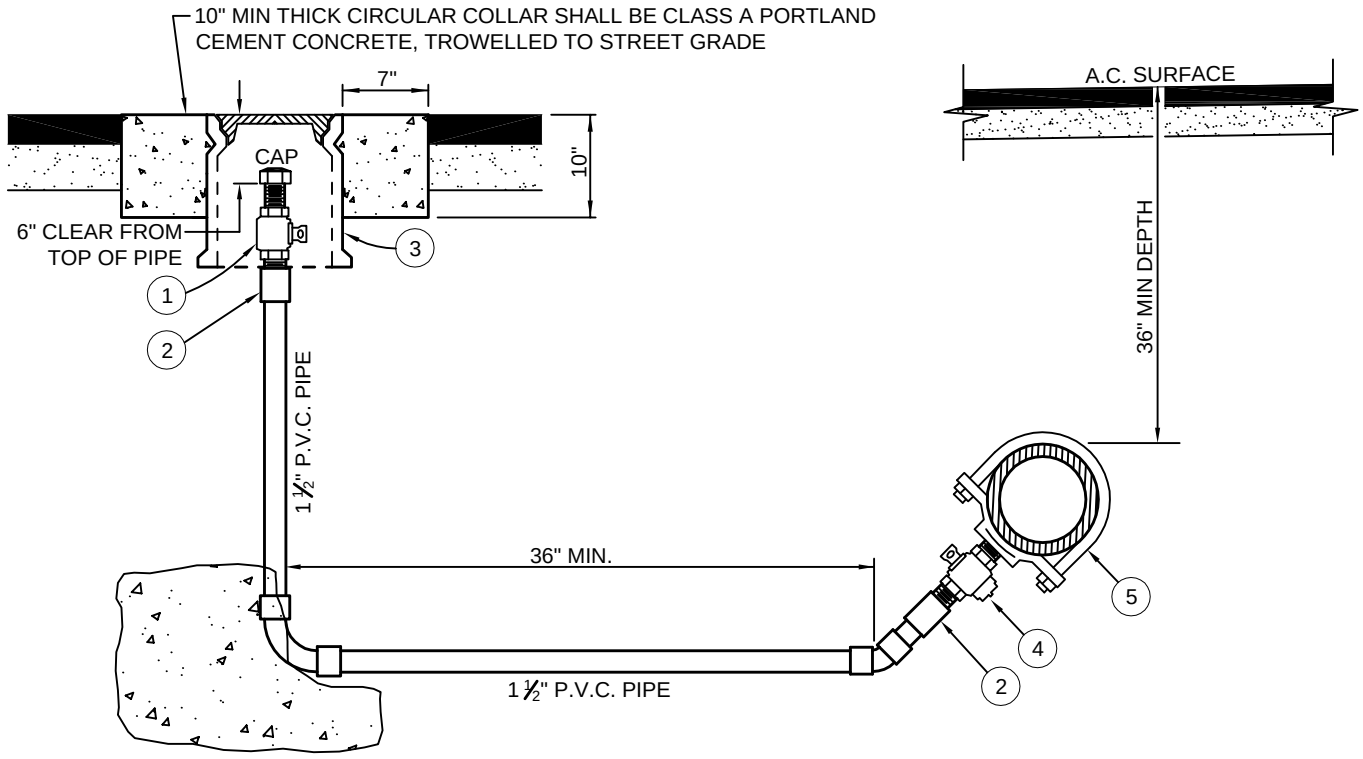

ON-RUN CONNECTION OR DEAD END

NOTES:
1. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
2. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.
3. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

ITEM NO.	NO. REQ'D.	SIZE AND DESCRIPTION	MATERIAL SPECIFICATION
1	1	1-1/2" CURB STOP	JAMES JONES J-182 WITH LOCKWING, MUELLER, OR APPROVED EQUAL
2	2	1-1/2" ADAPTER	I.P. THREAD-P.V.C. SLIP
3	1	VALVE BOX WITH CAST IRON LID	CHRISTY G-8, BROOKS 3-RT, OR APPROVED EQUAL
4	1	1-1/2" CORPORATION STOP	JAMES JONES J-40, MUELLER H-10012, OR APPROVED EQUAL
5	1	SERVICE SADDLE	MUELLER BRONZE DOUBLE STRAP BR 2B 0899 IP 200, O.A.E.

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BLOW-OFF ASSEMBLY

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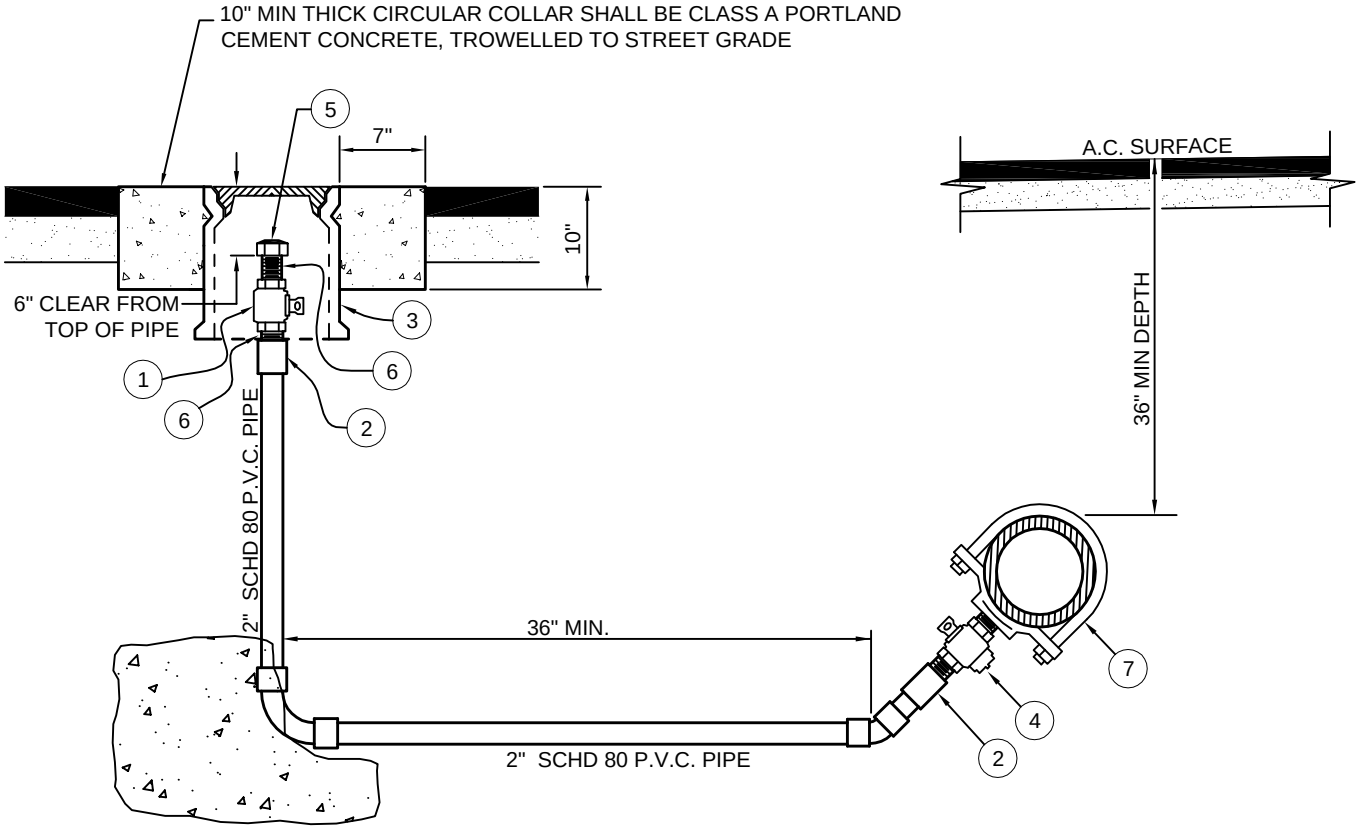

ON-RUN CONNECTION OR DEAD END

NOTES:
1. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
2. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.
3. UNDER NO CIRCUMSTANCES SHALL UTILITY LIDS AND CONCRETE COLLARS BE LOCATED WITHIN CURBS, GUTTERS, SIDEWALKS, DRIVEWAY APRONS, CURB RAMPS, OR CROSS GUTTERS.

ITEM NO.	QTY. REQ'D.	SIZE AND DESCRIPTION	MATERIAL SPECIFICATION
1	1	2" CURB STOP	JAMES JONES J-182 WITH LOCKWING, MUELLER, O.A.E.
2	2	2" ADAPTER	I.P. THREAD x P.V.C. SLIP
3	1	VALVE BOX WITH CAST IRON LID	CHRISTY G-8, BROOKS 3-RT, O.A.E.
4	1	2" CORPORATION STOP	JAMES JONES J-40, MUELLER H-10012, O.A.E.
5	1	2" IP GALV. CAP	
6	2	2" IP GALV. NIPPLE	
7	1	SERVICE SADDLE	MUELLER BRONZE DOUBLE STRAP BR 2B 0899 IP 200, O.A.E.

O.A.E. = "OR APPROVED EQUAL"

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2" BLOW-OFF ASSEMBLY

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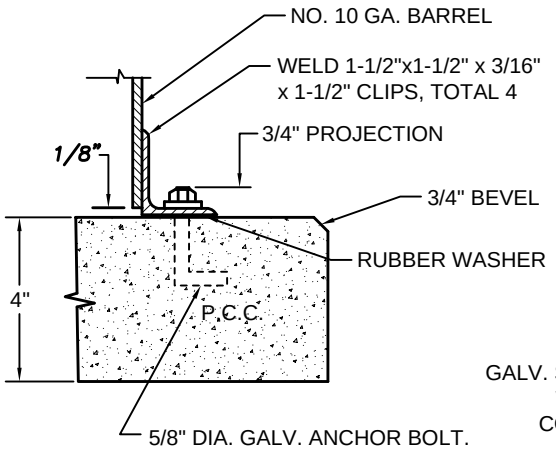


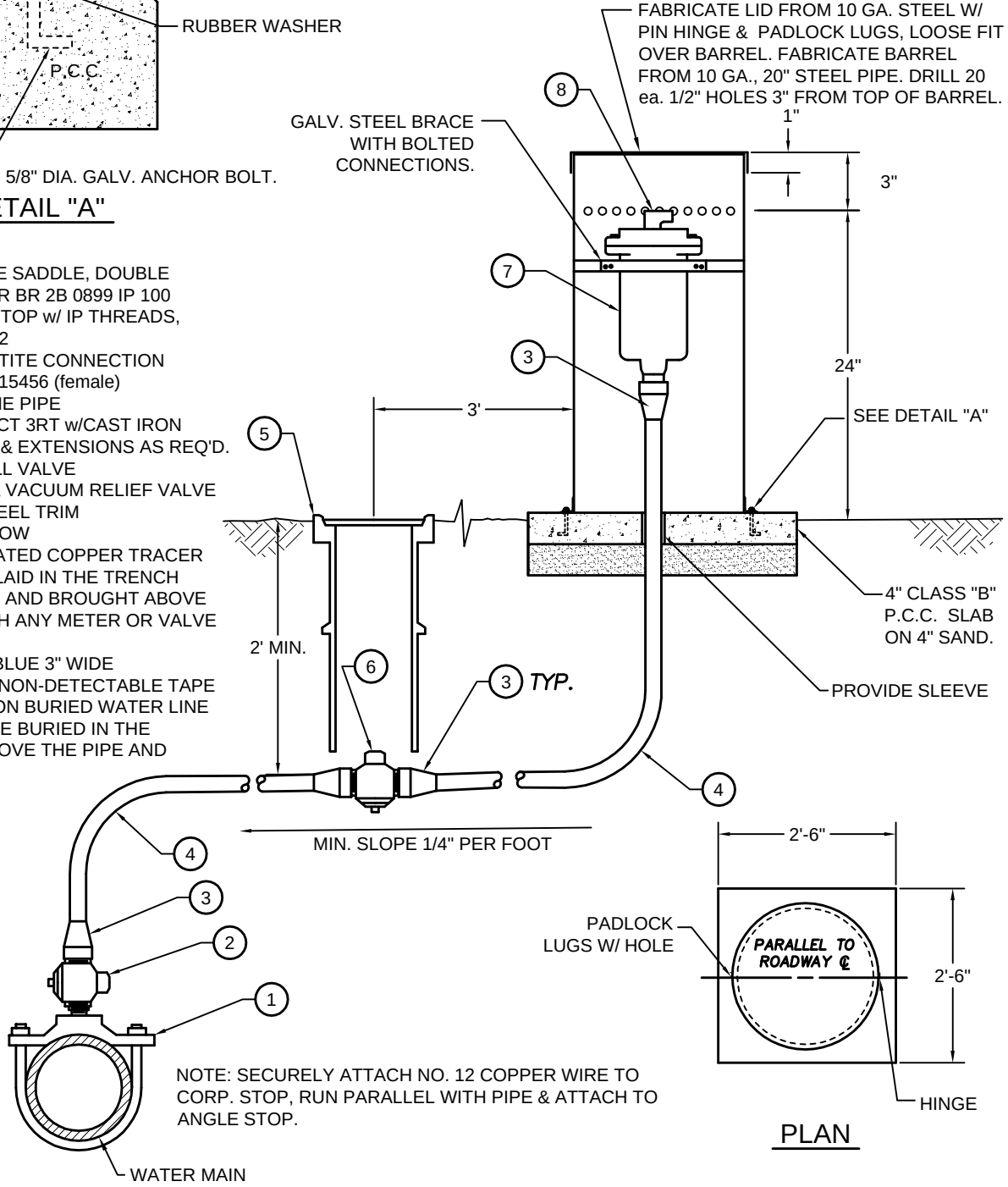
DETAIL "A"

SURFACE PREPARATION AND PAINT:

a. PREPARE BOTH INSIDE AND OUTSIDE PIPE SURFACES BY WIRE BRUSH CLEANING.
b. INSIDE AND OUTSIDE SURFACES SHALL BE PRIMER COATED WITH TWO COATS. PRIMER SHALL BE "RUST-OLEUM CLEAN METAL PRIMER", OR APPROVED EQUAL.
c. PAINT SHALL BE RUST-OLEUM INDUSTRIAL ENAMEL COLOR "SAFETY BLUE", OR APPROVED EQUAL, TWO COATS OF PAINT ARE REQUIRED.

NOTES:

1. BRONZE SERVICE SADDLE, DOUBLE STRAP, MUELLER BR 2B 0899 IP 100
2. CORPORATION STOP w/ IP THREADS, MUELLER H-10012
3. MUELLER INSTA-TITE CONNECTION H-15426 (male) H-15456 (female)
4. 1" POLYETHYLENE PIPE
5. BROOKS PRODUCT 3RT w/CAST IRON TRAFFIC COVER & EXTENSIONS AS REQ'D.
6. JONES J1931 BALL VALVE
7. APCO 143C AIR & VACUUM RELIEF VALVE w/STAINLESS STEEL TRIM
8. SCH. 80 PVC ELBOW
9. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
10. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.



PLAN

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1" AIR and VACUUM RELIEF ASSEMBLY

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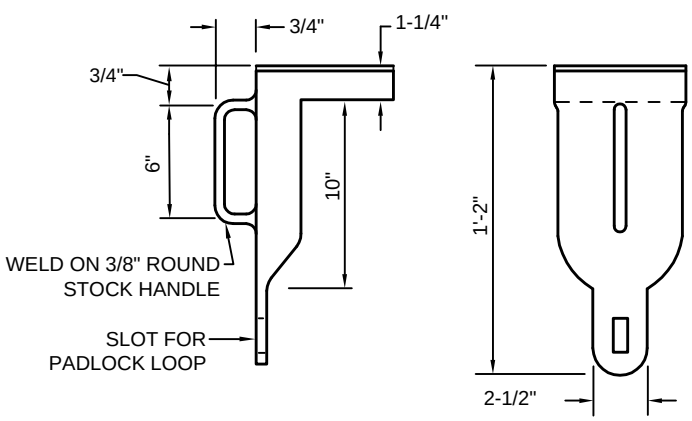
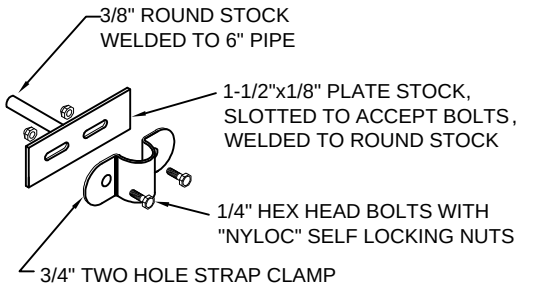
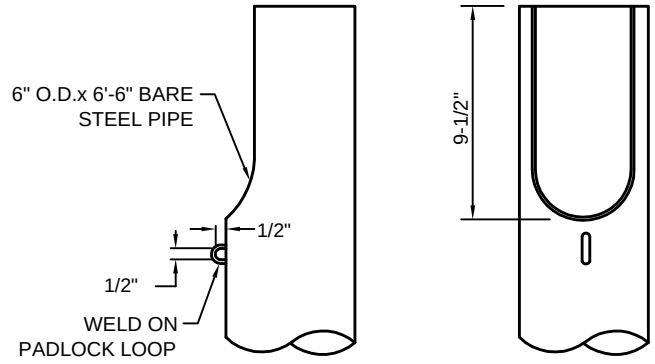
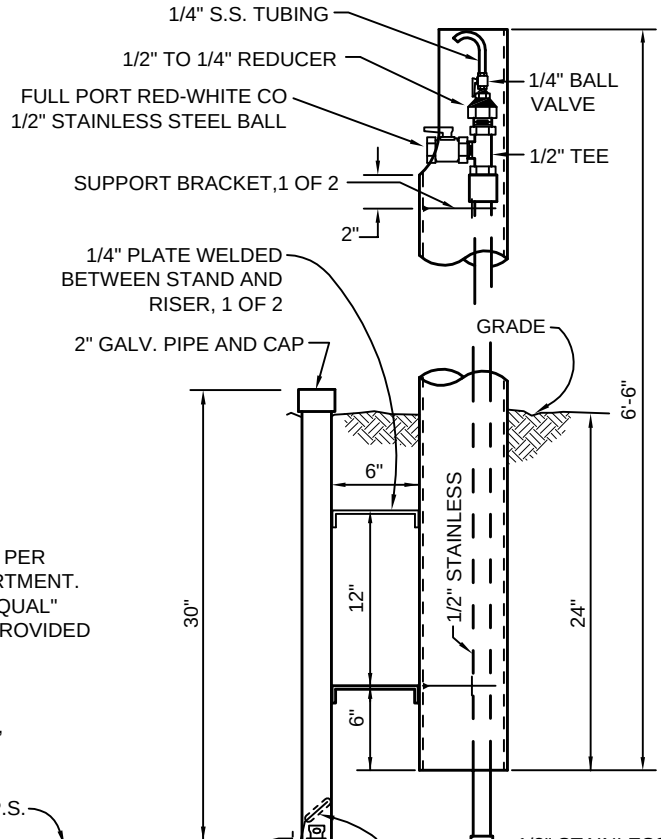




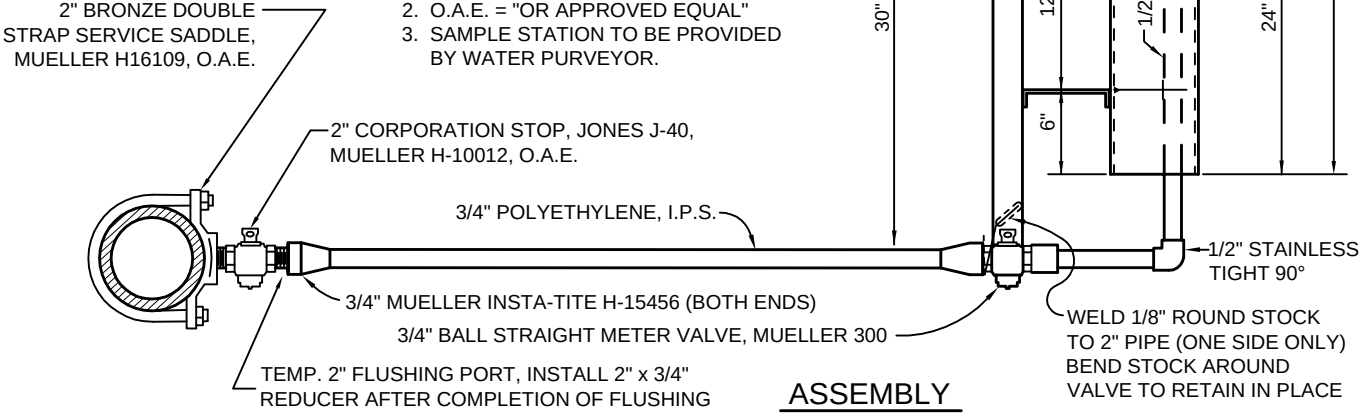
SUPPORT BRACKET



STAND AND COVER



NOTES:
1. LOCATE SAMPLE STATION PER DIRECTION OF THE DEPARTMENT.
2. O.A.E. = "OR APPROVED EQUAL"
3. SAMPLE STATION TO BE PROVIDED BY WATER PURVEYOR.



ASSEMBLY

NOTES:
1. SURFACE PREPARATION AND PAINT:
   a. WELD ALL SUPPORT BRACKETS TO PIPE PRIOR TO PAINTING.
   b. PREPARE BOTH INSIDE AND OUTSIDE PIPE SURFACES BY WIRE BRUSH CLEANING.
   c. INSIDE AND OUTSIDE SURFACES SHALL BE PRIMER COATED WITH TWO COATS. PRIMER SHALL BE "RUST-OLEUM CLEAN METAL PRIMER", OR APPROVED EQUAL.
   d. PAINT SHALL BE RUST-OLEUM INDUSTRIAL ENAMEL COLOR "SAFETY BLUE", OR APPROVED EQUAL, TWO COATS OF PAINT ARE REQUIRED.
2. 14-GAUGE INSULATED COPPER TRACER WIRE SHALL BE LAID IN THE TRENCH ABOVE THE PIPE AND BROUGHT ABOVE GRADE THROUGH ANY METER OR VALVE BOXES.
3. COLOR CODED BLUE 3" WIDE POLYETHYLENE NON-DETECTABLE TAPE MARKED "CAUTION BURIED WATER LINE BELOW" SHALL BE BURIED IN THE TRENCH AND ABOVE THE PIPE AND TRACER WIRE.

SAN LUIS OBISPO COUNTY DEPARTMENT OF PUBLIC WORKS

WATER SAMPLING STATION

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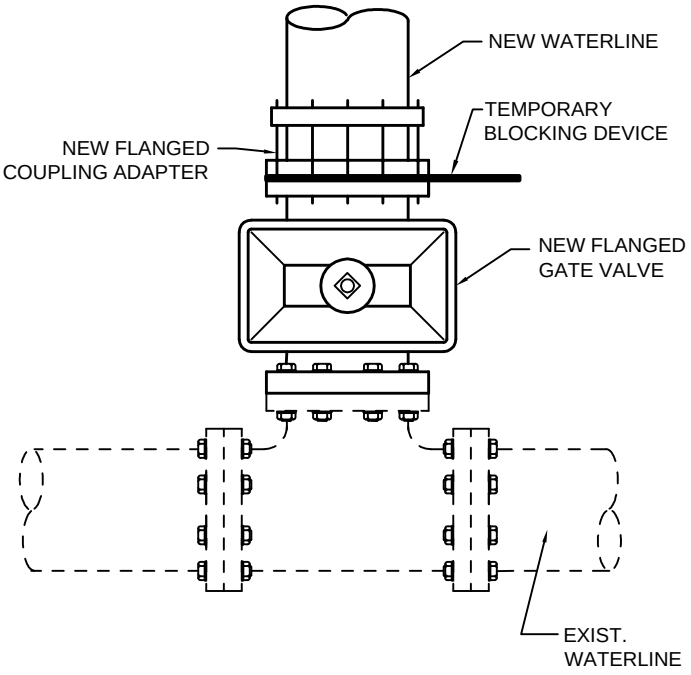
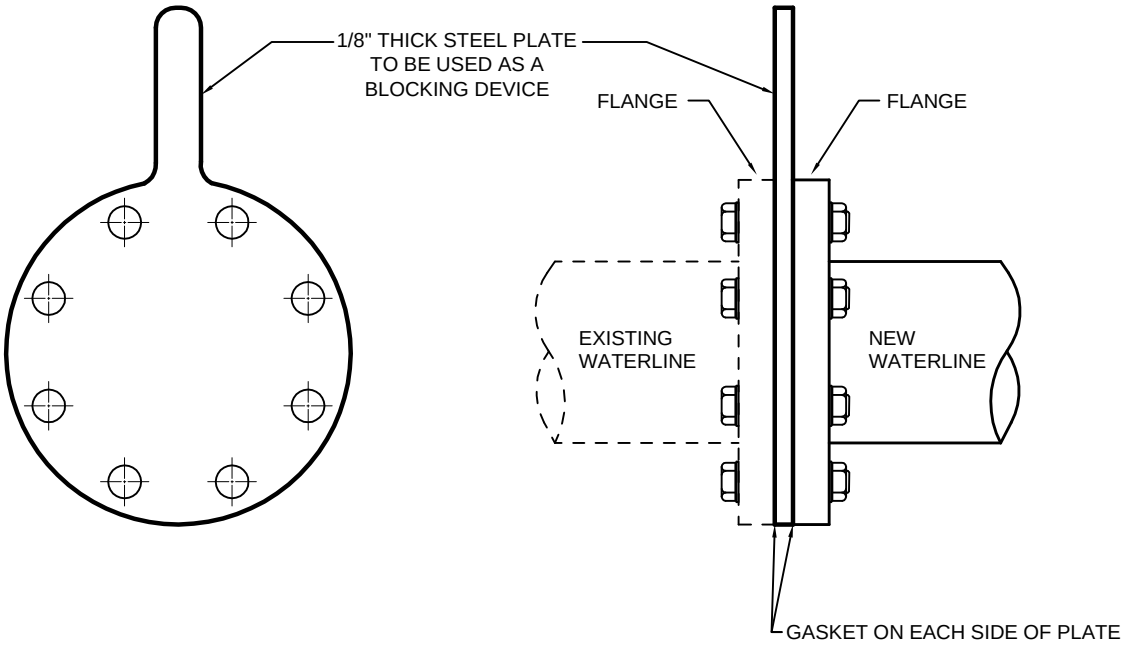
NOTES:
1. DIRECT CONNECTION TO THE EXISTING WATER SYSTEM SHALL NOT BE PERMITTED UNTIL THE NEW INSTALLATION HAS PASSED BACTERIA TESTING AND A PHYSICAL CHECK BY THE WATER QUALITY MANAGER. SEPARATION SHALL BE ACHIEVED BY THE INSTALLATION OF THE TEMPORARY BLOCKING DEVICE AS SHOWN HEREON
2. PRESSURE TESTING AGAINST VALVES SHALL NOT BE ALLOWED. NEW VALVES SHALL BE SWABBED WITH CHLORINE PRIOR TO INSTALLATION.
3. WHEN TEMPORARY BLOCKING DEVICE IS REMOVED, THE CONTRACTOR SHALL ADJUST FITTING TO ELIMINATE 1/8" GAP WITHOUT FORCING THE JOINT TOGETHER.
4. TEST PRESSURE SHALL BE 50 PSI GREATER THAN THE WORKING PRESSURE OF THE PIPE MEASURED AT THE LOWEST ELEVATION OF THE SYSTEM OR 150 PSI, WHICHEVER IS GREATER.





PROCEDURE FOR CONNECTING NEW WATERLINES TO EXISTING SYSTEM (ALTERNATIVE TO THE OLD INDUSTRIAL STANDARD METHOD): AT THE POINT OF CONNECTION TO THE EXISTING SYSTEM, ALL JOINTS BETWEEN FITTINGS AND VALVES SHALL BE FLANGED. ANY CHANGE REQUIRES WRITTEN APPROVAL FROM THE DEPARTMENT. AT THE JOINT THAT CONNECTS THE EXISTING SYSTEM TO THE NEW LINE, A BLOCKING DEVICE SHALL BE INSTALLED. THIS DEVICE SHALL BE CONSTRUCTED OF 1/8" THICK STEEL PLATE. IT SHALL BE INSTALLED BETWEEN THE TWO FLANGES WITH A GASKET ON EACH SIDE. THIS WILL ALLOW ALL FITTINGS, VALVES, AND THE PIPELINE TO BE DISINFECTED AND PRESSURE TESTED AS ONE UNIT. AFTER THE NEW SYSTEM HAS MET ALL REQUIREMENTS, THE DEPARTMENT WILL ALLOW THE CONTRACTOR TO REMOVE THE BLOCKING DEVICE. THE DEVICE AND BOTH GASKETS ARE TO BE REMOVED AND A NEW GASKET SHALL BE INSTALLED BETWEEN THE FLANGES. THE NEW SYSTEM IS THEN IN SERVICE.

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NEW WATERLINE CONNECTION DETAILS

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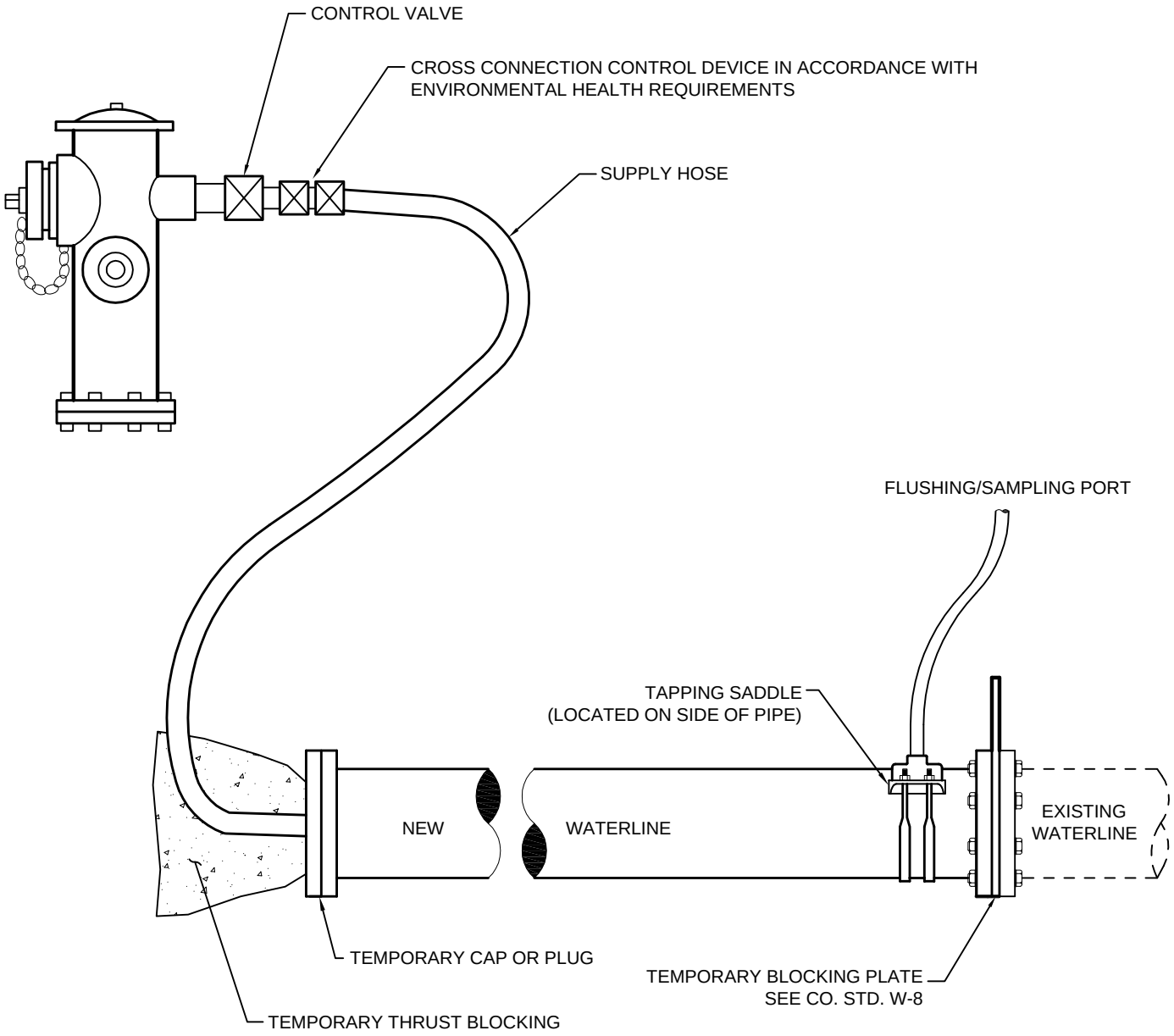

NOTES:

1. DIRECT CONNECTION TO THE EXISTING WATER SYSTEM SHALL NOT BE PERMITTED UNTIL THE NEW INSTALLATION HAS PASSED BACTERIA TESTING. MAINTAIN AIR GAP PER AWWA STD. C651

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NEW WATERLINE FLUSHING DETAIL

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